A THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D)
IN GEOGRAPHY AND RESOURCE MANAGEMENT,
SCHOOL OF EARTH SCIENCES AND NATURAL RESOURCE MANAGEMENT.

IDENTIFICATION OF SERVICE CENTRE AND SPATIAL PLANNING FOR BALANCED DEVELOPMENT: A CASE STUDY OF AIZAWL DISTRICT, MIZORAM.

Submitted by Saithangpuia

Under the Supervision of
Dr. Girindra Kumar
Professor
Department of Geography and Resource Management
Mizoram University
Aizawl: Mizoram
2012.

8th May 2012

DECLARATION

I, Mr. Saithangpuia, hereby declare that the subject of the thesis entitled *"**Identification of Service Center and Spatial Planning for Balanced Development: A case Study of Aizawl District, Mizoram***" is the record of the work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/ Institution.

This is being submitted to Mizoram University for the Degree of Philosophy in Geography and Resource Management.

(SAITHANGPUIA)
Candidate

Acknowledgment

First of all I thanks to Almighty God for his guidance.

I must deem myself lucky to have been places under the supervision of Dr. Girindra Kumar, Professor, Department of Geography and Resource Management, who has taken great pains in going through the manuscript and supervising the entire work. It would not have been possible for me to complete without his guidance.

Academic inspiration, valuable suggestion and cooperation from my colleague- Mr R.Lalruatkima, Mr. C.Lalhumbika, Mr.Benjamin L. Saitluanga, Dr. B.Vanlalthlana and Mr.Andrew Lalsangzela Sailo during the entire work have been worthwhile.

I gratefully acknowledge the kindness and cooperation from Dr. Rintluanga Pachuau, Dr.P. Rinawma, Dr. Ch. Udaya Bhaskara Rao and Mr. Zonunsanga of Department of Geography and Resource Management, Mizoram University.

I express my sincere thanks to Dr.James L.T Thanga, Senior Statistician, Department of Economics for his untiring help and suggestion.

I am extremely thankful to Prof. Surendra Singh, Dept. of Geography, NEHU and Mr. Lalrinmawia, Research Scholar Dept. of Geography and Resource Management for their suggestions and cooperation.

I deeply express my heartfelt gratitude to my father S.Lianchhuma, my mother Hmingkhumi, my sister Vanlaldingliani Sailo and Melody Ngurthantluangi for their constant motivation, support and valuable help.

I am extremely thankful to the villagers of Aizawl district for their help during the collection of data.

Saithangpuia

CONTENTS

List of Tables

List of Figures

CHAPTER – I

INTRODUCTION

- Theoretical and conceptual framework
- Statement of the problem
- Study area
- Objective of the study
- Review of Literature
- Data base and Methodology
- Organization of the chapter

1.1 Theoretical and conceptual framework

The definition, content and dimension of development has been contested and changed over the past decades with economic, political and social trends. In fact, development theories did not appear in an intellectual vacuum. It is rather rooted in the tradition of economic, political and sociological theorizing which developed in Europe from eighteen century onwards (Martinussen, 1997). In fact, development theories appeared in the capitalist traditions is found along this antithesis: market versus the state. While, the former carried a pragmatist-conservative view, highlighting free enterprises, free trade and the least possible state intervention; the later carried liberal/interventionist view, which stresses the necessary intervention by the welfare state (Hadjimichalis, 1987).

The proponent of the free play of the market for economic growth (Smith, 1950) argues market as a mechanism for maximizing efficient resource use and human well-being was challenged in the early twentieth century by significant economic events (1929 Wall Street Crash and the Great Depression of the 1930s).In the light of events Keynes (1936), suggested the government's role in promoting the economic growth rather than allowing the market to operate alone. Since then Keynesian approach to development through international organization (World Bank, GATT and IMF) is believed to bring about development it being transmitted from the largest urban core through to the successive lower levels of the national urban system (Berry, 1971). Salvation of the periphery according to the view lied in closer investment and trade ties with the core nations (Gereffy and Fonda, 1992). Such a view is found to have reinforced the Modernization theory and its outgrowth the different sheds of Dependency theory. In opposition to most of the claims of modernization theory emphasizing on the exploitative potential under the concept of core-periphery relation

in which the links were brought to the center and which was considered to be the source of many third world's problems, rather than a solution (Valenzuela and Valenzula, 1978). Due, however, to the inefficiency and slower rate of economic growth, the involvement of the state was questioned and neo-classical or neo-liberal theorists have been arguing for reducing state intervention and letting the market set prices and wages (Balassa, 1971 & 1981: Lal, 1983).

Throughout the classical to neo-classical/neo-liberal theories of development it is observed that there is dualism in economic development (regional dualism or inequality) and neo-classical theorists subscribe that this dualism is on account of malfunctioning of equilibrium mechanism and it would disappear in course of economic growth processes when there will be greater unification of factor markets and economic integration among regions. It is in the same light that Rostow (1960) also argues that it is possible when an underdeveloped economy **takes off** to self-sustaining growth and economic maturity. However, this neo-classical belief in regional economic disparity has been found to be persisting. Thus, Myrdal (1957) and Hirschman (1958) questioned the effectiveness of its equilibrating mechanism in reducing regional disparity (Patnaik, 1981). Myrdal and Hirschman analyzed core-periphery relationship based on similar ideas of 'backwash' or 'polarization' (concentration of growth or resources in leading regions) and 'spread effect' or 'trickle down' (diffusion of growth and resources to lagging regions) respectively (Chakravorty, 2005). Myrdal and Hirschman advocated that because of interrelated factors, regional imbalances according to them are likely to widen in the absence of state intervention. Therefore, they consider state intervention to be politically necessary and inevitable to improve the distribution of welfare.

There is another group of scholar who advocate that the policies or programmes are made in favour of urban core (Lipton, 1977) and the growing economic inequality between developed and less developed nations exist due to the unequal exchange rate (Griffin, 1969; Gonzalez, 1969; Young, 1971 and Emmanuel, 1972). On the other hand, the relationship between economic growth and regional income disparity as well as economic convergence versus divergence as a possible outcome of economic growth resulting in regional inequality increases during the early stages of development and declines during the later stages.

On the other hand, the arrangement and association of various things and elements their linkages reflecting interaction among them within the framework of spatial organization have been an important instrument for balanced regional development. The intensity of functional interrelationships between two places and points and the movement of men and material (Reily, 1929 &1931; Converse, 1949; Carrothers, 1956; Ullman, 1956; Carey, 1958; Lukerman & Porter, 1960; Olsson, 1965) have been manifested in the spatial organization of region or an area. The classical spatial organization theories explaining the location of economic activities, settlement and their spatial arrangement (Vonthunen theory of Agricultural Location, Theory of Industrial Location of Alfred Weber and the Central place Concept of Walter Christaller and August Losch) also implied that growth and development tend to concentrate at certain area/point at the cost of other.

The significance of the desired spatial organization or optimum/appropriate location of socio-economic facility lies in the fact that, a region having such facilities would be more amenable to economic development than the region lacking in it. However, in actual practice such socio-economic facility may not be available in a uniform pattern in a region. Therefore, regional disparities do occur in a given time and

space. In the context of developmental inputs, when new activities or functions are proposed, the consideration for the location of such function and facilities become extremely important. It may be noted that economic growth and development is not accomplished merely by providing functions/services. It is also necessary to ensure that services/functions should be made at right places in right manner according to their needs and capabilities to sustain and serve concerned areas. The idea of selective and appropriate location of service/function is most relevant because resources at the disposal of the developing economies are not enough to provide all services and all developmental programmes to all settlements (Rao, 1990).

Since resources in the form of government provision are scarce and inadequate, it is believed that they should be properly and efficiently located and utilized for development. As all settlement may not be efficiently provided service/function, selection of settlements becomes essential for the provision and optimum location of socio-economic facilities. Thus, study of the settlement framework is necessary for optimum location of function and it is through a network of hierarchical framework of settlements that a process of development spreads in a region and economic growth filters down from higher order centers to lower order and diffuse over the entire area in course of time.

Selection of hierarchical orders of service centers and demarcation of their areas of interaction for services and functions proposed to be developed in a region is the basic concept under spatial planning. In this context it is noteworthy that spatial planning is defined as locational planning or the systematic planning of locations in a geographical space (Singh and Pandey, 1986). Spatial planning also tries to organize space in a suitable manner where developmental inputs could be located at the optimum and appropriate places to maximize access of services/functions to the people and at the

same time minimizes distance for availing particular facility/group of facilities. Therefore, rationalization of central places/service centers and their spatial organization is believed to be the only way for ensuring a balanced development of a region. This, it is believed, may only be attained through evolving a systematic spatial development framework based on scientific spatial organization of service centers under different hierarchy.

The central place theory (the term central place may be considered synonymous with the term service center) is concerned with the evolution and functioning of spatial patterns of points providing services to their surrounding regions. The term 'central place' was first used by Jefferson (1931) for a settlement which is necessarily a focus of various activities such as economic and social for the surrounding hinterland (Mandal, 2001). Later, Christaller (1933) advanced 'central place' (Zentralort) on a scientific lines in his search for laws governing the distribution and size of towns, the function they perform and their spatial arrangement (Tiwari, 1988). Losch (1939) following Christaller's work presented central place model in a more dynamic and diversified form. These two works of Christaller and Losch are considered to represent classical central place theory. Central place theory has further been elaborated, enriched and advanced by Dickinson (1929 and 1934), Smailes (1944), Berry and Garrison (1958) where in they considered all urban centers to be central places.

Central place theory is generally based on the following principles that believe in:

a) Centralization as an ordering principle
b) Concept of centrality
c) Concept of central place (s)
d) Concept of central function
e) Concept of complementary region

f) Concept of threshold

g) Concept of range of goods

a) **Centralization as an ordering principle**

The centralization of mass around the core is an elementary process. This is a centralistic order that exists in all matter in nature, whether inorganic or organic. Christaller taking the analogy from the nature thus, believes that functions/services are concentrated around certain points based on their hierarchy in the spatial organization of settlement in an area. Thus, higher orders of settlements are generally found to have greater range of services as compared to the lower orders. This may follow the general principles under locational theories of basic activities or it may be caused by agglomeration economies.

b) **Concept of centrality**

A centrality is referred to as the attractive power or importance of a settlement. A simple measure of centrality may be obtained by counting the number of functions, which a settlement provides. Higher the order of settlement, greater will be its specialization of its functions. Therefore, greater would be its centrality. In the classical central place theory, centrality or importance is manifested by quantity and quality of different services or functions provided by the settlement. It defines the functional importance of a settlement over other settlement surrounding it.

c) Concept of central place (s)

The basic proposition of Christaller's central place theory dwells upon the concept of central place itself. All the settlement, however, cannot be considered central place. In fact, a central place is a settlement providing function/service not only to its own population but also to other settlements. It is normally located at minimum aggregate

travel distance that involves minimum cost to the customers and maximum profit to sellers. The basic function of central places is to offer goods and services for the surrounding settlements.

Central places are categorized into different hierarchical order on the basis of number and types of functions provided and size of population served by them. Thus, central place vary in their significance. The higher order central places contain a considerable number of higher order functions and serve a larger area and population. On the other hand, central places of lower order possess few functions of lesser importance and serve a smaller tributary/complementary region. There is a hierarchy of central places where the higher order central place provides more number of and specialized services which the lower order central places do not provide. Conversely, however, higher order central places also provide functions which are normally performed by the lower order central places.

d) **Concept of central function**

The functions of and services provided by the central place to their surrounding settlements are known as central function. These functions are performed by a central place but are availed of by number of other settlements surrounding them. Central place provides a large number of functions and services having different threshold and range. Hence, the central function are of varying significance and are classified into hierarchical order ranging from lower to higher order functions/services corresponding to their respective order as central place.

e) Concept of complementary region

The surrounding areas around a central place which are functionally interrelated with that place are collectively known as the area of interaction or the complementary region of that central place. It is the area enclosing a central place by the range of its

goods/services. The areas of interaction of central places may be delineated through the critical study of spatial interaction between the settlements. Christaller pointed out that the complementary region of a center in a homogeneous landscape should take the form of hexagon. However, it is difficult to find such kind of arrangement in real world as landscapes are rarely homogeneous and functions rarely uniform.

f) **Concept of Threshold**

Threshold concept under central place theory refers to the number of persons needed to support a function. No function can develop unless there is sufficient demand for it. The threshold of a function is always taken in terms of the minimum population size of the settlement needed to support it.

g) **Concept of range of goods**

The range of goods is expressed in terms of the maximum distance over which the demand of given goods is found to be positive. In other words, range of a good refers to the distance the consumer travels to avail services offered by a central place.

Thus, it is imperative to identify the hierarchical order of service centers in developing regions to provide a suitable spatial development framework for optimum location of service/function. The arrangement and hierarchical order of service centre may be utilized in order to facilitate balanced socio-economic development as only settlement are expected to provide spatial framework for the social and economic activities. Therefore, rational evaluation of service centers and their spatial organization through spatial planning is necessary for ensuring a balanced socio-economic development of a region.

In the light of the above mentioned, an attempt has been made in the present study to identify service centers and their impact on spatial planning for balanced development of Aizawl district.

1.2 Statement of the problem

Considerable advances in economic concept and theories for planning and economic development have been made during the recent past. There are many approaches to development being evolved and a number of alternative theories and models have been proposed. On the Indian scene, most of these models have been tried. Although spectacular growth has been achieved in many sectors, the benefits of the development have not percolated down in a desired manner and there are regions where socio-economic development is found to be much below the expected level. It is widely recognized that there exists inter-regional and intra-regional disparities in the level of socio-economic development in every geographical region. However, the magnitude of disparity in socio-economic development is found to be more pronounced where there is absence or lack of efficient spatial developmental framework.

Therefore, in order to tackle the problems of an area, geographers, planners and decision makers commonly have been emphasizing the importance of identification of service centers which cater to the needs of their surrounding region and its populace. Adoption of the model is expected to play a decisive role to arrive at a balanced regional development.

As a matter of fact, Aizawl district is found to have a very uneven distribution of service centers. It is reflected in large scale movement/migration of people from surrounding areas to the state capital Aizawl, located in the district. The distribution pattern of service centers is apparently not conducive for efficient spatial development. As a result glaring intra district disparity in the level of socio-economic development is found in Aizawl district. It is believed that Aizawl town (state capital) as a service centre and as a catalyst for development, if linked properly with several subsidiary

centers, may provide necessary impetus for regional development within the district in particular and the state in general.

The idea of selective location of function/service is most relevant in Aizawl district due to the fact that it is not possible to provide developmental input and programme to each and every settlement. The optimum location of functions/services at the appropriate service centers is believed to be necessary as service centers function as regional/sub-regional centers and points of spatial interaction. It, however, requires analysis of the centers' capacity and capability to hold new and existing functions/services for its complementary region. An objective analysis in this regard may provide suitable efficient spatial development framework to attain desirable spatial organization for balanced development in Aizawl district.

1.3 Study Area

In the light of the Planning commission of India's recommendation that district should be considered as the viable unit for micro level planning as it expected to have a well organized administrative structure, Aizawl district has been selected for the study keeping in view existing district and block boundaries. With the state capital located in the district it is believed that it may act as a service centre of high order and a catalyst to integrate various service centers within the district for desired operation of developmental process.

Aizawl district is situated in the north-central part of Mizoram and lies between 24º 25' 16.04'' and 23º 18' 17.78'' North latitudes and 92º 37' 03.27'' and 93º 11' 45.69'' East longitudes (State Remote Sensing Center, 2006). It is bounded on the north by Cachar district of Assam, on the east by Champhai district and Churachanpur district of Manipur, on the west by Mamit district and Kolasib district, on the south by

Serchhip district. The total geographical area of Aizawl district is 3576.31 sq.km which accounts for about 16.96 p.c of the total geographical area of the state. The total population of the district is 325676 (census of India-2001). The district comprises five rural development blocks having four notified towns. The following table provides area, population and number of notified towns in different rural development blocks with their population.

Table 1.1 Population and Area of Aizawl district (2001)

Sl. no	Block	Population	Area (in sq.km)	Notified Towns	
				Name of N.T	Population
1	Aibawk	15987	616.88		
2	Darlawn	24169	1037.48	Darlawn N.T	3865
3	Tlangnuam	242789	532.67	Aizawl N.T, Sairang N.T	228280 5304
4	Thingsulthliah	30394	874.13	Saitual N.T	10966
5	Phullen	12337	515.15		
	Aizawl District	325676	3576.31		

1.4 Objective of the study

The specific objectives of the study are as follow –

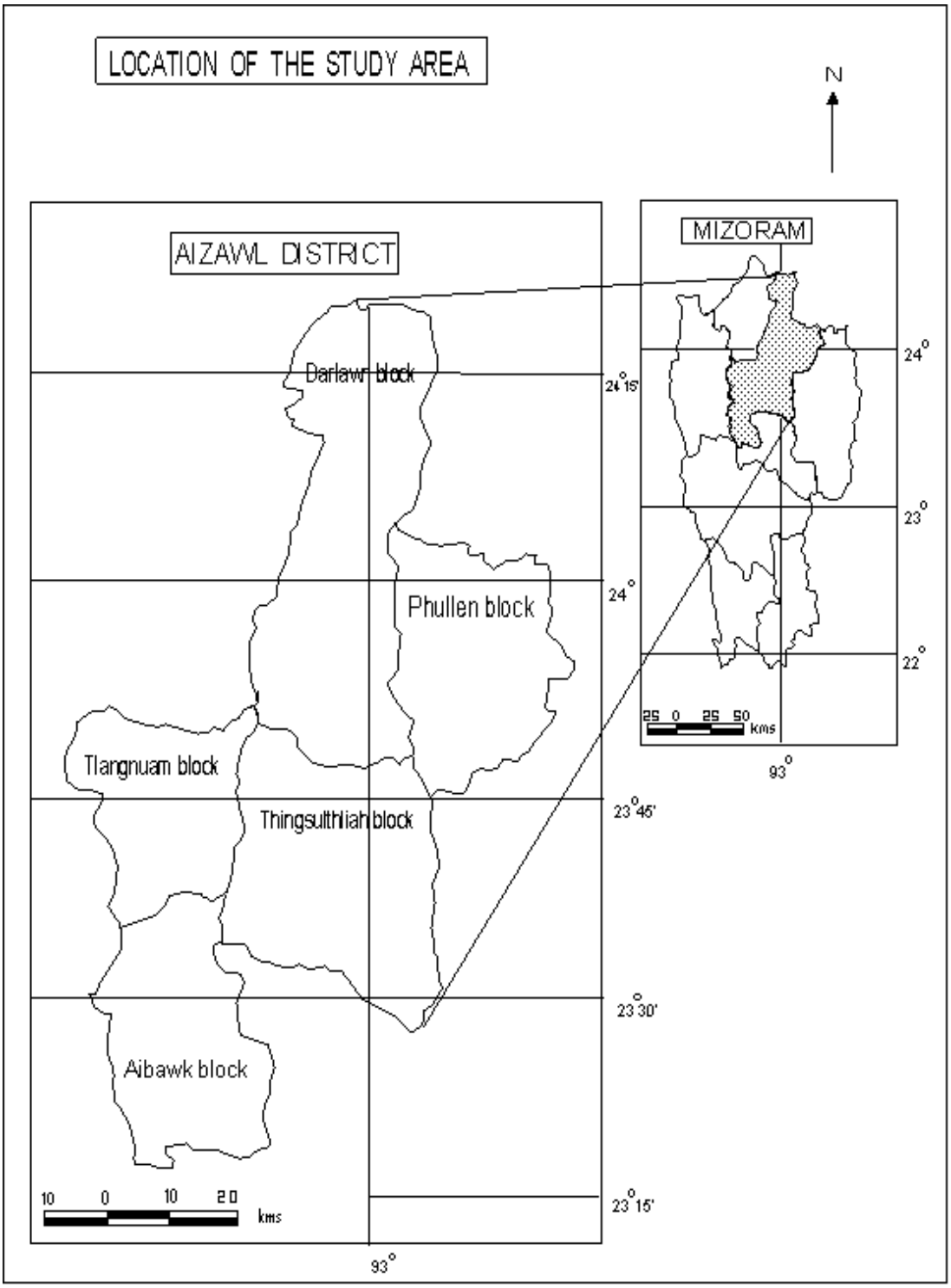
a) to assess the inter-block level of socio-economic development of study area.

b) to identify service centers of different orders and delineate their complementary region through the study of spatial interaction.

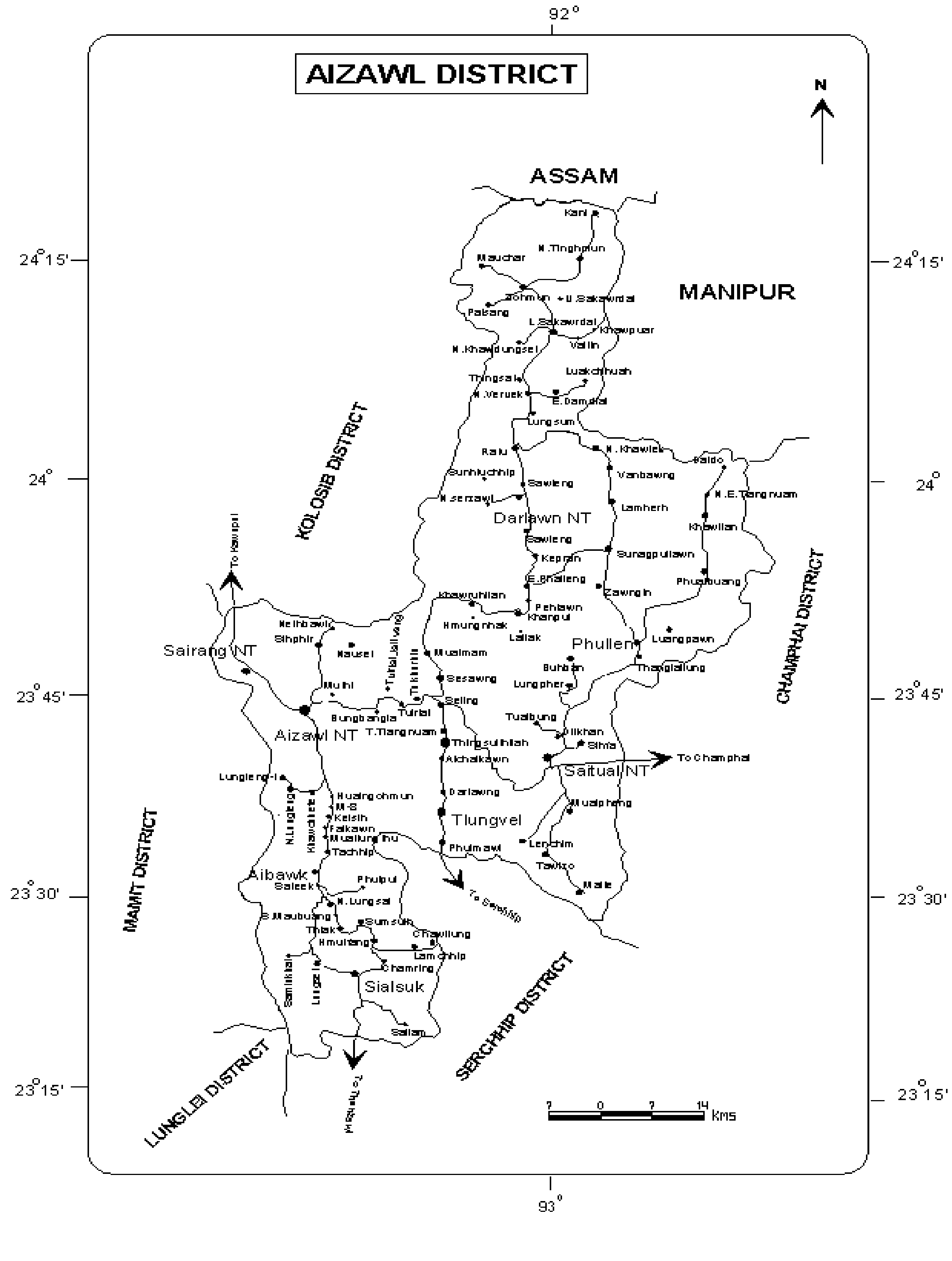
d) to identify the spatio-functional gap and formulate spatial development framework through spatial planning.

Figure 1.1 Location of the study area

(a)



(b)



AIZAWL DISTRICT
92°
93°
24°15'
24°
23°45'
23°30'
23°15'
N
ASSAM
MANIPUR
KOLOSIB DISTRICT
CHAMPHAI DISTRICT
MAMIT DISTRICT
LUNGLEI DISTRICT
SERCHHIP DISTRICT
Darlawn NT
Phullen
Sairang NT
Aizawl NT
Saitual NT
Tlungvel
Aibawk
Sialsuk
To Champhai
Kms

1.5 Review of Literature

The concept of development has been contested and debated over the past decades with economic, political and social trends. Regional development vis-a-vis Area development planning with special emphasis on service center/central place have been done by a number of scholars. However, no research work is known to have been undertaken within the conceptual framework of central place/ service center in Aizawl district as well as in Mizoram at large.

Development theories appeared in the capitalist tradition is found between-market versus the state. Smith (1950) argues free market as a mechanism for maximizing efficient resource use and human well-being. However, the importance and the role of free market for economic development was challenged in the early twentieth century by significant economic events (1929 Wall Street Crash and the Great Depression of the 1930s), and Keynes (1936) suggests the government role in promoting the economic growth rather than the putting the market operate alone.

On the other hand, Lal (1983) and Balassa (1971, 1981) criticized the widespread intervention of the state in economic activities leading to inefficiency and slower rates of economic growth drawing inspiration from the classical economic theories. This neo-classical or neo-liberal idea advocated that greater economic growth may be generated through reducing the intervention of the state.

World Bank (1993) highlights the economic and social development achieved by the East Asian nations following Neo-liberal strategies thereby opening their economy to foreign investment and trade, minimizing state role in national economy and investment in human capital through education. On the other hand, another group of scholars Escobar (1995), Dasgupta (1985), Sach (1992), Rahnema & Bawtree (1997), Seabrook (1994) and Crush (1995) stressed on the importance of discourse of

development (what it has been called as post-development) and the development processes. They also asserted that pattern of development being experienced by the southern countries is based on Eurocentric assumption.

Slater (1993) argues that after the post-war period major conceptualization of development has been influenced by geopolitical imagination. This has reflected in the process of modernization of western countries to developing countries showing a tendency to geopolitical power. He also suggested that geopolitical imagination is a key to rethink/considered global development issues.

Simon (1997) has mentioned a broad and critical perspective on current development thinking and paradigm shift of development during the last two decades. He highlights the reasons for the emergence of fundamental critiques of conventional development and developmentalism from various perspective- post structuralist, post-development and anti-development.

Nabudere (1997) studied the Eurocentric intellectual origins of modernization as being synonymous to development. He further observed that the confrontation and compromise between modernity and post-traditionalism led to environmental degradation and over population, reinforcing rural poverty and cultural disorientation.

Narman (1997) analyzed the courses of development studies. The weak policy implication of development has made a gap between development thinking- theory and practice. However, with a strong empirical field work and interest in theoretical issue development geography may function as a catalyst to bridge the gap between theory and practice.

Sharp and Briggs (2006) argued about the process of development and post colonialism being experienced among the Bedouin in Eastern Desert of Egypt near Sudan border. They asserted that despite decades of development theorization and

development practice, the people are not having better condition. Therefore, there is a need for alternative conceptualization of development from the dialogue between development studies and post colonialism. They further suggest that the local as site of real experience but it has to be theorizing through operation of the state and international relations.

Sachs and Warner (1995), Bhagwati (2004) and Wolf (2004) advocated that globalization as the road to development and it would bring economic prosperity. On the other hand, this view has been challenged and contested by Stiglitz (2002), Nayyar (2003) that it led to slower but more volatile growth and increase in inequality. Nayyar (2006) also argued for new agenda on development which concern for efficiency with equity focusing on the people rather than economies.

The realization that 'convergence in economic growth' as a means of development was an ideal that needed incorporation of spatial dimensions in economics laid the foundation of regional studies and regional planning particularly after the Second world war. In fact, spatial dimension in development is also found in Keynesian forms of development policy where development benefits are meant to spread to different regions. It was around 1960 regional aspect of economic growth attracted significant attention.

Perroux (1950) growth pole theory has been interpreted on a geographical space by Boudeville (1966) where the point or center having certain economic activities is found to generate growth and innovation and this center promotes economic development of a region. Myrdal (1957) highlighted the spatial inequalities inherent in free market economic development when a region started to grow, people, resources and finance would be drawn to that area leaving other areas depleted of resources. Thus, he propounded that the tendency for polarization forces is stronger than the

trickling down forces and urged for state intervention. On the other hand, Hirschman (1958) argued that spatial polarization would automatically reversed once economic development reached certain level or the benefits of polarization would spread and the degree of polarization would reduce.

Lipton (1977) argues that policies are made for in favour of urban areas to the cause of rural areas thus, favourable conditions are created in urban areas. Isard (1960) asserted that meaningful study of region (a dynamic organism) or regional system may be carried out only by regional science approach. He further advocated that through such an approach the basic principles of spatial organization processes could be identify. Moreover, the importance of space in economic development was reiterated by Friedman (1966), Alonso (1969), Berry (1969) and Rodwin (1970).

The relationship between a region economy and its spatial structure and, the process of regional economic growth associated with a diversity of spatial-structure transformation has been asserted by Parr (1987). krugman (1998 a) also argues the importance of location, space, region (spatial economies) in new trade and new growth theories. His work on 'new economic geography' stressed on how historical accident can shape economic geography and how gradual changes in underlying parameters can produced discontinuous change in spatial structure. It represents the importance of placing geographical analysis in economic mainstream. In fact, Krugman (1998 b) 'economic geography' is a style of economic analysis which tries to explain the spatial structure of the economy using certain technical tricks to produced models in which there are increasing returns and markets characterized by imperfect competition.

However, Martin and Sunley (1996) made a critical assessment of Paul Krugman's geographical economics and its implication for regional development

theory. They asserted that in order to understand trade it is necessary to understand the process of regional development within nations.

Rigg et al. (2009) made an important comment on the world development report-2009 by criticizing the report usage of the term 'economic geography'. They opined that it is a disappointment for economic geographers as it ignores the work of generations of geographers. However, this report considers the issue of 'space' and it is believed that the influence of geography on economic opportunity is acknowledgeable.

MacLeod (2001) argued for the resurgence of region (new regionalism) as regionalism and globalism is part of the same process of economic transformation in today's globalization world. Coe et al., (2004) proposed an integrated conceptual framework for globalizing regional development taking into account external or global forces as well as regional. They also opined that the strategic coupling of the global production networks of firms and regional economies ultimately drives regional development through the process of value creation, enhancement and capture.

The concomitant agglomeration of resources in certain pockets or region result in disparity or inequality among inter as well as intra region. This inequality has been engaged by scholar from various disciplines. Patnaik (1981) asserted that according to neo-classical, regional dualism or inequality in income arises only on account of malfunctioning of equilibrium mechanism and such malfunctioning is largely attributed to market imperfections and institutional bottlenecks which impede smooth factor and resource movement for bringing about efficient regional allocation of resources.

Williamson (1965) argued for the hypothesis that regional income disparities are related to national levels of economic development. He suggested that increasing regional inequality is generated during the early stages of development, while at the latter stage regional convergence is believed to be found. He also proposed that the

degree of regional inequality is very high in the middle income classes and, regional dualism is much more extensive within agriculture than the industrial sector.

Emmanuel (1972) studied the growing economic inequality between developed and less developed nations in terms of the theory of unequal exchange based on a modified version of Marxian analysis of price formulation. He argued that because of the existence of considerable wage difference mechanism, developed countries are exploiting the third world nations and consequently the economic gap between them is found to be wide. The same view has been endorsed by Young (1971), Griffin (1969) and Gonzalez (1969) on account of unequal exchange mechanism among the growing and stagnant regions.

Gereffi and Fonda (1992) studied the comparative analysis of regional path of development on four third-world regions: Latin America, East Africa, East Asia, south Asia and Sub-Saharan Africa based on five major development theories viz. neoclassical economies, world-system/dependency theories, development state, Institutional analysis and Marxism. They argue that regions in which agriculture remain dominant have poorest records of economic as well as social well being. At the same time, high level of industrialization is not associated with high living standard and equitable pattern of income distribution in Latin America and south Asia. Clarke (1980) also argues that high unemployment and economic distress is associated with capitalist spatial system.

The pioneering study on level of regional development in India using district level data has been made by Mitra (1965) based on a simple method of assigning and adding up ranks to highlight regional disparity. The same method has been adopted by Nath (1970) in analyzing the regional disparity of different region in India. Ganguli and Gupta (1976), Rao (1977), have been using principal component method to find out the

composite index on regional disparity. Benerjee and Ahluwalia (2003), Ryngynga (2003), Sharma and Kumar (1993) analyzed the regional disparities on the basis of Z-score technique. Kendall's Coefficient technique has also been used by Phanse and Dubey (1993) in dealing with regional disparities in level of socio-economic development in Malwa Region. A combination of indexing method, deprivation method and principal component method has been adopted by Agarwala and Hazarika (2004).

A number of studies in regional development of India show that the regional disparities in India have increased over the plan period and particularly during the 1990s. The same view has been endorsed by Ahluwalia (2002), Nagaraj, et. al., (1998), Rao, et. al., (1999), Shand and Bhide (2000). Similarly, Nair (1983), Mahajan (1982) also observed that regional disparity is found to increase from mid-fifties to early seventies. Dutta and Choudhury (1995 & 1996) studying recent years also observed that regional disparity in India is diverging in the process of economic growth despite all policies and measures adopted by government of India and Planning Commission. On the other hand, Sarker (1994) studied the regional imbalances in Indian economy over the plan periods. He argues that the hypothesis of Inverted U-shaped curve is found to exist in the country which further confirms the observations made by Kuznets (1957) and Williamson (1965).

Bhattacharya and Sakthivel (2004) analysed the growth rates of aggregate and sectoral domestic product of major states in the pre and post-reform period. They asserted that the growth rate of GDP has marginally improved in the post-reform decades, while regional disparity in state domestic product has widened drastically. Minocha (1983) has strongly urges spatial planning, sectoral integration of plans and emphasized more on locational analysis in the Indian planning processes.

Rao (1993) studied the levels of development of Karnataka based on selected indicators - environment, social & manpower, settlements, infrastructure, agriculture, Industries and general economy with the help of multivariate analysis techniques and correlation matrix. He further advocated that economic regionalization is a suitable technique of regional development planning for diverse geographical condition like Karnataka. Pathak (1994) has made a study on regional disparities and development in the third world countries. The centralize planning adopted by third world countries show increasing imbalanced regional development. Therefore, he suggests that 'growth equity' or 'equity with growth' for the balanced regional development in the third world country is necessary.

Singh and Singh (1994) studied regional disparities in Uttar Pradesh at district level based on 36 indicators. They argued that priority based concerted efforts from central and state government could be effective through transfer of resources and technology to all district. Singh and Mangat (1994) studied regional disparities in Industrial development in Punjab. They asserted that to reduce the imbalance of industrial development, it is necessary to disperse industry at small urban centers with provision of infrastructural facilities. Pal et al. (1994) studied disparities in the level of regional development with reference to Varanasi region using Multivariate factor analysis on the basis of 42 variables. They asserted that block level analysis is important for balanced development strategy and it has to be carefully analyzed and perceived prior to arriving at certain conclusion.

Naseer (2004) studied the level of development of West Plain of Uttar Pradesh based on 37 variables with the help of Z-score method. He argued that high level of development is found in the western part and it is declined towards the East. Shaban and Bhole (2000) examined the inter-state differentials in rural development in India.

They asserted that as disparities are found to be very high therefore, there is a need to have effective planning authorities. Nagaraj and Murthy (2007) studied the regional disparity of Chitradurga district with the help of Kendall's ranking coefficient method based on thirty seven social, economic and demographic indicators. Rukshanna (2009) studied the regional imbalances among districts of western Uttar Pradesh with the help of Z-score technique. On the basis of twenty six variables it is found that development of agriculture need strong remedial measure by policy planning and integrating it with the industrial development as industries are mainly agro-based.

Thaker and Shiyani (2009) studied the regional disparities in the levels of socio-economic development in Gujarat with the help of fifty-seven indicators using factor analysis. They argued that in spite of occupying the front runner in overall economic development in the country, development is however, biased and an imbalance. Nayak and Narayankar (2009) analyzed the levels of regional development and made correlation between different factors which led to regional disparities of Bellary district. They asserted that positive correlation is existing between demographic and economic development as well as demographic and combined (social, economic, demographic) development. Hangaragi (2010) studied 583 districts of India based on simple ranking method, indices method and principal component method to identify backward area for balanced regional development. He stressed for systematic implementation of special programmes like IRDP, DPAP etc. in those identified backward district for balanced regional development. Patra (2010) examines inter-regional variation in Infrastructural facilities of thirty districts in Orissa with the help of Principal Component Analysis. He further stresses that the position of the districts remains the same over the period of analysis and there is a positive relationship between infrastructure and human development.

Service center/central place identification is necessary for spatial planning/locational planning and it is observed from the previous studies that a problem arises in the identification of a service center. Jefferson (1931) for the first time used the term 'central place' in 1931 for a settlement which is necessarily a focus of various activities such as economic and social for the surrounding hinterland. Christaller (1966) emphasize on the degree of centrality of a place based on the number of telephone connections.

Smailes (1994) and Dickinson (1932) considered all the retail and wholesale trading establishment, banking and financial agencies, trade and personal services, amusement and various other services including profession and government administration as indicators of centrality of the center. Green (1949) measures the centrality of a place by taking into account the intensity of bus services from the areas around it. Similarly, Brush (1953) assess the centrality of the place on the basis of the functions they performed by combination or association of them. Godlund (1956) derived the index of centrality using the relationship between the total population of a center and the number of person employed in retail and commerce. Berry and Garrison (1958) in their study of Snohomish country used population threshold for each function to determine the importance of a center. Preston (1971) identify the centrality of a place based on retail sales and service sales, income and expenditure in his study of Pacific Northwest – Washington, Oregon, Idaho, and the mountain counties of western Montana. Barton (1978) argued that exchange and the entrepreneurial role are basic features of the achievement of centrality. Hassinger (1957) has been associated with the scalogram analysis for the identification and ranking of central place.

Olayiwaola and Aguda (2009) have been associated with principal component analysis for the hierarchical order of service centers in Ijesaland, Nigeria. On the other

hand, Abiodun (1958) has done a multivariate analysis for classifying the different categories of settlement in Nigeria. Davies (1967) formulated a locational index/location coefficient of shop in his study of South Wales. The functional index has been obtained by adding the centrality values for different functions in a particular settlement.

A number of works on service centers have been done in India. Sen et al., (1971) conducted the centrality as well as interaction of central place in Miryalguda taluka of the Nalgoan district in Andhra Pradesh using the scalogram method and population threshold with the help of statistical technique. Bhat et al., (2003), Thakur (1985), Sharma (2001) identify the centrality of a central place based on the principle that 'greater the scarcity greater the importance in terms of centrality'. Wanmali (1992) also made an attempt to identify service center of North Arcot district of Tamilnadu on the basis of functional presence and number of dependent settlement. Mishra and Sharma (2007) used functional specialization index for the functional classification of urban centers of Rajasthan.

Market and service centers play important role as the nodes of socio-economic interactions in the vast rural landscape. Thus, studies on the characteristics of market and service centres assume immense significance particularly for rural area development planning. Yavagal (1992) studied the central places /service centres with their hierarchical orders, keeping in view the spatial patterns to bridge the gap between functional and spatial disparities. Singh (1992 & 1993) focused on the identification and hierarchy of service centres. He observed that transportation system and natural circumstances have played significant role in the growth and distribution of service centres.

Mishra and Sharma (2003) studied the rural growth centres as a device to eliminate regional imbalances and inequalities. Mishra and Dubey (1996) also identifed hierarchical order of service centres, delineating their service area and suggested a spatial plan for the location of various developmental functions and services. Kumar and Sharma (1997) studied the rural centres of services of Sindega district characterized by unique physical make up, distinct tribal economy. They advocated that service centers may be developed as market towns to achieve the earnestly desired goal of balanced regional growth.

Rao and Ramachandran (1983) studied on the mobility patterns and consumers travel behaviour of rural people. They observed that the relationship between socio-economic status and choice of central place is significance as the richer class tended to go to higher order central places, while the poor go to lower order central places.. Keeping in view the importance of service centres in regional development, Barthakur (1979) studied the growth and development of service centres in Brahmaputra valley and emphasized on the existence of wide gaps among the service centres reflecting regional disparity. Bhattacharya (1979) also discussed the distribution pattern of central places and their order on the basis of commercial functions. He stressed on the functional role of the different orders of service centres in the Brahmaputra valley. Sharma (1983) studied the distributional pattern and hierarchy of market centres in central Assam. He also examined the spatial arrangement of the market centres and complimentary areas in the light of Christaller's central place model. In a methodologically innovative study, Sharma and Sharma (1985) identified the service centres of Nowgong District of Assam and ranked them according to the services available using standard scores. They observed that the hierarchy of service centres

prevalent in the district does not conform to a pattern necessary for a proper spatial organization.

Rao (1988) studied the retrospect and prospect of central place theory for regional planning and also growth centers project in India. Misra (1983) also evaluated and analysed the validity and applicability of growth poles and growth centres to solve regional development problems. He put forward a new concept - growth foci for Indian context, which is actually a modified form of growth pole theory. He made an appeal to put into practice the growth foci hypothesis without any difficulty in the developing countries.

Papola (1998) studied the integrated development of mountain area and argued that a special distinctive approach must be adopted in framing developmental programmes as mountain areas are characterized by inaccessibility, fragility, and marginality etc. Wanmali and Islam (1995) studied the spatial distribution of rural services in Andhra Pradesh, Maharastra and Tamil Nadu. They observed that in spite of the economic disparities between regions, Christaller's central place theory provides a framework to examine demographic, functional and spatial characteristics of settlements.

Misra (1970) studied the applicability of growth pole policy in the context of perspective spatial planning. He observed that high growth rate without spatial integration leads to regional imbalances and spatially dual economies. He also mentioned that concept of growth poles is not only theoretical proposition but also practical tool to be used by planners for a balanced spatial development.

Hodgson (2002) discussed bout various location-allocation models for growing Indian economy thereby proposing the need to incorporate location –allocation models in the provision of medical, educational, marketing facility etc. Singh and Singh (2001)

have been emphasizing on formulating a location-allocation strategy for guiding new investment in various sectors of activities at new suitable locations to ensure both equitable and efficient spatial distribution of developmental. They also asserted that spatial planning is necessary for the locational planning of socio-economic facilities and infrastructure may be efficiently provide keeping in view the requirement and priorities of people as well as of the region.

Sharma and Sharma (1993) studied spatial planning for socio-economic development of Balrampur Development Block of Gonda district of Uttar Pradesh. They argued that there should be suitable spatial framework at micro level through the identification and hierarchical ordering of service center in order to achieve the objectives of growth and distributive justice to avoid regional imbalances.

Misra et al. (1994) mentioned the absence and neglect of spatial aspect in demarcation of basic planning units and implementation in developmental programmes. They further asserted that there is a need to identify compact and functional unit areas on the basis of spatio-functional organization of the region for physical planning at any level. Rao (1986), Sarma and Kumar (1989) studied the optimum/appropriate location of socio-economic facility through the hierarchical framework of service centers for socio-economic development. Tiwari (1988), Shekhar (2004), Singh and Singh (2001) identified the spatial development framework through the manual or graphical method with the help of space covering and space partitioning techniques. Singh and Sanjenbam (1991) studied the importance of micro-level planning for the optimum development on the bases of their needs, resources and manpower.

Misra (1990) argued the need for spatial planning through the detail analysis of spatial organization of an area. He also stressed that efficient spatial development framework is needed for development of an area. Wanmali and Khan (1988) argued the

role of location in regional planning with reference to the provision of social facilities. They asserted that through the study of hierarchical framework of settlement the existing imbalances between center and periphery may be reduced if socio-economic facilities are located in the proper location.

1.6 Data base and Methodology

The present study is based on empirical observation and data have been collected from various sources. The collection of data is mostly based on primary sources, where necessary and relevant information are collected through intensive field survey covering the entire study area (92 settlements) with the help of questionnaires (Appendix-1). In addition to primary sources, secondary data relating to population have also been collected from successive census enumeration periods (1961, 1971, 1981, 1991 & 2001 census) and block level statistics-2003 (Govt. of Mizoram). Other necessary data have also been drawn from published and unpublished work of different scholar.

As the present study attempts to provide a spatial development framework for spatial planning by identifying the hierarchical framework of service centers according to the location of appropriate service center in order to enhance balanced development for Aizawl district. Therefore, necessary measure has been taken as-

a) The pattern of growth and density of population as well as density and spacing of settlements have been analysed at the block level. Concentration and density measures are used to show spatial patterns that are cartographically represented by choropleth and other suitable technique.

b) For the identification of the level of socio-economic development in Aizawl district, twenty one (21) indicators based on demographic, social and economic

have been selected. The Composite index has been prepared to reflect the level of socio-economic development among the five blocks of Aizawl district. The method used to find out the composite index is explained below -

(i) Data obtained from secondary sources have been transformed into variables to be used as indicators

(ii) To transform data matrix into scale free matrix, indicators have been standardized by subtracting the mean from each individual variables and divided by their standard deviation as-

$$Zi = (Xij-Xj)/ SDj$$

Where Zi is the Z-score for the i^{th} unit, Xij is the X variable in the i^{th} unit and j^{th} variable, Xj is the mean of j^{th} variable and SDj is the standard deviation of the j^{th} variable

(iii) After obtaining Z-score for every indicator, composite score for each block has been obtained by adding up of individual Z-score as-

$$Ci = \sum Z$$

Where Ci is the composite score and $\sum Z$ is the summation of Z- scores.

After obtaining composite score of the three sectors viz. Demographic, social and economic, composite index has been derived by adding the three composite score. On the basis of composite index all the blocks are categorized into three classes of high development, medium development and low development areas. It is required to be mentioned that the blocks with above Mean + 1 standard deviation has been designated as high development, between Mean + 1 standard deviation and mean has been designated as medium development and below mean as low development area respectively.

c) The hierarchical order of service centers has been identified on the basis of the selected six central functions /services. The selected central functions /services are further sub divided into twenty two functions/services. The sub functions of education consist of primary school, middle school, high school, higher secondary school, college and university. Health sub functions comprise sub health center, primary health center/urban health center, community health center and hospital. Communication sub functions include branch post office, sub post office and post and telegraph office. Rural animal health center, veterinary dispensary and veterinary hospital constitute veterinary sub functions. Recreation sub functions comprise public library, public playground and cinema hall. Banking and police sub function include bank, police outpost and police station. The availability/unavailability of selected functions/services has been compiled after visiting all the settlements (92 settlements out of 100 settlements) in the study area.

The selected functions/services are grouped into three orders namely, low order, middle order and high order on the bases of entry point method (function first appear at the minimum population size of settlement) (Sen, et. al., 1971). This hierarchical order of functions/services has been used for the identification of hierarchical order of service centers/central places in the study area. If a settlement has more than 50 % of the services that constitute a given order and provides any of those services to another settlement, then it is considered to be a service center for that order of functions/services (Wanmali, 1992:42-45). The extent over which a service center influence in a region (complementary region) has also been identified on the bases of space preference of the people in availing

various functions/services by constructing ray diagram showing people's choice of center for various order of functions/services.

d) Spatial development framework has been planned out by using the scientific technique of spatial planning. The norms of equity (travel distance) and efficiency (population threshold) of a group of functions/services have been proposed after computing the average travel distance at the block level and average threshold population at the hierarchical order of function/service, and then finally of the study area.

The spatial-gap of service centers has been determined on the bases of proposed equity (travel distance) and efficiency (population threshold) following manual or graphical technique of space covering and space partitioning method (Fisher et. al, 1978). The functional-gap has been determined when all the functions identified at a particular order are expected to exist in all the service center of the respective order. In case this is not available there is a functional-gap (Singh & Singh, 2001:161). Thus, the technique of spatial planning has been employed to ensure the most equitable and efficient distribution of function/service for spatial development framework in Aizawl district.

1.7 Organization of the chapter

The present study is organized into six chapters.

The first chapter is introductory chapter. This being an introductory chapter, attention has been given to deal with the theoretical and conceptual framework of the present study. It also deals with the statement of the problem, study area, objective of the study, review of literature, source of data and methodology of the present study.

The second chapter pertains to the physical and cultural settings of the study area on account of geology, topography, drainage, climate, land use/land cover, population and settlement.

The third chapter is devoted for analysis of inter-block level of socio-economic development of five rural development blocks of Aizawl district.

The fourth chapter deals with identification of hierarchical order of service centers along with their complementary regions.

The fifth chapter deals the spatial development framework of the study area through the technique of spatial planning. The adequacy/inadequacy of function/service (functional-gap) and spatial-gap as well as provision of functions/services at the appropriate service centers for balanced development have been considered in this chapter.

The last chapter provides the major findings and conclusion of the present study.

REFERENCES

1. Abiodun, J.C., (1958): "Urban hierarchy in a Developing Country", *Economic Geography*, Vol.43.
2. Agarwala,A.K and Hazarika, P., (2004): *Developmental Disparities-A Quantitative Insight*, Akansha Publishing House, New Delhi
3. Ahluwalia, Montek.S., (2002): "State Level Performance under Economic Reforms in India", *Economic Policy Reforms and the Indian Economy'*, Anne, O. Krueger, (ed.), Oxford University Press, New Delhi, pp.91-125.
4. Alonso,W., (1969): "Urban and Regional Imbalances in Economic Development", *Economic Development and Cultural Change*, No.17.
5. Balassa, Bella., (1971): "Trade policies in developing countries", *American Economic Review*, Vol. 61, May.
6. Balassa, Bella., (1981): *The Newly Industrializing Countries in the World Economy*, Oxford, Pergamon.
7. Barton, Bonnie., (1978): "The Creation of Centrality", *Annals of the Association of American Geographers*, Vol.68, No. 1, March, pp.34-44, Taylor and Francis Ltd.
8. Barthakur, M., (1979): "Growth and development of service centres in the Brahmaputra Valley and their influence on the rural development", *The North Eastern Geographer*, Vol-II, No-1 & 2, pp. 84-88.
9. Benerjee, Anuradha and Ahluwalia, Deepa., (2003): "Regional disparities in demography, economic and social development in India: A study based on selected Indicators", *Economic Liberalization and Regional Disparities in India-special focus on the North Eastern Region,*A.C Mohapatra & C.R Pathak, (eds.), Star Publishing House, Shillong.
10. Berry, B.J.L., (1969): "Relationship between Regional Economic Development and the Urban System: The Case of Chile", *Rijdscrift Voor Economische en Sociale Geografic,* No. 60.
11. Berry, B.J.L and Garrison, W.L., (1958): *Recent Development of Central Place Theory,* Papers and Proceedings of the Regional science Association, Vol.4, p.111
12. Berry, B.J.L Brian., (1971): "City size and Economic Development: Conceptual Synthesis and Policy Problem with Special Reference to South and Southeast Asia", *Urbanization and National Development,* Jakobson, L. and Ved Prakash, (eds.) Sage.
13. Bhagwati, J., (2004): *In Defence of Globalization*, Oxford University Press, Oxford.
14. Bhattacharya, B.B., and Shakthivel, S., (2004): "Regional Growth and Disparity in India - Comparison of Pre-and Post-Reform Decades", *Economic and Political Weekly*, Vol.39, No.10, March, pp.1071-1077.
15. Bhat et al.,(2003): *Micro level Planning, a case study of Karnal Area,Haryana-India*, Rajesh Publications,New Delhi, p.60.

16. Bhattacharya, N.N., (1979): "Central places of the Darrang District, Assam", *North Eastern Geographer.* Vol-II, No-1&2, pp. 70-73.

17. Boudeville, J.R., (1966): *Problems of Regional Economic Planning,* University Press, Edinburgh.

18. Brush, J.E., (1953): "The hierarchy of central place in south western Wisconsin", *Geographical Review*, Volume 43

19. Carrothers, G.A.P., (1956): "An Historical Review of the Gravity and Potential concepts of Human Interaction", *Journal of the American Institute of Planner*, Vol.22, pp.94-102.

20. Carey, H.C., (1958): *Principle of Social Science*, Lippincott, Philadelphia.

21. Chakravorty, Sanjoy., (2005): "The history and geography of regional development theory: A futile search for a paradigm", *Development, Displacement and Disparity*, Nirmala Banerjee and Sugata Manjit, (eds.),Orient Longman, p.35.

22. Christaller, Walter., (1933): *Die Zentralen Orle in Suddeutschland,* Fischer, Jena; translated by C.W. Baskin as:*Central places in Southern Germany,* Prentice Hall, New Jersey, 1966.

23. Clark, L. Gordon., (1980): "Capitalism and Regional Inequality", *Annals of the Association of American Geographers*, Vol.70, No.2, June, pp.226-237.

24. Coe, Neil. M. et al.,(2004): "Globalizing regional development: a global production networks perspective" *Transaction of the Institute of British Geographers,* New Series, Vol.,29, No.4, December, pp.468-484

25. Converse, P.D., (1949): "New Laws of Retail Gravitation", *Journal of Marketing*, vol.1.

26. Crush, J., (1995): *The Power of Development*, London and New York, (ed.) Routledge.

27. Dickinson, R.E., (1929): "The Regional Functions and zones of Influence of Leeds and Bradford", *Geography*, Vol.15, pp.548-557.

28. Dickinson, R.E., (1934): "The Metropolitan regions of the United States", *Geographical Review*, Vol.24, pp.278-291.

29. Dasgupta, S., (1985): *Towards a Post Development Era*, London, Mittal

30. Davies, W.K.D., (1967): "Centrality and the Central place hierarchy", *Urban Studies,* Vol. 4, No. 1.

31. Dickinson, R.E., (1932): "The distribution and functions of the smaller urban settlements of east Africa", *Geography*-VII, pp.19-31.

32. Dutta, P.C and Choudhury, H., (1995): "Per capita household consumption inequalities in the north east region of India", IJRS, Vol. 27 (1&2).

33. Dutta, P.C and Choudhury, H., (1996): "A note on Inter-state variation in per capita non-food household items of consumption in the North east India', IJRS, Vol. 28(2).

34. Escobar, Arturo., (1995): *Encountering Development: The Making and Unmaking of the Third World*, Princeton, Princeton University Press.

35. Emmanuel, A., (1972): "Unequal Exchange", *New Left Book*.

36. Fisher, et. al., (1978): "Method of service center planning in rural areas, India", *Regional Planning and national Development*, R.P Mishra, D.V. Urs and V.K Natraj, (eds.), pp.434-441.

37. Friedman, J.P., (1966): *Regional Development Policy*: *A Case study of Venezuela*, Cambridge, M.I.T Press.

38. Ganguli, B.N. and Gupta, Debendra B., (1976): *Levels of Living in India – an Inter State Profile*, S.Chand & Co. Ltd, New Delhi.

39. Gereffi, Garry and Fonda, Stephanie., (1992): "Regional paths of development" *Annual Review of Sociology,* vol., 18, p.424.

40. Gonzalez, Casanova, P., (1969): "Inter Colonialism and National Development", *Latin American Radicalism*, Horowitz, I.L, Decastro, J.I and Gerassi, J., (eds.), New York.

41. Godlund, S., (1956): "Bus Service in Sweeden", *Lund Studies in Geography*, Series.13, p.17.

42. Green, F.H.W., (1949): "Motor-Bus centers in south west England considered in relation to population and shopping facilities", *Institute of British Geographers Publication*, No. 14, pp. 51-68.

43. Griffin, K., (1969): *Underdevelopment in Spanish America*, London.

44. Hadjimichalis, Costis., (1987): *Uneven development and Regionalism State. Territory and Class in Southern Europe*, Croom Helm, pp.12-22.

45. Hangaragi, S.S., (2010): "Identification of Backward Areas for Balanced Regional Development in India: A district level analysis", *Indian Journal of Regional Science*, Vol. XXXXII, No.4, pp.1-48.

46. Hassinger, E., (1957): "The Relationship of Retail Service Patterns to Trade Center Population Change", *Rural Sociology*, p.22.

47. Hirschman, A., (1958): *The Strategy of Economic Development*, Yale University Press, New Haven

48. Hodgson, M, John., (2002): "Interaction-based Location-allocation Models for Indian regional Planning:Background and Potential", *Regional Planning-concepts, techniques, policies and case studies,* R.P Misra, (ed.), Concept publishing company, pp.393-407.

49. Isard, Walter., (1960): *Methods of Regional Analysis: An Introduction to Regional Science*, John Wiley and Sons Inc., New York.

50. Jafferson, M., (1931): "The Distribution of Worlds City's Folk", *Geographical Review,* Volume XXI, p.453.

51. Keynes, J.M., (1936): *The General Theory of Employment, Interest and Money*,London, Macmillan.

52. Krugman P., (1998a): "What's new about the new economic geography", *Oxford Review of Economic Policy*, Vol.14,No.2,pp.7-17

53. Krugman P., (1998b): "Space: The final frontier", *Journal of economic Perspectives*, Volume 12, No.2, pp.161-174.

54. Kumar,A and Sharma, N., (1997): "Rural Centres of Services- A case study of Sindega", *Geographical Review of India,* Vol-39, March, No.1-4, pp.19-29.

55. Kuznets, S., (1957): "Quantitative aspect of economic growth of nations-II", *Economic Development and Cultural Change*, Vol.V, July.

56. Lal, Deepak., (1983): *The Poverty of Development Economics*, London; Institute of Economic Affairs.

57. Lipton, Michael., (1977): *Why Poor People Stay Poor Urban Bias in World Development*, Harvard University Press, Cambridge, Massachusetts.

58. Losch, August., (1939): *The Economics of Location*, Trans. By W.H Wonglom and W.F. Stolper, Yale University Press, New Haven, 1954 (Originally published in Germany by Fisher, Jena, 1939).

59. Lukermann,F. and Porter, P.W., (1960): "Gravity and Potential models in Economic Geography", *Annals of Association of American Geographers*, Vol.50, pp.493-504.

60. MacLeod,Gordon., (2001): "New regionalism reconsidered: Globalization and the remaking of Political economic space", *International Journal of Urban and regional research*, Vol.25.4, December, pp.804-829.

61. Mahajan .O.P., (1982): *Economic Planning and Regional Development in India,* Ess Publication, New Delhi.

62. Mandal, R.B., (2001): *Urban Geography, A Text Book*, Concept Publishing Company, New Delhi, p.146.

63. Martin, Ron and Sunley, Peter., (1996): "Paul Krugman's geographical economics and its implication for regional development: A critical assessment", *Economic Geography,* Vol.72, No.3, July, pp.259-292, Clark University.

64. Mitra, Ashok., (1965): *Levels of regional Development in India*, Government of India.

65. Minocha, A.C., (1983): "Regional Disparities in Indian: Some Basic Issues", *Social Scientist*, Vol.5, No.5, May, pp.51-57.

66. Mishra, R.N and Sharma, P.K., (2003): "Study of Rural Growth Centres in Jaisalmer District", *Annals of National Association of Geographers' India*, Vol-XXIII, No-1, June 2003 ,pp 37-46

67. Mishra, R.N. and Pawan K.S., (2007): "Functional Classification of Town", *Transaction*, Journal of the Institute of Indian Geographer, Vol. 29, No.2 Summer, University of Pune,pp.141-152.

68. Mishra,B.N & Dubey, V.N., (1996): "Settlement system analyses for spatial planning. A case study of Jaunpur District U.P", *Annals of National Association of Geographers' India,* Vol-XVI, No-1, June, pp 40-48

69. Misra, R.P., (1970): "Growth Pole policy for Regional development in India", *Balanced Regional Development, Concepts, Strategy and Case study*, T.B Lahiri, (ed.), Proceedings and papers of two-day all India conference, organized by Institute of Economic Geography India on March 7,8 at Calcutta.

70. Misra, O.P,et. al., (1994): "Integrated Development Planning and Spatio-Functional Integration. A case study of Tashil Tulsipur District, Gonda (UP)", *Geographical Review of India.* Vol.56, No.1, March.

71. Misra, R.P., (1990): *District Planning, A Handbook*, Concept Publishing company, New Delhi,pp.181-192

72. Misra, R.P., (1983): "Growth poles and growth centers in the context of India's urban and regional development problems", *Contribution to Indian Geography*….1, *Concepts and approaches*, R.P Mista, (ed.), Heritage Publishers, New Delhi,p.221-246.

73. Martinussen, J., (1997): *Society, State and Market: A Guide to Competing Theories of Development*, London, Zed Books.

74. Myrdal, G., (1957): *Economic Theory and Underdeveloped Regions*, Gerald Duckworth & Co., London.

75. Nabudere, Dani.W., (1997): "Beyond modernization and development, or why the poor reject development', *Geografiska Annaler*, Series B,Human Geography, Vol.,79,No.4, Current Development Thinking, pp.203-215.

76. Nagaraj.R, Aristomene Varaudakis and Marie A.V., (1998): "Long- run Growth Trends and Convergence Across Indian states", OECD technical Papers, No.131, January, pp. 1-58.

77. Nagaraj, H. and Murthy, K., (2007): "Geographical Analysis of Regional Disparities-A Case Study of Chitradurga District, Karnataka", *Transactions*, Vol.29, No.1, pp. 75-82, Institute of Indian Geographers.

78. Nair, K.R.G., (1983): *Regional Experience in a Developing Country*, Wiley Eastern Limited, New Delhi.

79. Narman, Anders., (1997): "Development thinking-bridging the gap between theory and practice", *Geografiska Annaler,* Series B. Human geography, Vol. 79, No.4,Current Development Thinking, pp.217-225,Blackwell Publishing.

80. Naseer, Yasmeen., (2004): "Levels of Development: A case study of western plain of Uttar Pradesh", *Geographical Review of India*, Vol.66, No.4, Dec., pp.350-358.

81. Nath, V., (1970): "Regional Development in Indian Planning", *Economic and Political Weekly*, January, pp.242-260.

82. Nayyar, Deepak., (2003): "Globalization and Development Strategies", *Trade and Development*, J.Toye, (ed.) Edward Elgar, Cheltenham.

83. Nayyar, Deepak., (2006): *Development through globalization?* Research Paper No.2006/29,March, United Nation University, World Institute for Development Economics Research.

84. Nayak, L.T and Narayankar, D.S., (2009): "Identification of Regional Disparities in Levels of Development in Bellary District-Karnataka", *Indian Journal of Regional Science*', Vol.XXXXI, No.1, pp.37-47, Regional Science Association, India.

85. Olayawola, A.M and Aguda, A.S., (2009): "Hierarchy of service centers in Ijesaland, Nigeria", *Journal of Geography and Regional Planning*, Vol. 2(5), pp.131-143, May, pp.131-143.

86. Olsson, G., (1965): *Distacne and Human Interaction: A Review and Bibliography*, Bibliography Series No.2, Regional Science Research Institute, Philadelphia.

87. Parr, B John., (1987): "The development of spatial structure and regional growth", *Land Economics*, Vol., 63, no.2, May, pp.113-127.

88. Patnaik, S.C., (1981): *Economics of Regional Development and Planning in Third World Countries*, Associated Publishing House, New Delhi, pp.1-2.

89. Pathak, C.R., (1994): "Regional Disparities and Development in the third World Countries-Some Reflections", *Poverty, Inequality and Development*, D.N Singh & T.D Singh, (eds.), pp.115-129, Environment and Development Study Center, Varanasi.

90. Pal, A.K. et al.,(1994): "Disparities in Levels of Regional Development: A Case Study", *Poverty, Inequality and Development*, D.N Singh & T.D Singh, (eds.), pp.197-213, Environment and Development Study Center, Varanasi.

91. Papola, T.S., (1998): "Regional Planning for Integrated Development, The case of Mountain Areas", *Annals of National Geographers' India*, Vol. XVIII, No-1 & 2 Dec., pp. 24-43.

92. Patra, A.K., (2010): "Inter-regional Disparities in Infrastructure Services: A study in Orissa", *Indian Journal of Regional science,* Vol. XXXXII, No.1, pp. 49-58.

93. Perroux, F., (1950): "Economic Space: Theory and application", *Quarterly Journal of Economics*, Vol.64, pp.89-104.

94. Phanse Vijaya and Dubey, Archana., (1993): "Dynamics of Regional Disparities in Levels of Socio-Economic Development in Malwa Region (M.P)", *Regional Disparities and Development in India*, R.S Tripathy and R.P Tiwari, (eds.), pp.203-217, Ashish Publishing House, New Delhi.

95. Preston, E. R., (1971): "The structure of central place system", *Economic Geography,* Vol. 47, No. 2, April, pp. 136-155.

96. Rao, Prakasa. V.L.S., and Ramachandran,R., (1983): "Mobility and Choices of Central Places", *Contribution to Indian Geography, Concepts and Approaches.* R.P. Misra, (ed.), Heritage Publishers, New Delhi,India, pp. 221-246.

97. Rahnema, M. and Bawtree, V., (1997): *The Post-Development Reader*, London and New Jersey, Zed Books.

98. Rao, Hemanta., (1977): "Identification of backward regions and the trends in regional disparities in India", *Arhta Viganana*, Vol.19, No.2.

99. Rao, Koteswara.T., (1990): *Regional Planning Resources and Rural Development in India*, ChughPublicatioins, India, p.2.

100. Rao, Nagabhushana. Eadubelli., (1986): *Strategy for Integrated Rural Development*, (*A case study of a region in Coastal Andhra)*, B.R Publishing Corporation.

101. Rao, M. Govinda, Shan, R.T., and Kalirajan, K.P., (1999): "Convergence of incomes across Indian states- A Divergent view", *Economic and Political Weekly*, March 27.

102. Rao, Prakasa. V.L.S., (1988): "Central Place Theory in retrospect and Prospect", *Contribution to Indian Geography…X, Regional Development*, Moonis Raza, (ed.), Heritage Publishers, pp.513-523.

103. Rao, T.N.A., (1993): *Balanced Regional Development-Levels of Development of Karnataka*, Academy of Regional science and Humanities (ACARSH), Belgaum.

104. Reily, W.J., (1929): *Methods of the Study of Retail Relationship,* Res. Monograph No.4, Bureau of Business research, University of Texas.

105. Reilly, W.J., (1931: *The Law of Retail Gravitation,* New York

106. Rigg, Jonathan et al., (2009): "The World Development Report-2009, Reshapes Economic Geography: Geographical Reflection", *Transaction of the Institute of British Geographers*, New Series, Vol.34, No.2, April, pp. 128-136.

107. Rodwin, L., (1970): *Nation and Cities*, Haughton Mifflin, New York.

108. Rostow, W.W., (1960): *The Stages of Economic Growth: A non-Communist Manifesto*, Cambridge, Cambridge University Press.

109. Rukshanna (2009): "Regional Imbalances in the Dimensions of Rural Development", *Indian Journal of Regional Science*, Vol. XXXXI, No.2, pp.135-148.

110. Ryngynga, K., (2003): "Levels of development in the hills of North-East India", *Economic Liberalization and Regional Disparities in India-special focus on the North Eastern Region,* A.C Mohapatra and C.R Pathak, (eds.), Star Publishing House, Shillong.

111. Sachs, W., (1992): *The Development Dictionary: A Guide to Knowledge as Power*, (ed.) London, Zed Books.

112. Sachs, J., and Warner, A., (1995): "Economic Reforms and the Process of Global Integration", *Brookings Papers on Economic Activity*,Vol.1, pp.1-118.

113. Sarma, P.V. and Kumar, Mohan. K.V., (1989): "Identification of Basic Planning Units for Integrated area Development-A case Study of Godavari delta region of Andhra Pradesh", *Planning, regional development and Disparities in India*, *(A.C Minocha Fecilitation volume)*, H.S Yadav, (ed.), Criterion Publications, pp.21-38.

114. Sarker, P.C., (1994): "Regional Imbalances in Indian Economy over Plan Periods", *Economic and Political Weekly*, Vol.29, No.11, March, pp.621-633.

115. Seabrook, J., (1994): *Victims of Development, Resistance and Alternatives*, London, Verso.

116. Sen, L.K., et. al., (1971): *Planning rural growth centers for Integrated Area Development, A study in Miryalguda Taluka*, National Institute of community development, Hyderabad, India.

117. Shand, Ric and Bhide, S., (2000): "Sources of Economic Growth- Regional Dimensions of Reforms", *Economic and Political Weekly*, October 14, pp.3747-57.

118. Sharma, R.C and Kumar, Naresh., (1993): "Regional Disparities in the levels of socio-economic development in India", *Regional Disparities and Development in India*, R.S Tripathi and R.P Tiwari, (eds.), Ashish Publishing House, New Delhi.

119. Shaban, Abdul and Bhole, L.M., (2000): "Regional Disparities in Rural Development in India", *Journal of Rural Development*, Vol.19, Jan.-March, NIRD, Hyderabad.

120. Sharma, Ravi Kiran., (2001): "Study of Central Place in Integrated Area Development of Ranchi Plateau", *Urban and Regional Development in India*, Volume Two, B.Thakur,VNP Sinha, M.Prasad, N.Sharma, RanaPratep, R.B Mandal & RBP Singh, (eds.),Concept Publishing Company, New Delhi,pp.365-390.

121. Sharma, P.K., (1983): *Market Centres in Central Assam: A geographical Analysis,* Unpublished Ph.D Dissertation, Utkal University,Bhubhaneswar.

122. Sharma,P and Sharma, H.N., (1985): "Identification, Ranking and Grouping of Service Centers-A Case Study of Nowgong District", *The North Eastern Geographers*. Vol-17, No 1& 2, pp 12-20

123. Sharma, S.C., & Sharma, R., (1993): "Spatial Planning for Socio-Economic Development at micro level", *Geographical Review of India*, Vol.55, March 1, No.1, Geographical Society of India, Kolkota, pp. 34-53.

124. Sharp, Joanne and Briggs, John., (2006); "Post Colonialism and Development: new dialogues?", *The Geographical Journal*, Vol., 172, No.1, March, pp.6-9.

125. Shekhar, Sudhanshu., (2004): *Regional Planning in India (volume –two)*, Institute for Sustainable Development, Luknow and Anmol Publications, New Delhi-110 002.

126. Singh, M.B and Singh, Virendra., (1994); "Regional Disparities in U.P", *Poverty, Inequality and Development*, D.N Singh and T.D Singh, (eds.), pp.156-169, Environment and Development Study Center, Varanasi.

127. Simon, David., (1997): "Development reconsidered; new direction in development thinking", *Geografiska Annaler*, Series B Human geography, Blackwell Publisher, vol.,79,no.4,pp.183-201

128. Singh, O.P & Singh, Raj L., (2001): "A Framework of spatial planning with an example", *Essays in Indian Geography, continuity of Traditions,* R. Gopalakrishnan and Ali Ahmed, (eds.), pp 147-165 .

129. Singh, J.P and Mangat, H.S., (1994): "Regional Disparities in Industrial Development in Punjab", *Poverty, Inequality and Development*, D.N Singh and T.D Singh, (eds.), pp.170-184, Environment and Development Study Center, Varanasi.

130. Singh, H.L., (1992 & 1993): "Identification of Service Centres, A case study in Koilwar Block of Bhojpur District, Bihar", *North Eastern Geographer*. Vol-24 No-1 &2, pp. 34-39.

131. Singh, R.P. and Sanjenbam, V., (1991): "Rural Development and Micro-Level planning: A case study of Jiribam Block, Manipur", *North Eastern Geographer*, Journal of the North-Eastern India, Geographical Society. Vol.23, No.1 &2, pp 5-15.

132. Singh, O.P. &.Singh, R.L., (2001): "A Framework of Spatial Planning with an example", *Essays in Indian Geography, Continuity and Traditions*, R. Gopalakrishnan and Ali Ahmed, (eds.), pp. 149, Regency Publications.

133. Singh, O.P. and D.C. Pandey., (1986): *Development Planning: theory and Practice*, Gyanodaya Prakasharan, Nainital, pp.7-36.

134. Slater, David., (1993): "The geopolitical imagination and the enframing of development theory", *Transaction of the Institute of British Geographers,* Vol.18, No.4, pp.419-437, Blackwell Publishers.

135. Smailes, A.E., (1944): "The Urban Hierarchy in England and Wales", *Geography*, Vol.29, pp.41-51.

136. Smith, Adam., (1950): *An Inquiry into the Nature and Causes of the Wealth of Nations*, London: Methuen (edited by Edwin Cannon), (as quoted in *Theories and Practices of Development*, Katie Willis, Routledge, 2005).

137. Stiglitz, J.E., (2002): *Globalization and its Discontents,* Allen Lane, London.

138. Thaker, Hrima. H., and Shiyani, R.T., (2009: "Socio-Economic Development in Gujarat: Rosy picture with concerns", *Journal of Rural Development*, Vol.28, No.4, pp. 55-528, NIRD, Hyderabad.

139. Thakur, R.N., (1985): *Micro-Regional Central Place System in India (A Case Study of the Siwan Region*, Inter-India Publication, pp.130-134

140. Tiwari, P.C., (1988): *Regional development and planning in India,* Criteria publications, New Delhi, p.5

141. Ullman, E.L., (1956): "The Role of Transportation and the Bases for Interaction", *Man's role in Changing the face of the Earth,* W.L Thomas, (ed.), University of Chicago Press, Chicago.

142. Valenzuala, J.S and Valenzula, A., (1978): *Modernization and dependency: alternatice Perspective in the Study of Latin American Underdevelopment*, comp. Polit., Vol.10, pp.535-557.

143. Wanmali, Sudhir and Islam, Yaslam., (1995): "Rural Services, Rural Infrastructure and regional development in India", *The Geographical Journal*, Vol.161, No.2, July, pp.149-166, Blackwell Publishing.

144. Wanmali, Sudhir and Khan, Waheedudin., (1988): "Role of Location in Regional Planning with Particular Reference to the Provision of Social Facilities", *Contributions to Indian Geography…X, regional Development*, Moonis Raza, (ed.), Heritage Publishers, pp.404-427.

145. Wanmali, Sudhir., (1992): *Rural Infrastructure, The settlement system, and development of the regional economy in Southern India,* Research Report, International Food Policy Research Institute, pp. 42-45.

146. Williamson, J.G., (1965): "Regional Inequality and the Process of National Development: A Description of the Pattern", *Economic Development and Cultural Change,* Vol. 13, No.4, Part II, July.

147. Wolf, M., (2004): *Why Globalization Works*, Yale University, New Haven and London

148. World Bank (1993): *The East Asian Miracle*, Oxford, OUP.

149. Yavagal, F.V., (1992): "Location and Allocation of Central Places. A study in an Integrated Area Development of Bijapur District, Karnataka", *Geography and Rural Development,* R.N.P Sinha, (ed.), Concept Publishing Company, pp. 181-195.

150. Young, C.E., (1971: "Rural-Urban Terms of Trade", *African Social Research*, No.12, December.

CHAPTER – II

PHYSICAL AND CULTURAL SETTING

- Introduction
- Geology
- Topography
- Drainage
- Climate
- Land use/ Land cover
- Population
- Settlement
- Conclusion

2.1 Introduction

Aizawl district is situated in the north-central part of Mizoram and lies between 24º 25' 16.04'' and 23º 18' 17.78'' North latitudes and 92º 37' 03.27'' and 93º 11' 45.69'' East longitudes (State Remote Sensing Center, 2006). It is bounded on the north by Cachar district of Assam, on the east by Champhai district and Churachanpur district of Manipur, on the west by Mamit district and Kolasib district, on the south by Serchhip district. The total geographical area of Aizawl district is 3576.31 sq.km which accounts for about 16.96 p.c of the total geographical area of the state. The total population of the district is 325676 (census of India-2001).

Physical setting represents the over-all natural condition of the area *in situ*. It may be understood as the integrated study of geology, relief features, drainage, climatic condition etc. (Pachuau, 1994: 22). Similarly, cultural setting also refers to the integrated study of population and settlement etc. An attempt has been made in the present chapter to study the physical and cultural aspect of Aizawl district on the bases of following head– geology, topography, drainage, climate, land use/ land cover, population and settlement respectively.

2.2 Geology

The study area represents a monotonous sequence of argillaceous and arenaceous rocks, which are classified by Geological survey of India into two formations viz., Middle Bhuban and Upper Bhuban formations. The formations are folded into almost N-S trending anticlines and synclines and affected by longitudinal, oblique and transverse faults of varying magnitudes.

The middle Bhuban formation is mainly a thinly bedded sequence with sandstone-shale/siltstone ratio of about 50:50, with mudstone. Sandstone are fine to

very fine grained, ash to bluish grey in colour, compact and hard, thinly bedded; rarely yellowish brown medium grained and friable. Few thick beds of sandstone are found in some areas. Shale and siltstone are dark and grey in colour and usually splintery. This group of rocks occupies the core of anticlines, flanked on either side of upper Bhuban formation. A few thickly bedded sandstone bands are noticed at certain places. These beds are important source of building and road construction material and theyform the main ridges of the area. The contact between middle and upper Bhuban formation is gradational and transitional.

The upper Bhuban formation occupies the core of Tlawng, Tuirial, Tuivawl and Tuirini synclines and the lithology in these areas is mainly represented by shale siltstone and little mudstone. The arenaceous – argillaceous ratio is about 50 : 50 in the lower part and 80 : 20 in the upper part of the formation. Geomorphically, this unit occurs as subdued hills giving rise to hummocky topography.

Table- 2.1 Lithological Statistics of Aizawl District.

Sl.no	Rock Types	Area (Sq. km)	in %
1	Sandstone	1279.63	35.78
2	Siltstone & Shale	2264.32	63.31
3	Limestone	1.47	0.05
4	Clayey	25.52	0.71
5	Gravel, Sand & Silt	5.36	0.15
	Grand Total	3576.31	100

(Source: State Remote Sensing Center, Science Technology & Environment, Planning Department, Govt. of Mizoram)

2.3 Topography

The topography of the study area is characterized by mountain ranges, ridges running in north to south direction in parallel series. The ridges, and mountain ranges are separated from one another by narrow and deep river valleys. The area is characterized by six main ridgelines and intervening valleys and less prominent ridges.

i) On the eastern side of Tlawng River, a highly dissected ridge line starts from Tahreuh tlang near Chamring village towards northwest till Maubuang village and continues up to Aizawl city whose total length is about 45.3 kms. This ridge line terminates at Bawngkawn saddle. It attains a height of 1619 meters near Chamring, 980 meters near Aibawk, 1156 meters at Tlangnuam and 1188 meters at Laipuitlang.

ii) Another ridge line starts from Durtlang (1383m) and continues towards Sihphir and Neihbawih (1441m) and further extends up to Kolosib district

iii) On the eastern side of Tuirial river, another ridge line starts from Phulmawi village (1149m) in the south and continues towards Tlungvel (1288m) and Thingsulthliah village (1052m). It further continues northward through Sesawng and it ends at Mualmam village. The total length of this ridge is about 30 kms. Another ridge runs in the northern side near Hmunzawl village (800m) and ends near Sunhluchhip village (1040m). The total length of this ridge is about 18 kms.

iv) Between the river Tuivawl and river Tuirial, another major ridge runs from Tualbung village (1309m) and continues through chalhfilh tlang (1866 m)and passes through Pehlawn, Kepran, Darlawn and ends at 7.5 kms north of Ratu village. The total length of this ridge line is about 52 kms. On the south eastern side, another ridge line originates from Tawi tlang (1837m) and continues towards Ruallung (1350m) and Saitual village (1202m) and it ends near Sihfa village (1278m). The total length of this ridge is about 23 kms.

v) Between Tuivai and Tuivawl rivers in the north eastern part of the district, another major ridge line originating from Zawngin village (1220m) and continues towards northward passing through Suangpuilawn village (1125m), Vanbawng village (1393m) and Khawlek village(1273m). It terminates near Tuivai river.

vi) Another ridge line in north eastern part of the district starts from Lenhlingzo tlang (1717m) near Phuaibuang village and continues northward passing through Khawlian and Daido village and it ends at the boundary near Vangvu stream. The length of this ridge line is about 18 kms.

Generally, we can categorized the whole district into the following three geomorphic classes-

1) Structural hills: It is associated with folding, faulting and other tectonic processes. The structural hill is further divided into three classes –

a) High structural hills (above 1200m)-Cover an area of 180.21 sq.km or 5.04 % of the study area. It is found mainly at the peaks of Hmuifang, Tawi, Chalhfilh and Mawmrang tlang.

b) Medium structural hills (500-1200m) – Cover an area of 330.37 sq.km or 32.22%. It is found along Aizawl, Neihbawi and East Phaileng ridge. Moreover, it is also found below the peaks of Hmuifang, Tawi, Chalhfilh, Mawmrang Tlang and Suangpuilawn ridge.

c) Low structural hills (below 900m) – cover an area of 2530.93 sq.km or 70.77 % of the study area and are found almost throughout the study area.

2) Valley Fill: Valley Fill is of fluvial origin characterized by the unconsolidated sediments deposited by streams or rivers in a narrow fluvial valley. They are found along Tuirial River, Tuirini River and along the streams of the northern part of the district. It covers an area of 33.07 sq.km and accounting for about 0.92 % of the study area.

3) Flood Plain: It constitutes another geomorphic class and are found along the major rivers. They are formed by deposition of alluvium such as gravel, sand and silt. It covers an area of 1.73 sq.km and it is about 0.05 5 of the study area.

Table- 2.2 Geomorphological classes of Aizawl District.

Sl.no	Geomorphic unit	Area(Sq.km)	in %
1	High structural hill	180.21	5.04
2	Medium structural hill	830.37	23.22
3	Low structural hill	2530.93	70.77
4	Valley Fill	33.07	0.92
5	Flood Plain	1.73	0.05
	Grand Total	3576.31	100

(Source: State Remote Sensing Center, Science Technology & Environment, Planning Department, Govt. of Mizoram)

The study area is characterized by several prominent hill ridges running parallel to each other from north to south except the southernmost hill ridges around Sialsuk and Chamring villages, where the hill ridges run in north-west to south –east direction. The study area has few plain areas, stretching between hills and along the major rivers. They are usually found in the northern part of the district. Although there is unavailability of extensive plain area, a small parcel of land along the rivers is utilized for the cultivation rice.

The western part of the district along Tlawng river is characterized by narrow river valleys with ravines and gorges except Sairang village. The central part, at the confluence of Tuirial and Tuirini rivers is dominated by gently sloping and low-lying hills. The south eastern and easternmost part of the district around Tawi tlang, Hriangmual tlang and Mawmrang tlang are characterized by spectacular scarps. Hills of the eastern part are larger in areal extends as well as steeper than the western and central part of the district. The slope of the study area can be divided into nine slope facets as follows –

Table- 2.3 Slope statistics of Aizawl district

Slope	Area	in %
0 – 3	22.93	0.64
3 – 10	2.72	0.08
10 – 15	5.9	0.17
15 – 25	119.35	3.34
25 – 35	341.2	9.54
35 – 50	1370.7	38.33
50 – 70	1164.75	32.57
70 – 100	450.35	12.59
>100	98.4	2.75
Total	3576.31	100

(Source: State Remote Sensing Center, Science Technology & Environment, Planning Department, Govt. of Mizoram)

2.4 Drainage

Most of the major rivers like Tlawng, Tuirial, Tuirini, Tuivawl and Tuivai are flowing northward except Mat river which is flowing southward. Moreover, there are a good number of streams and rivulets flowing in various directions and is confluence with major rivers. It is found that most of the drainage pattern is dendritic to sub-dendritic patterns and the streams are youthful stage with deep courses. The major drainage systems of Aizawl district are as follows –

i) Tlawng Drainage System – Tlawng River is one of the most important rivers of Mizoram and it is the longest river in Mizoram. Important tributaries are Lau lui, Changte lui, Serlui A, Tuikual lui, Kurung lui and Dur lui. The drainage system as a whole is elongated in north to south direction, dendritic to sub-dentritic drainage patterns and even sub-parallel drainage patterns are found on the western flanks of Tanhril village. Among these tributaries Changte lui and Lau lui have flood plain making the area suitable for agriculture purpose.

ii) Tuirial Drainage System - Tuirial river originates from Chawilung hill and flows northward throughout the district till it enters Cachar district of Assam. The important tributaries are Tuirivang lui, Tuinghaleng lui, Suanghuan lui, Chite lui, Tuipawl lui, Sihphir lui, Tuirini lui, Tuiphu lui , Tuitung lui, Tuitla lui, Tuisual lui, Mairang lui, Chengkawl lui and Matai lui. The drainage system is elongated north to south direction and is found to be dentritic to sub-dentritic drainage patterns.

iii) Tuivawl Drainage System – Tuivawl river originates at a height of 1590 m above sea level from Rullam tlang and forms a district boundary with Champhai district. Important tributaries are Ralzawh lui, Thang lui, Puantawm lui, Tuichhiahlian lui, Tuiraih lui, Tuituai lui, aier lui, Siktui lui and Lozal lui. The drainage system is elongated in north to south direction showing dentritic to sub-dentritic drainage patterns.

iv) Tuivai Drainage System – Tuivai River is the largest river in Aizawl district in terms of volume. It has a source in Manipur and forms a boundary line between two state for a considerable length and after entering Mizoram it forms district boundary line between Aizawl district and Champhai district. It has many important tributaries having flood plains along their courses, such as Tuiphal lui, Tuiriza lui, Tuitut lui etc. in the southern part and Rahnam lui, Luak lui, Zilthaw lui, Sumlung lui and Rundung lui are the notable northern tributaries. Dendritic to sub-dentritic pattern are observed in this drainage system.

2.5 Climate

The climate of Mizoram is Tropical Monsoon type of climate. So, Aizawl district, situated in the north-central part of the state enjoys a moderate climate owing to its tropical locations (Pachuau, 1994:41). It is neither hot nor too cold throughout the year.

Aizawl district is under the direct influence of the south west monsoon, as such Aizawl district has humid tropical climate characterized by adequate amount of rainfall, short winter and long summer with heavy rainfall (State Remote Sensing Center, 2006).

2.5.1 Season:

Due to variation in temperature, rainfall, humidity and other general weather conditions, four types of season are observed in Aizawl district.

i) The Cold or winter season (Thlasik) - Cold or winter season starts from December to first half of February. This is the coldest season of the year. During this period rainfall is either scanty or insignificant as compare to other seasons. Whatever rainfall available during this period is received from North East Monsoon or retreating Monsoon. This season is characterized by clear sky with pleasant weather condition.

ii) The spring Season (Thal) - Spring season is the shortest season of the year. It starts from the second half of February to the half of March. Temperature is mild during this period and the sky is clear.

iii) The Summer or rainy Season (Nipui/Fur) - Summer season or Rainy season (Nipui/Fur) is the longest season starting from the second half of March till the first half of October. The early part of this season i.e, from second half of March till first half of May is characterized by bright sunshine and clear sky with little or no cloud till it is disrupted by the monsoon. Rainfall is heavy from May to September and about 40 % of the annual rainfall is received during July and August. The heavy rainfall normally in the morning is sometimes associated with hailstorms and thunder. Soil erosion and landslide are the common phenomena during the rainy season.

iv) Autumn season (Favang) – Autumn season covers a period generally starting from the second part of October to November. This season is the most pleasant season where the temperature is mild and moderate.

2.5.2 Temperature:

The temperature condition prevailing in Aizawl district does not fluctuate much throughout the year. The highest temperature observed during the last twenty years recorded was as high as 36.7 ºC in the month of April, 1999. Generally, July, August and September are the warmest months for the whole year with average temperature of 30.4º C,30.7 ºC and 30.9 ºC respectively. The temperature fall down from the month of November gradually and it is minimized in December and January. January is the coldest month with the average maximum temperature of 25.9 º C and minimum temperature of 8.2 ºC. However the lowest temperature recorded was 5.4 ºC during December, 1991. (Monthly mean, maximum and minimum temperature has been shown in the appendix-2).

2.5.3 Rainfall

Since the entire state of Mizoram is under the influence of south west monsoon, Aizawl district also receives adequate amount of rainfall during monsoon season mainly from south-west monsoon. Normally, heavy rainfall starts from the second/third week of May and it ends in the early part of October. Average rainfall of Aizawl district is 2786.6 mm per annum and the highest rainfall received was 865.5 mm on July, 2004. June, July and August are the rainiest months while December, January and February are the driest months. (Average monthly rainfall has been shown in the appendix-2).

2.6 Land Use/Land Cover

The term ‘land used’ not only implies the use of land for cultivation, pastoralism, forestry etc., but it also includes the various related aspects and factors which direct and regulate the process of such utilization in a region. The existing pattern of land used in a region is an outcome of the interplay of man’s activities under a set of physical and

cultural circumstances (Tiwari; 1988:91). The major land use/Land cover of the study area can be broadly divided into six categories. Out of the total geographical area of 3576.31 sq.km, forest has the largest coverage of about 80.27%. A considerable proportion of land is covered by shifting cultivation (16.6%), followed by built-up land (1.36%), Scrub land (0.99%), Water body (0.04%) and Agriculture land consisting of plantation and kharif land is negligible.

2.7 Population

Population or human resource is an element of prime importance in the social, cultural and economic development of a region. It is the people that propel social progress, create social wealth, develop science and technology and, through their hard work, continuously transform the human environment. In other words, population is a point of reference from which all other elements are observed (Trewartha, 1953:18). Hence population has been an important exercise in the planning of developmental processes.

2.7.1 Growth

Growth of population is the changes in the number of people living in a particular area between two given points of time. Changes in the size of population (population growth) is mainly due to birth and death rates and migration during the period under consideration. The pattern of population distribution in a region is mainly dependent on the past changes in the population characteristics in terms of location, distribution, density, growth and mobility (Pachuau, 1994:111). The net change between two points of time is expressed in percentage and is described as the growth-rate of population. The growth of population is positive if there is increase in population and negative if there is decrease in population between two given points of time (Khullar, 2001:179).

Table-2.4 Land Use/Land Cover Statistics of Aizawl District

Category	Area (sq.km)	In Percentage
1. Built –up land		
1.1 City	26.31	0.74
1.2 Town	3.15	0.09
1.3 Village	18.82	0.53
2. Agriculture Land		
2.1 Cropland		
Kharif	2.23	0.06
2.2 Plantation		
Citrus woodland	1.59	0.04
Banana	1.4	0.04
Pineapple	0.13	0.004
Tea	0.51	0.01
Tung	1.61	0.04
Misc. Agriculture Plantation	6.69	0.19
3. Forest		
3.1 Dense	642.75	17.97
3.2 Medium dense	410.21	11.47
3.3 Less Dense	399.73	11.18
3.4 Bamboo	1403.01	39.23
3.5 Forest Plantation		
Teak	12.23	0.34
Miscellaneous	2.86	0.08
4. Shifting Cultivation		
4.1 Current Shifting Cultivation	185.44	5.19
4.2 Abandoned shifting cultivation	407.97	11.41
5. Scrub Land	35.38	0.99
6. Water Body	14.29	0.4
Total	2576.31	100

(Source: State Remote Sensing Center, Govt. of Mizoram)

Population growth or change can be measured both in absolute numbers and in terms of percentage. The growth of population in terms of percentage is generally calculated by dividing the absolute change by the population at an earlier date and multiplying it by hundred (the denominator should be the mid – period population, but since the mid-period population will have to be estimated, therefore, the growth rate is normally calculated by using the actual population size at the beginning point of the period under review) (Chandna, 2004:100-101). (The pattern of population growth (1961-2001) at the village level has been shown in the Appendix-3)

It is observed that the population of 1971 for most of the settlement is not available due to the fact that grouping of villages has been introduced during 1961-1971. It is also pertinent to mention that the negative and positive growth rate is also observed at various settlements in the study area. The population growth rate of Aizawl district during 1981-1991 is 51.24% and it declined to 38.72% during 1991-2001. Analyses of population growth at the block level (table 1.8) shows that the highest rate is observed in Tlangnuam block (76.95%) in 1981-1991 and Phullen block is found to have a negative growth rate of -1.93%. The highest growth rate is observed in Tlangnuam block (46.32%) during 1991-2001. On the other hand, lowest rate is found in Aibawk block (10.87%).

The highest growth rate of Tlangnuam block (1981 -1991 and 1991 -2001) may be attributed to the continuous rural-urban migration and it is found to be more pronounce during 1981 – 1991 (Vanlalthlana, 2001). The coefficient of variation has been decreased to 0.60 (1991-2001) from 1.24 (1981-1991).

2.7.2 Distribution and Density of population

The spatial pattern of population distribution in the study area is uneven and it is more or less largely influence by the topographical condition which has significance impact

on the transportation route connecting the human habitation. It is imperative to mention that settlements having large population are located either along the highway or at the confluence of several highways. On the contrary low population is mostly confined to remote area. As the study area is characterized by hilly and rugged topography, the transportation route follows the major ridge line sometime at the top of the hill above several thousand meters. Besides, socio- cultural, educational and administrative factors also have an influence on the distribution of population in Aizawl district. Population density is concerned with the ratio between the size of population and the area. Thus, it is usually express in terms of persons per square kilometer or per square mile.

It is observed that the density of population of Aizawl district is 43.4 persons per square km in 1981. It is found to increases about 65.64 in 1991 and 91.06 persons per square km in 2001. Tlangnuam block is found to be having highest density of population about 455.79 persons per square kilometer in 2001. It is pertinent to mention that the coefficient of variation of density of population of the district has been increasing from 1.31 to 1.7(1981-2001).

Three areas of density may be identified in Aizawl district as follow –

(a) Areas of high density: Block with a population density of more than 50 persons per square kilometer is Tlangnuam block.

(b) Areas of moderate density: Block with a population density between 25 and 50 persons per square kilometer is Aibawk block and Thingsulthliah block.

(c) Areas of low density: Block with a population density of less than 25 persons per square kilometer is Darlawn block and Phullen block.

2.8 Settlement

Settlement is defined by geographers as a place inhabited more or less permanently by men or women. A settlement denotes the area of interaction of a given group of people and includes areas of residential, social and economic activity. Richthofen defined settlement as the natural manner in which man established himself on the earth's surface.

2.8.1 Density of settlement

The observed density of settlement of Aizawl district is 2.73 (table 1.10). Aibawk block has the highest settlement density of 3.56 followed by Darlawn block (2.89), Thingsulthliah (2.63), Phullen block (2.32) and Tlangnuam block (2.25). The coefficient of variation of density of settlements in Aizawl district is 0.19. Three classes of density of settlement has been identifies as follow-

(i) Settlement density above 3 per 100 sq. km – Aibawk block

(ii) Settlement density between 2.5 and 3 per 100 sq. km – Darlawn block and Thingsulthliah block

(iii) Settlement density below 2.5 per 100 sq. km – Phullen block and Tlangnuam block

2.8.2 Spacing

Spacing of settlements is closely related with the size and density. It may be explained in terms of straight line distance among settlements and their locational arrangement in respect of one another (Tiwari, 1988:83). Therefore, the wider the spacing, the larger is the size of settlements. The spacing of settlements in Aizawl district has been analyzed with the help of the following formula –

$D = 1.0746 \sqrt{A/N}$ (Mather, 1944:173-180)

Where, D = Inter village distance

A = Area of the region

N = Number of settlements in the region.

Spacing of settlements in Aizawl district can be categorized into three categories-

(i) High spacing (above 7) : Tlangnuam block (7.15) and Phullen block (7.04) are included in the category of very high spacing of settlements in Aizawl district.

(ii) Moderate spacing (6 – 7): Thingsulthliah block (6.62) and Darlawn block (6.31) are found in moderate spacing of settlements.

(iii) Low spacing (below 6) : Only Aibawk block is found in the category of low spacing of settlements. In this block settlements are 5.69 km apart or the inter-village distance is 5.69 km.

The coefficient of variation of spacing of settlement is 0.09.

Table- 2.5 Aizawl district - Population growth (1981 – 2001)

R.D BLOCKS	1981	Growth rate in %	1991	Growth rate in %	2001
1. DARLAWN	18066	11.88	20213	19.57	24169
2. PHULLEN	11070	-1.93	10856	13.64	12337
3. AIBAWK	11671	23.54	14419	10.87	15987
4. TLANGNUAM	93769	76.95	165925	46.32	242789
5. THINGSULTHLIAH	20638	13.11	23345	30.19	30394
AIZAWL DISTRICT	155214	51.24	234758	38.72	325676
Coefficient of variation		1.24		0.60	

Source: 2001 Census of India.

Table-2.6 Aizawl district - Density of Population (1981 – 2001)

R.D BLOCKS	1981 person per sq. km	1991 person per sq. km	2001 person per sq. km
1. DARLAWN	17.43	19.48	23.29
2. PHULLEN	21.48	21.07	23.94
3. AIBAWK	18.91	23.37	25.91
4. TLANGNUAM	176.03	311.49	455.79
5. THINGSULTHLIAH	23.6	26.7	34.77
AIZAWL DISTRICT	43.4	65.64	91.06
Coefficient of variation	1.35	1.61	1.70

Source: Census of India 2001

Fig- 2.1 Decadal growth of population (1991 - 2001)

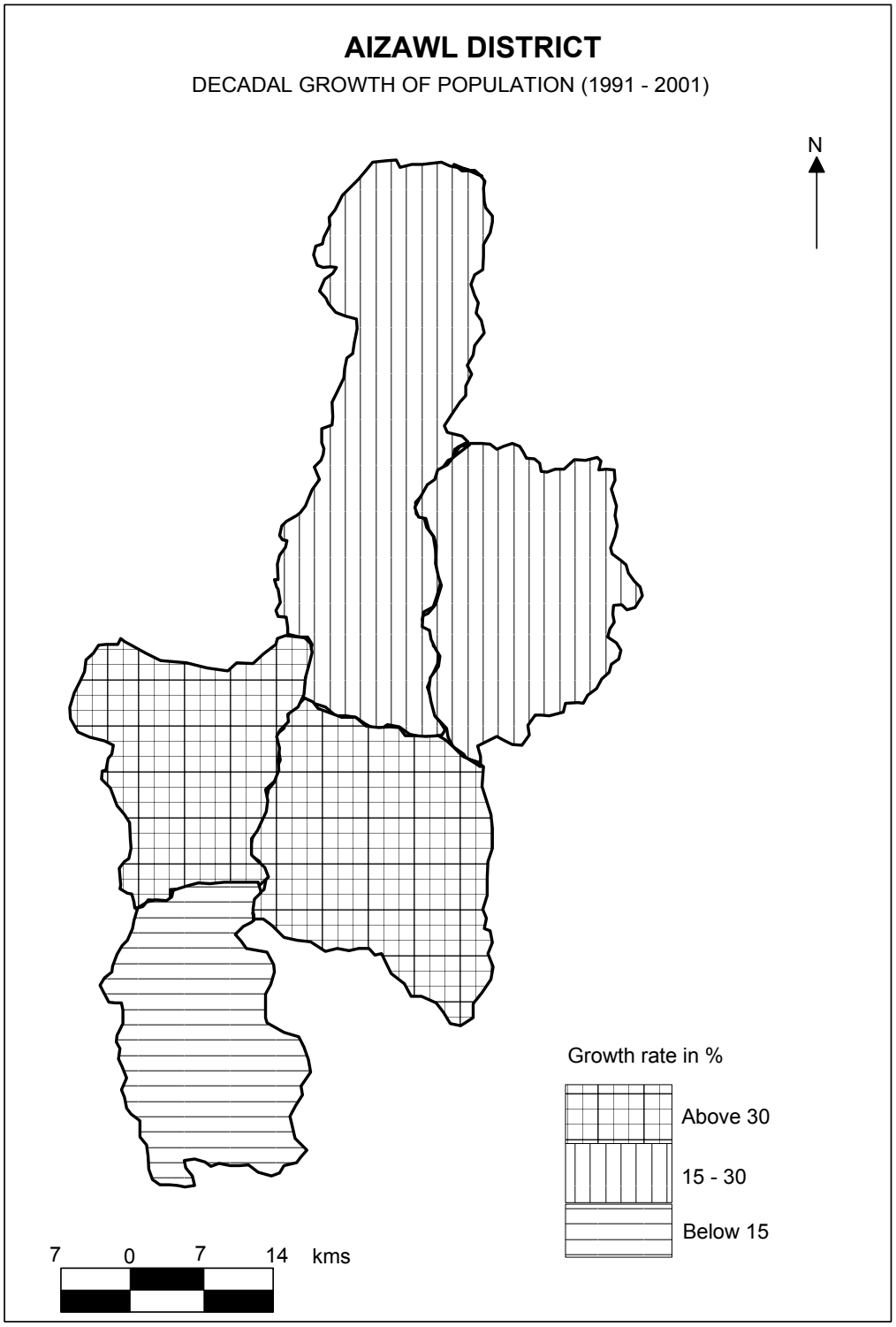


Fig-2.2 Density of population -2001

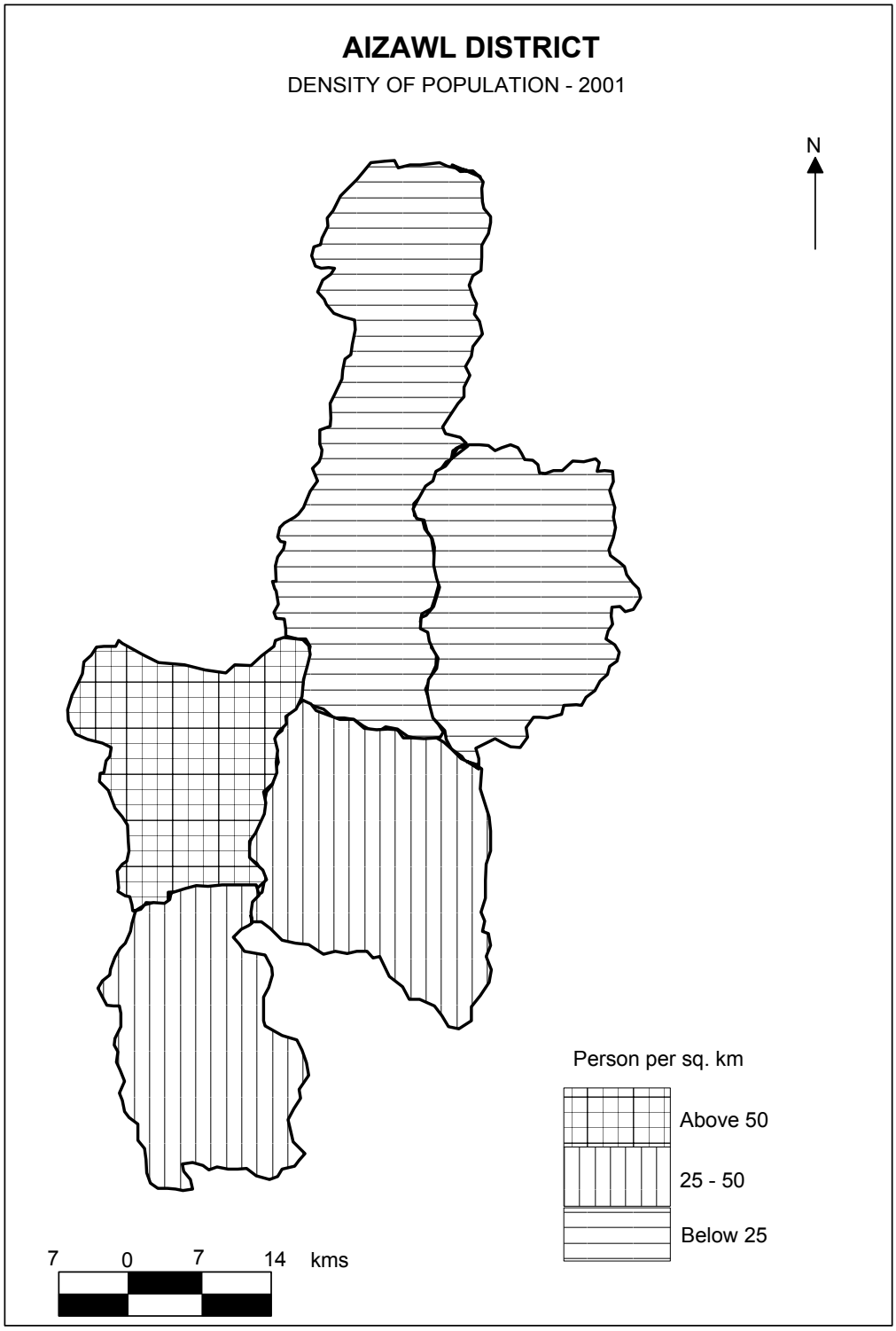


Table- 2.7 Aizawl district - Size and Density of Settlement (2001)

Sl.no	R.D Block	Average area per settlement (in sq.km)	Average population per settlement (in number)	Settlement density per 100 sq.km
1	Darlawn	34.58	805.63	2.89
2	Phullen	42.92	1028.08	2.32
3	Aibawk	28.04	726.68	3.56
4	Tlangnuam	44.38	20232.41	2.25
5	Thingsulthliah	38	1321.47	2.63
	District total	39.58	4822.85	2.73
	Coefficient of variation			0.19

Table-2.8 Aizawl district- Spacing of Settlement (2001)

Sl.No	R.D Block	Number of Settlements	Area in Sq. km	Spacing in Km
1	Darlawn	30	1037.48	6.31
2	Phullen	12	515.15	7.04
3	Aibawk	22	616.88	5.69
4	Tlangnuam	12	532.67	7.15
5	Thingsulthliah	23	874.13	6.62
	District total	99	3576.31	6.45
	Coefficient of variation			0.09

Fig- 2.3 Density of settlements

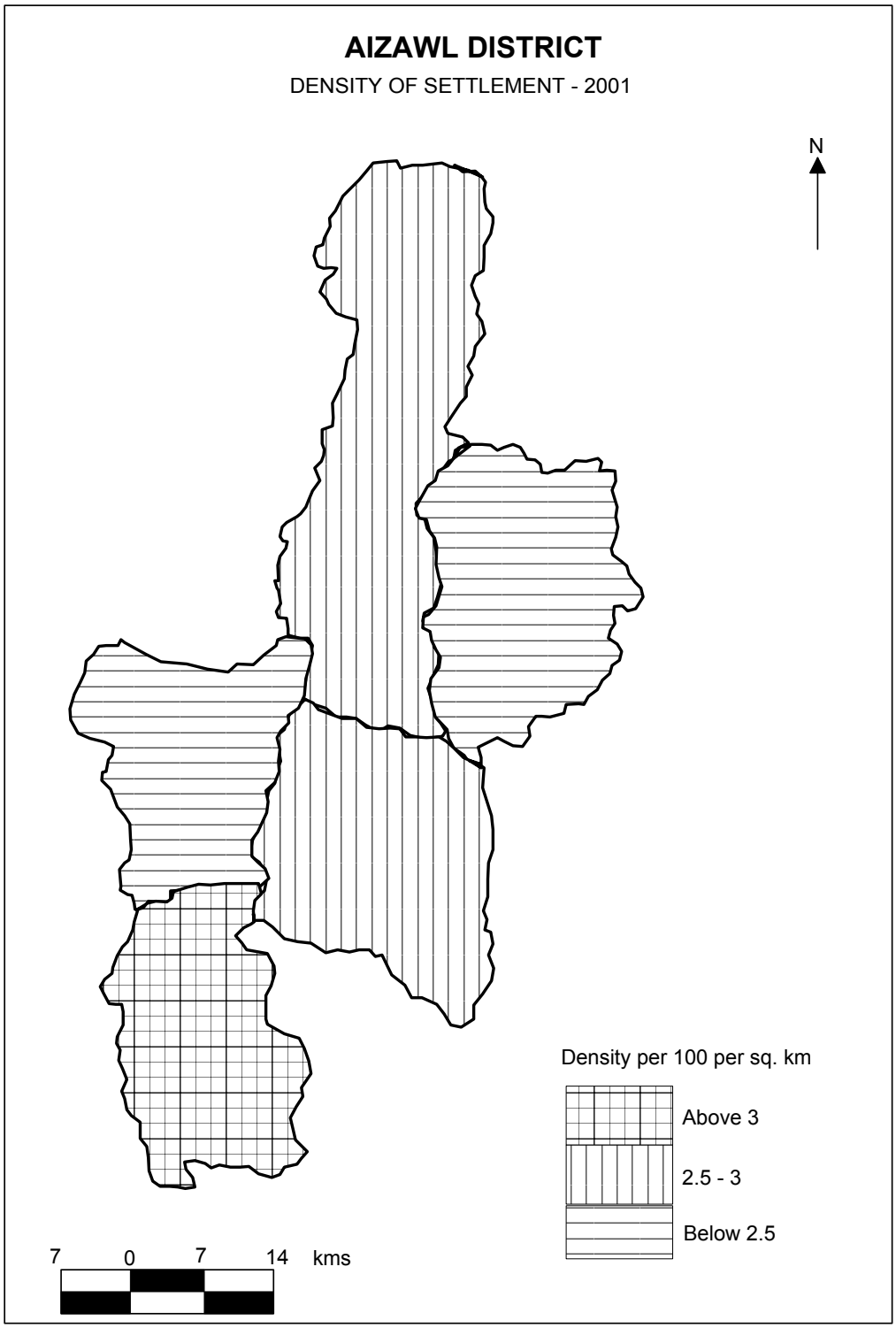
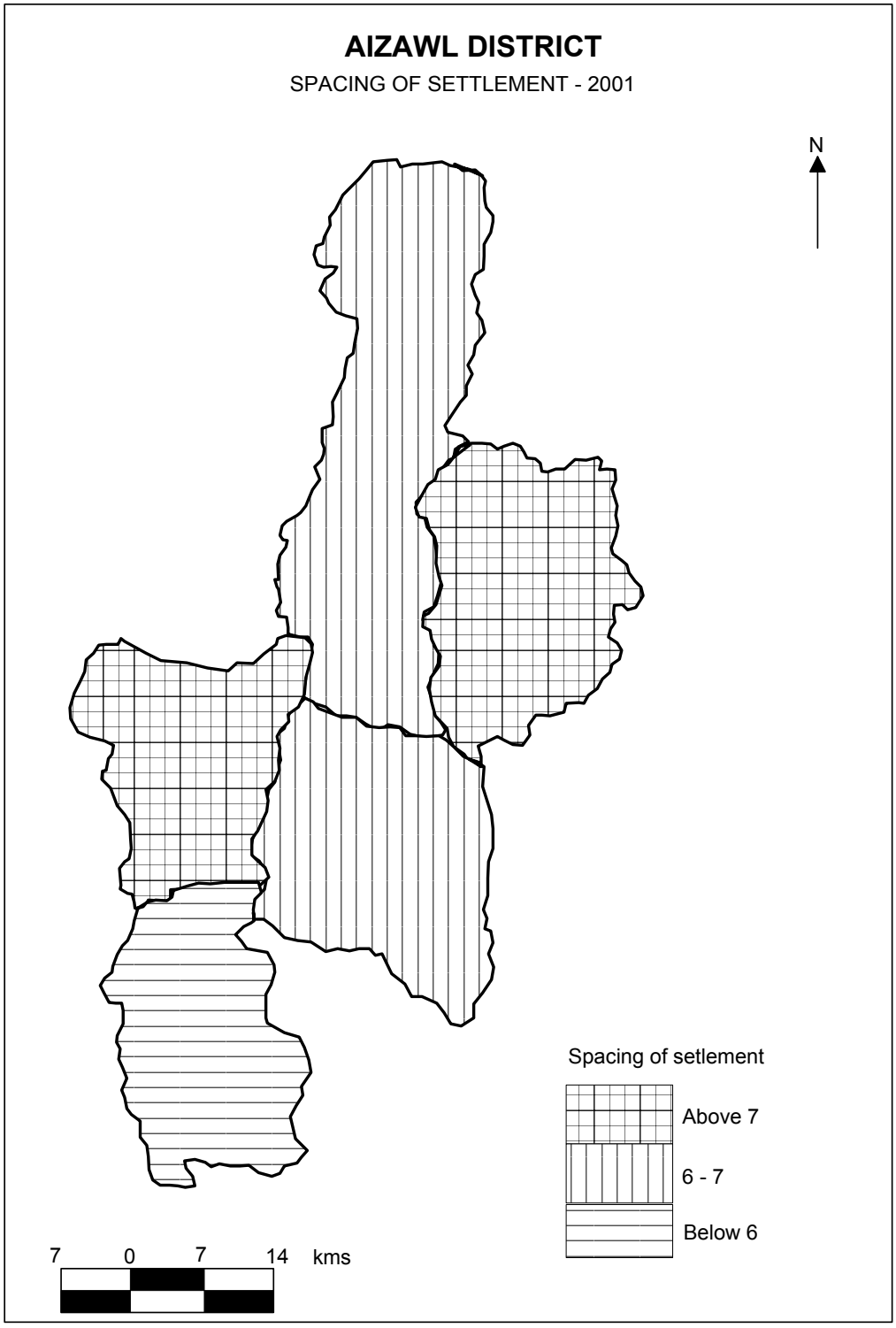


Fig- 2.4 Spacing of settlements



2.9 Conclusion

The study of physical and cultural settings of Aizawl district may be summarized as below-

Firstly, the population distribution is uneven in Aizawl district. It is observed that settlements having large population are located either along the highway or at the confluence of several highways. On the contrary settlement having low population is mostly confined to remote area as well as area having poor transportation linkages. Thus, transportation route has tremendous influence on the distribution of population in Aizawl district.

Secondly, the population growth rate is found to be decrease in Aizawl district. The population growth rate of 1981 to 1991is 51.24 %. It decline to 38.72 % during 1991 to 2001. Among the block Tlangnuam block is found to have highest growth rate about 76.95% (1981 -1991) and 46.32% (1991-2001) respectively. This may be attributed to continuous rural-urban migration and it is more pronounce during 1981 – 1991.

Thirdly, the density of population of the district has been increasing and it reaches 91.06 persons per sq. km in 2001. Tlangnuam block has the highest density of population about 455.79 persons per sq. km. This may be attributed to the present of the state capital i.e., Aizawl city containing about 25.7% of the state population and about 70.09% of the district population.

Lastly, the density of settlement of Aizawl district is 2.73 per 100 sq. km. The highest density is found in Aibawk block (3.56) and the lowest density is observed in Tlangnuam block (2.25). The spacing of settlement or inter village distance of Aizawl district is calculated to be 6.45 km. The highest spacing of settlement 7.15 is found in Tlangnuam block and the lowest spacing 5.69 is observed in Aibawk block. It is

pertinent to mention that there is a correlation between density of settlement and spacing of settlement as it is observed that block with high density of settlement is found to have low spacing of settlement. On the other hand, high spacing of settlement is associated with low density of settlement.

REFERENCES

1. Chandna, R.C., (2001): *Geography of Population*, Kalyani Publishers, pp.100-102.
2. Khullar, D.R., (2001): *India- A comprehensive Geography*, Kalyani Publishers, p.179.
3. Mather, E.C., (1944): "A Linear distance map of farm population in the United States", *Annals of the Association of American Geographers*, Vol.34, pp.173-180.
4. Pachuau, Rintluanga., (1994): *Geography of Mizoram*, R.T Enterprise, p.22.
5. Pachuau, Rintluanga., (1994): op.cit, p.41.
6. State Remote Sensing Center., (2006): *Natural resources mapping of Mizoram using Remote Sensing and GIS, Aizawl District (A project Report)*, Science Technology and Environment, Planning Department, Govt. of Mizoram.
7. Tiwari, P.C., (1988): *Regional development and planning in India,* Criteria publications, New Delhi, p.5.
8. Trewartha, G.T, (1953): "A Case of Population Geography", *Annals of the Association of American Geographers,* p.18.
9. Vanlalthlana, B., (2001): *Population Redistribution and Urbanization in Mizoram*, Unpublished Ph.D Thesis, Dept. of Geography, North Eastern Hill University, Shillong.

CHAPTER – III

INTER-BLOCK LEVEL OF SOCIO-ECONOMIC DEVELOPMENT

- Introduction
- Indicators of socio-economic development
- Level of demographic development
- Level of social development
- Level of economic development
- Level of socio-economic development
- Conclusion

3.1 Introduction

Reducing regional inequality or disparity is the major concern for any type of development planning. The main problem faced by most of the countries is of regional imbalance and of regional inequalities. Even in developed countries the regional imbalance and inequalities are present in a substantial proportion. Some states are economically advanced and some are backward and even within each state some region are more developed and some are primitive (Lekhi, 2005:34). It is also observed that the regional imbalance is more pronounced in developing countries than the developed countries as the poor countries are characterized by large and growing regional disparities and the rich countries are generally characterized by small and diminishing gaps.

Most of the theories of economic development in a capitalist framework assume a harmonious self-adjustment in the system and rule out the possibility of a regional problem. This neoclassical belief in the equilibriating market mechanism in reducing regional economic disparity persisted till Second World War. Following Kuznets (1963 & 1973) inverted-U curve of income inequality, Williamson (1965) argued that regional inequality increases during the early stages of development and declines during the later stages amidst debate on economic convergence versus divergence as a possible outcome of economic growth (Patnaik, 1981:1). The growing economic inequality between developed and less developed nations in terms of the theory of unequal exchange is also suggested by Griffin (1969) and Gonzalez (1969), Young (1971), Emmanuel (1972). Despite the biasness of state intervention (Lipton, 1977), the political-economic perspective on regional development (Myrdal, 1957; Hirschman, 1958; Friedman, 1966 & 1973; Boudeville, 1966) advocated that without the intervention of the state, regional imbalances are found to be increase. Thus, Chakravorty (2005) argued that state

intervention is politically necessary and inevitable in order to improve the distribution of welfare. Regional inequality in India has also been endorsed by Swamy (1967), Rao (1972), Sampath (1977), Sarkar (1994) suggesting the convergence in inequality over the years, while others Rao (1973), Ojha and Bhatt (1964), Mathur (1983), Dutta and Chowdhury (1995) (1996) are in favour of a tendency of divergence which is found to be contradicting the inverted U phenomenon of Williamson.

Disparity or inequality in the level of socio-economic development at the block level (Lalrinmawia, 1999) and of the district level (Saitluanga, 2008) is also observed in Mizoram. The disparity among inter/intra district appears to be the unequal distribution of socio-economic development attributes like Government sponsored facilities.

It is also observed that the study area does not have sound economic base in manufacturing sector and it has been categorized as 'no industry district'. (Lianzela, 1994:142). There is a vast untapped natural resource to expedite the process of development, but not yet explored, and which may be attributed to physical as well as technological factors. It is pertinent to mention that the State as well as Aizawl district is found to be depends upon the flow of central assistance. It is also observe that majority of the population live on agriculture and allied activities, even though the contribution of agriculture to the state economy is marginal. Thus, the people depend directly or indirectly on the Government allocation of resources through various socio-economic institutions.

It is also found to be true in any region that socio-economic facilities which are meant to generate socio-economic betterment of the people are limited and scarce, it eventually deteriorates the quality of life and their productivity. On the other hand, availability and accessibility to such facilities are expected to improve quality of life, productivity and further boost the welfare of the people and expedite economic growth.

Thus, socio-economic facility of an area is believed to play a very important role in the process of development and hence, greater emphasis should be placed on the basic social and economic service, facilities and amenities. It is in this light that, an attempt has been made in the present study to assess the level of socio-economic development of Aizawl district in terms of the availability of social and economic facility, and attributes of demography.

3.2 Indicators of socio-economic development

Any development study necessarily depends on certain indicators throwing light on the living standard and level of development. Scholars have been trying to define and interpret level of development of any region in terms of certain selected indicators. There have been numerous attempts on the evaluation of level of development of region, district, block and cluster of villages etc., where the selection of indicators has been determine by the availability of requisite data and study area personality. Moreover, indicators should be relevant in the context of regional development and should as far as possible, reflect the activity, quality and trend (Rao, 1993:16).

In the present analysis data has been collected from secondary sources. An attempt has also been made to select the appropriate indicator showing the inter-block disparity on socio-economic development as relevant as possible. Hence, the selected indicators are grouped into three sectors namely – demographic sector, social sector, and economic sector.

Demography or human resource is one of the most practical resources. Higher development of human resource results in greater level of overall development. The availability of number of females per thousand males, population growth and density have constituted the structure of demography in a region.

Any region to attain any development goals needs a sound base of education, health and communication facilities. Proper training on personal development in educational institution acts as an important development strategy. Medical facility is also an essential ingredient for development as a good condition of health is prerequisite to cater any developmental activities in a region. Efficient and effective delivery of information through communication facility is also necessary to expedite the process of development.

One of the most important indicator of economic development is per capita income. Due to unavailability of per capita income at the block level, surrogate indicators of economic development have been considered in the present study. Availability of main workers, marginal workers and working population engaged in secondary activities are the important attributes of development and it depicts the structure of the economy of a region. Accessibility in terms of transport for carrying goods and passengers is one of the key indicators of economic development. Moreover, the infrastructure and amenities play an important role in accelerating the pace of development and it is found to be a base for any kind of economic development. Electrification and banking facility is one of the basic necessities of man and is an essential to modernize rural community. The availability of household items viz., telephone, television, vehicle and household material has also reflected the economy of the family in particular and of the region in general. Thus, in the light of above discussion, the following indicators have been selected-

The selected indicators are as follows:

(A) Demographic Sector

X1 Population density.

X2 Sex ratio.

X3 Population growth rate (1991-2001).

(B) Social Sector

X4 Number of Middle school per ‘000 population.

X5 Number of High school per ‘000 population

X6 Number of Sub-center per ‘000 population.

X7 Number of PHC/CHC per ‘000 population

X8 Number of Branch post office per ‘000 population

X9 Number of Sub post office per ‘000 population

X10 Percentage of Literacy to total population.

X11 Work participation rate.

(D) Economic Sector

X12 Percentage of main workers to total worker.

X13 Percentage of marginal workers to total worker.

X14 Percentage of working population engaged in secondary sector.

X15 Percentage of villages having Bus service to total number of villages.

X16 Percentage of household availing Banking service to total household.

X17 Percentage of household using concrete as material of walls to total household.

X18 Percentage of electrified household to total household.

X19 Percentage of household having Car, Jeep, and Van to total household.

X20 Percentage of household having Television to total household.

X21 Percentage of household having telephone to total household.

Table-3.1 Aizawl district- Values of Indicators of Socio-Economic Development.

Sl.no	Block	Demographic Indicators			Social Indicators			
		X1	X2	X3	X4	X5	X6	X7
1	Darlawn	23.29	954	19.57	0.028	0.014	0.015	0.003
2	Phullen	23.94	937	13.64	0.019	0.01	0.007	0.002
3	Aibawk	25.91	957	10.87	0.021	0.009	0.02	0.002
4	Tlangnuam	455.79	962	46.32	0.153	0.051	0.052	0.004
5	Thingsulthliah	34.77	876	30.19	0.033	0.019	0.016	0.001
	Aizawl district	86.7	95.2	38.72	0.15	0.1	0.11	0.01

Sl.no	Block	Social Indicators				Economic Indicators		
		X8	X9	X10	X11	X12	X13	X14
1	Darlawn	0.017	0.001	77.09	63.5	76.84	23.15	0.08
2	Phullen	0.006	0.001	77.6	60.7	86.74	13.26	0.01
3	Aibawk	0.018	0.002	81.67	69.2	71.8	28.19	0.02
4	Tlangnuam	0.035	0.009	83.92	45.1	76.57	23.42	0.76
5	Thingsulthliah	0.017	0.002	81.14	64.1	77.94	22.05	0.04
	Aizawl district	0.09	0.02	82.81	50	76.91	23.1	0.93

Sl.no	Block			Economic Indicators				
		X15	X16	X17	X18	X19	X20	X21
1	Darlawn	48.48	20.37	0.96	47	0.82	8.57	2.71
2	Phullen	33.33	16.44	0.25	39	0.83	3.32	0.04
3	Aibawk	54.16	24.91	1.36	92	1.8	10.64	4.12
4	Tlangnuam	76.92	53.15	16.38	97	7.38	42.63	30.79
5	Thingsulthliah	65.21	31.74	1.77	89	1.89	15.39	9.6
	Aizawl district	59.78	46.15	12.71	86	5.91	34.81	24.5

3.3 Level of demographic development

The density of population is found to be highest in Tlangnuam block (455.79) in Aizawl district (table3.1). Other blocks are found to have population density below the district which is about 86.7. The highest sex ratio (962) and population growth rate(46.32) are also observed in Tlangnuam block. It is pertinent to mention that Phulen block and Thingsulthliah block are having low sex ratio about 937 and 876 respectively. In respect of population growth rate Darlawn block, Phullen block, Aibawk block and Thingsulthliah block are having below the district (38.72).

The ranking of demographic development (table 3.2) of Aizawl district shows that Tlangnuam block ranks first, followed by Darlawn block, Aibawk block, Phullen block and Thingsulthliah block. Tlangnuam block has the highest composite score about 4.02, followed by Darlawn block (-0.31), Aibawk block (-0.81), Phullen block (-1.19) and thingsulthliah block (-1.17). Thus, all the blocks have been categorized into three level of demographic development as follows -

a) High development (above 2.31)

There is only one block i.e., Tlangnuam block observed in this category. Tlangnuam block has a good performance in demographic development. The composite score of Tlangnuam block (4.02) is higher than the average Aizawl district (0).

b) Medium development (between 2.31 and 0)

There is no block falls under the composite score between 2.31 and 0 for medium development. This implies that there is huge disparity in respect of demographic development among the blocks.

c) Low development (below 0)

All the blocks except Tlangnuam block are found to have composite score below 0. Thus, they are categorized under low development. Thingsulthliah block, Darlawn

block, Aibawk block and Phullen block are having composite score below average Aizawl district which is about 0. The composite score of Darlawn block is calculated to be -0.31, Aibawk block is -0.81, Phullen block is -1.19 and Thingsulthliah block is -1.71. Therefore, to bring these four blocks either at par or above the calculated average Aizawl district (0), it is imperative to mention that necessary measure should be taken to reduce the disparity found in demographic development in Aizawl district.

3.4 Level of social development

It is observed that Tlangnuam block is having more educational institution viz. middle school (0.153) and high school (0.051) respectively (table 3.1). On the other hand, Phullen block has the minimum number of middle school (0.019) and high school (0.01. The health facilities like sub health center and community health center are found to be more in Tlangnuam block. Taking into account communication facility it is found that Tlangnuam block is having maximum number of branch post office and sub post office. It is also apparent to mention that all the blocks are having communication facilities below the district. All the blocks are having good performance in literacy however, only Tlangnuam block has literacy percentage above the district. Work participation rate is found to be highest in Aibawk block (69.2) and the lowest is observed in Tlangnuam block (45.1). The work participation rate of the district is calculated to be 75.42.

Table-3.3 shows the composite score of social development and ranking of five blocks of Aizawl district. It is observed that Tlangnuam block having composite score of 11.84 has been ranked as first, followed by Aibawk block (-3.63), Thingsulthliah block (-0.29), Darlawn block (-0.54) and Phullen block (-3.63). Thus, all the blocks have been categorized into three level of social development as follows –

a) High development (above 7.6)

Tlangnuam block has been categorized as high development with a composite score of about 11.84. It is observed that Tlangnuam block has far exceed the district average (1.67) in respect of social development.

b) Medium development (between 7.6 and 1.67)

There is no block having a composite score between 7.6 and 1.67 falling under medium development. This indicates that there is disparity in respect of social development in Aizawl district.

c) Low development (below 1.67)

Aibawk block, Thingsulthliah block, Darlawn block and Phullen block are found to have composite score below 1.67. Thus, they are designated as low development. The composite score of Aibawk block is calculated to be 0.99, Thingsulthliah block is -0.29, Darlawn block is -0.54 and Phullen block is -3.63. These four blocks have comparatively low composite score than the district average (1.67). Therefore, it is imperative to mention that these four blocks should be place at par or above the district average to reduce the disparity of social development in Aizawl district.

3.5 Level of economic development

Phullen block is found to have the highest score of main workers to total workers. Similarly, Aibawk block has the highest score of marginal workers to total workers. Aizawl district has 0.93 % of working population engaged in secondary sector, whereas all the blocks are having below district percentage in this regards (table 3.1). It is observed that Tlangnuam block has the highest percentage of working population engaged in secondary activities. The percentage of household availing banking service in the district is 46.15. It is pertinent to mention that Darlawn block, Aibawk block,

Table- 3.2 Composite score and ranking of demographic development of Aizawl district

Sl.No	Block	X1	X2	X3	Composite Z-core	Rank	Status
1	Darlawn	-0.47	0.47	-0.31	-0.31	2	LD
2	Phullen	-0.46	-0.01	-0.72	-1.19	4	LD
3	Aibawk	-0.45	0.56	-0.92	-0.81	3	LD
4	Tlangnuam	1.79	0.7	1.54	4.02	1	HD
5	Thingsulthliah	-0.41	-1.73	0.42	-1.71	5	LD
	Average Aizawl District					0	

HD = High Development, MD = Medium Development, LD = Low development.

Table- 3.3 Composite score and ranking of social development of Aizawl district

Sl.no	Block	X4	X5	X6	X7	X8	X9	X10	X11	Composite Z-Score	Rank	Status
1	Darlawn	-0.4	-0.35	0.76	1	-0.1	-0.67	-1.11	0.33	-0.54	4	LD
2	Phullen	-0.56	-0.59	0.29	0	-1.2	-0.67	-0.93	0.02	-3.63	5	LD
3	Aibawk	-0.52	-0.65	1.06	0	0	-0.33	0.48	0.95	0.99	2	LD
4	Tlangnuam	1.79	1.82	2.94	2	1.7	2	1.26	-1.69	11.84	1	HD
5	Thingsulthliah	-0.31	-0.06	0.82	-1	-0.1	-0.33	0.3	0.39	-0.29	3	LD
	Average Aizawl District									1.674		

HD = High Development, MD = Medium Development, LD = Low development

Phullen block and Thingsulthliah block are having below the district. Tlangnuam block has the highest score about 16.38% of household using concrete as material of walls. Other blocks are found to have below 12.71% of the household using concrete as material of walls. Aibawk block, Tlangnuam block and Thingsulthliah block are having above 86 % of electrified household to total household. Tlangnuam block is found to have 7.38% of household having car, jeep and Van. Similarly, in respect of percentage of household having Television and Telephone connection to total household, Tlangnuam block has the highest percentage of about 42.63%.

The composite score and ranking of economic development of Aizawl district (table 3.4) shows that Tlangnuam block having the highest composite score of about 11.39 has been ranked as first. Thingsulthliah block (-0.86) has been ranked as second, Aibawk block (-2.4), as third and Darlawn (-4.42) as fourth respectively. The lowest composite score (-8.15) is observed in Phullen block and it has been ranked as fifth. Thus, three level of economic development have been identified in the study area.

a) High development (above 6.5)

Tlangnuam block with a composite score of about 11.39 has been found in high development. The calculated average composite score of Aizawl district is -0.89, and it is observed that Tlangnuam block has far exceed the district average in economic development.

b) Medium development (between 6.5 and -0.89)

There is no block found in medium development having a score value between 6.5 and -0.89. This, however, signify the disparity of socio-economic development in Aizawl district.

c) Low development (Below -0.89)

Thingsulthliah block, Aibawk block, Darlawn block and Phullen block have been designated as low development. Thingsulthliah block has a composite score of about -0.86. While, composite score of Aibawk block is calculated to be -2.4, Darlawn block is -4.42 and Phullen block is -8.15. Thingsulthliah block, Aibawk block, Darlawn block and Phullen block are having composite score below the district average (-0.89). The disparity observed in economic development of Aizawl district would be reduce if the low development blocks have been made at least at the level of district average.

3.6 Level of socio-economic development

Level of socio-economic development of Aizawl district has been identified from the composite index (table 3.5). In fact, the composite index has been calculated from the summation of composite score of demographic, social and economic. All the blocks have been categorized into three level of socio-economic development as follows -

a) High development (above 16.19)

- Tlangnuam block

b) Medium development (between 16.19 and 0.78)

- Nil

c) Low development (below 0.78)

- Aibawk block, Thingsulthliah block, Darlawn block and Phullen block.

(a) High development

The composite index of Z-score shows that Tlangnuam block is comparatively the most developed block in Aizawl district. Tlangnuam block is found to have the highest score of about 27.25. It is also observed that Tlangnuam block is found to have the highest composite score in all the sectors viz. demography (4.02), social (11.84) and economic

(11.39) respectively. This may be attributed to the concomitant process of urbanization which has been accompanied by the availability and increase of various socio-economic facilities. Moreover, the present of Aizawl city (state capital) is also found to be a powerful pull factor of attracting administration, education, commercial, socio-cultural activities. The calculated average composite index of Aizawl district is 0.786. Thus, it is imperative to mention that Tlangnuam block is far above the district average in the level of socio-economic development.

(b) Medium development

There is no block falling under medium development having the composite index ranging between 16.19 and 0.78. Thus, it is apparent to mention that there is disparity in the level of socio-economic development in the study area as no block appears to qualify for the medium development.

(c) Low development

Aibawk block, Thingsulthliah block, Darlawn block and Phullen block are having composite index below 0.78. These blocks are designated as low development. It is observed that Aibawk block, Thingsulthliah block and Darlawn block are having more or less the same composite index value. The composite index of Aibawk block is calculated to be -2.22, whereas, Thingsulthliah block is -2.86, and Darlawn block is -5.27. Phullen block is found to have a comparatively lower composite index of about -12.97. The calculated average composite index of Aizawl district is 0.786. It is apparent to mention that these four blocks are having the composite index below the district average. Therefore, it is imperative to mention that Aibawk block, Thingsulthliah block, Darlawn block and Phullen block should be place at the level or above the

district average (0.786). Thus, it is necessary to take some measure to reduce the disparity of socio-economic development found in Aizawl district.

3.7 Conclusion

The present study on inter-block level of socio-economic development of Aizawl district can be summarized as follows.

Firstly, to identify the level of socio-economic development among the blocks, twenty one (21) indicators have been selected. The selected indicators are further categorized into three sectors namely, demography, social and economic. It is observed that there is variation in value of indicators among the blocks in Aizawl district.

Secondly, three level of demographic development has been identified on the bases of composite score obtained by the blocks. Tlangnuam block has been identified as high development. The remaining blocks viz. Thingsulthliah block, Darlawn block, Aibawk block and Phullen block have been designated as low development. There is no medium development block.

Thirdly, Tlangnuam has been designated as high development block and there is no medium development block in social development. Aibawk block, Thingsulthliah block, Darlawn block and Phullen block are belonged to low development in social development. Similarly, three level of economic development observed in the study area are: Tlangnuam block as high development and Thingsulthliah block, Aibawk block, Darlawn block and Phullen block as low development. There is no medium development block in respect of economic development.

Lastly, the level of socio-economic development of Aizawl district has been identified from the summation of composite score of demography, social and economic development. Thus, the three level of socio-economic development is observed in

Aizawl district. The most developed block in Aizawl district is Tlangnuam block. There is no medium development. Aibawk block, Thingsulthliah block, Darlawn block and Phullen block have been designated as low development block. Thus it is imperative to mention that low development blocks i.e., Aibawk, Thingsulthliah, Darlawn and Phullen block are found necessary to bring at the level of district average (0.786) in order to reduce the disparity in the level of socio-economic development in Aizawl district.

Table- 3.4 Composite score and ranking of economic development of Aizawl district

Sl.no	Block	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	Composite Z-Score	Rank	Status
1	Darlawn	-0.21	0.21	-0.31	-0.43	-0.62	-0.46	-0.94	-0.63	-0.49	-0.54	-4.42	4	LD
2	Phullen	1.58	-1.58	-0.6	-1.47	-1.08	-0.68	-1.65	-0.8	-0.96	-0.91	-8.15	5	LD
3	Aibawk	0.31	0.92	-0.81	0.02	-0.41	-0.77	0.59	-0.63	-0.73	-0.89	-2.4	3	LD
4	Tlangnuam	0.47	0.61	1.39	0.89	1.32	1.42	0.82	1.48	1.5	1.49	11.39	1	HD
5	Thingsulthliah	0.58	0.58	-1	0.75	0.7	-0.98	0.81	-1.12	-0.64	-0.53	-0.86	2	LD
	Average Aizawl district											-0.89		

Table 3.5 Composite Index and Ranking of Socio-Economic Development of Aizawl District.

Sl.no	Block	Demography	Social	Economic	Composite Index	Rank	Status
1	Darlawn	-0.31	-0.54	-4.42	-5.27	4	LD
2	Phullen	-1.19	-3.63	-8.15	-12.97	5	LD
3	Aibawk	-0.81	0.99	-2.4	-2.22	2	LD
4	Tlangnuam	4.02	11.84	11.39	27.25	1	HD
5	Thingsulthliah	-1.71	-0.29	-0.86	-2.86	3	LD
Average Aizawl District		0	1.67	-0.88	0.786		

Fig.3.1

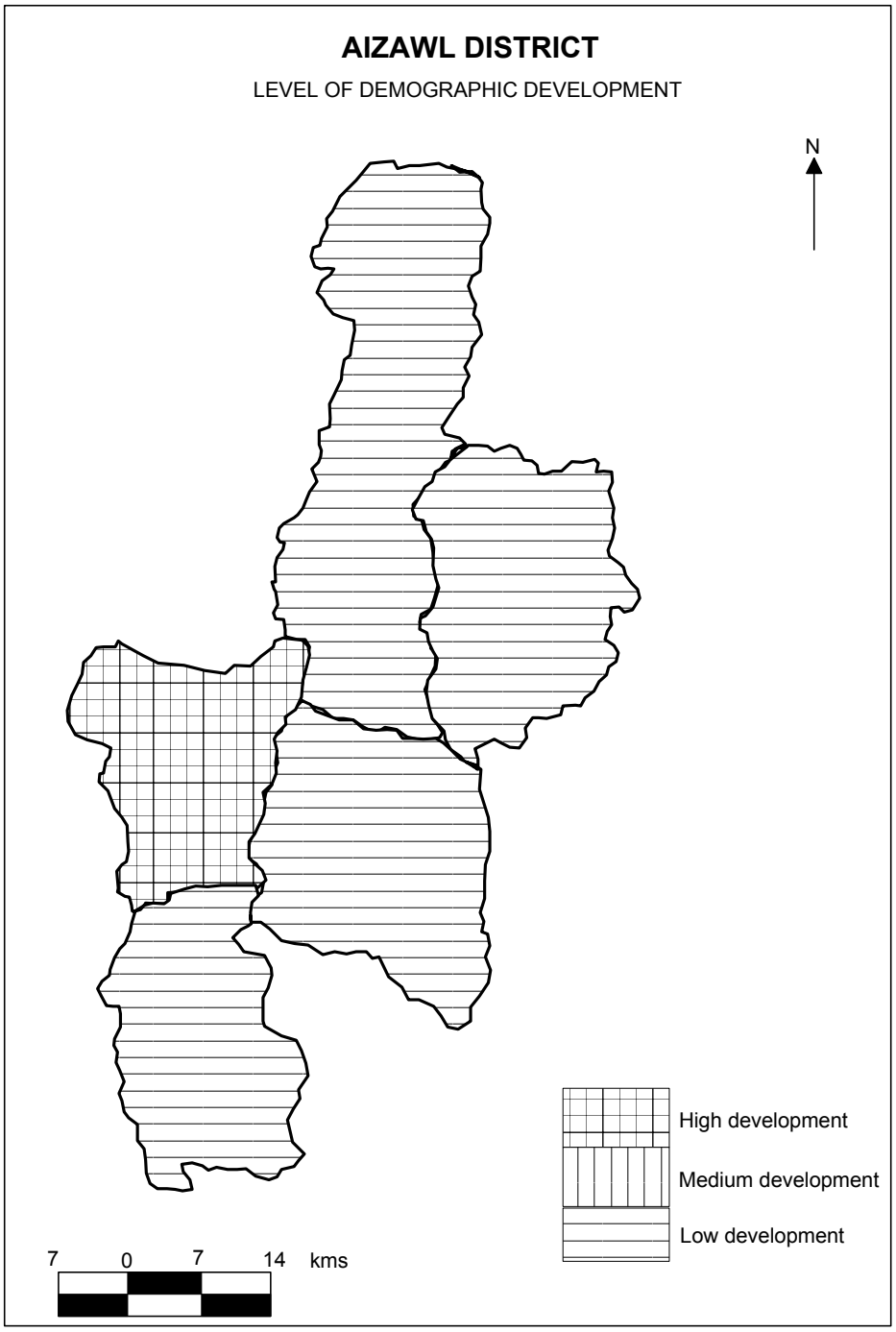

AIZAWL DISTRICT
LEVEL OF DEMOGRAPHIC DEVELOPMENT
N
High development
Medium development
Low development
7 0 7 14 kms

Fig.3.2

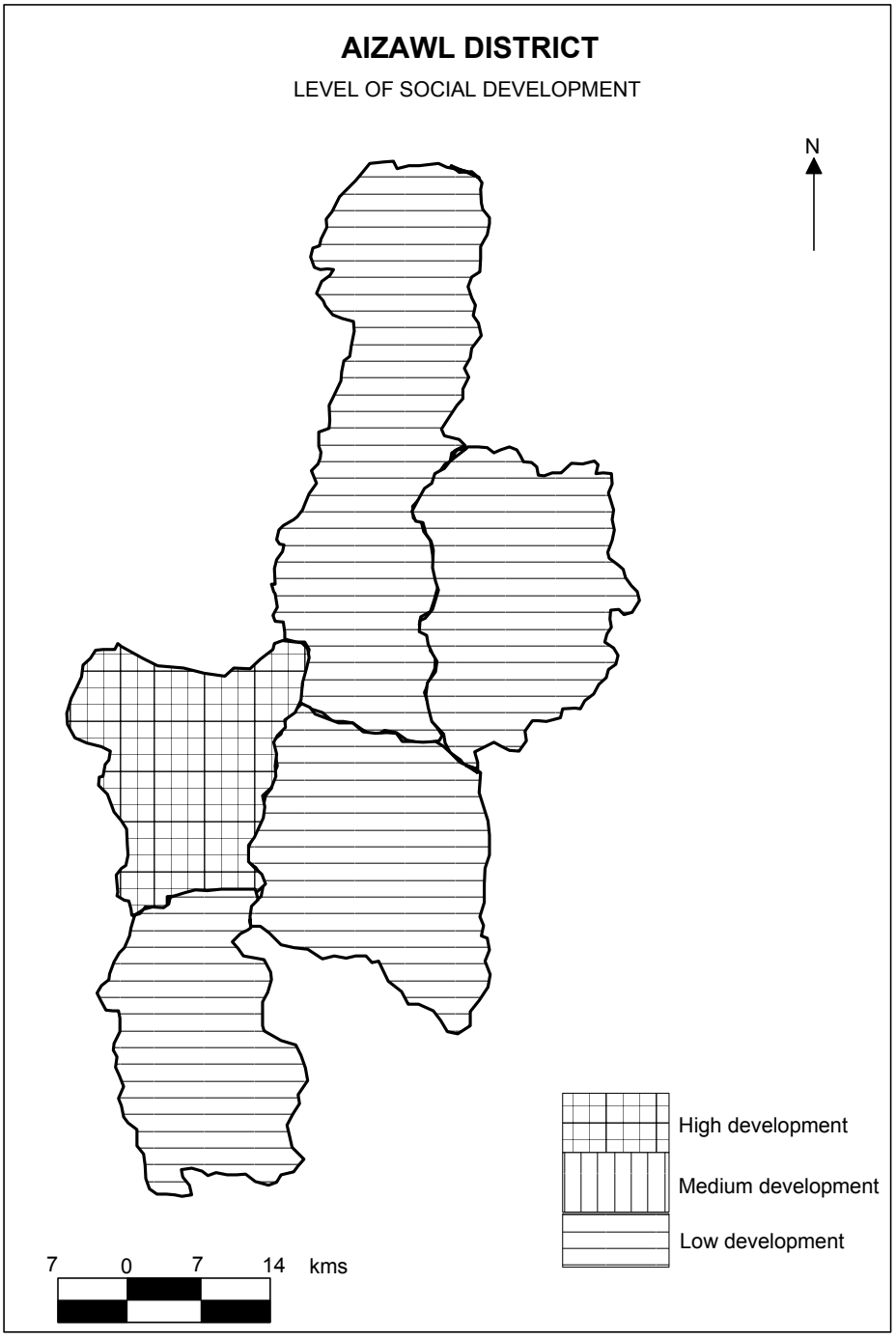

AIZAWL DISTRICT
LEVEL OF SOCIAL DEVELOPMENT
N
High development
Medium development
Low development
7 0 7 14 kms

Fig.3.3

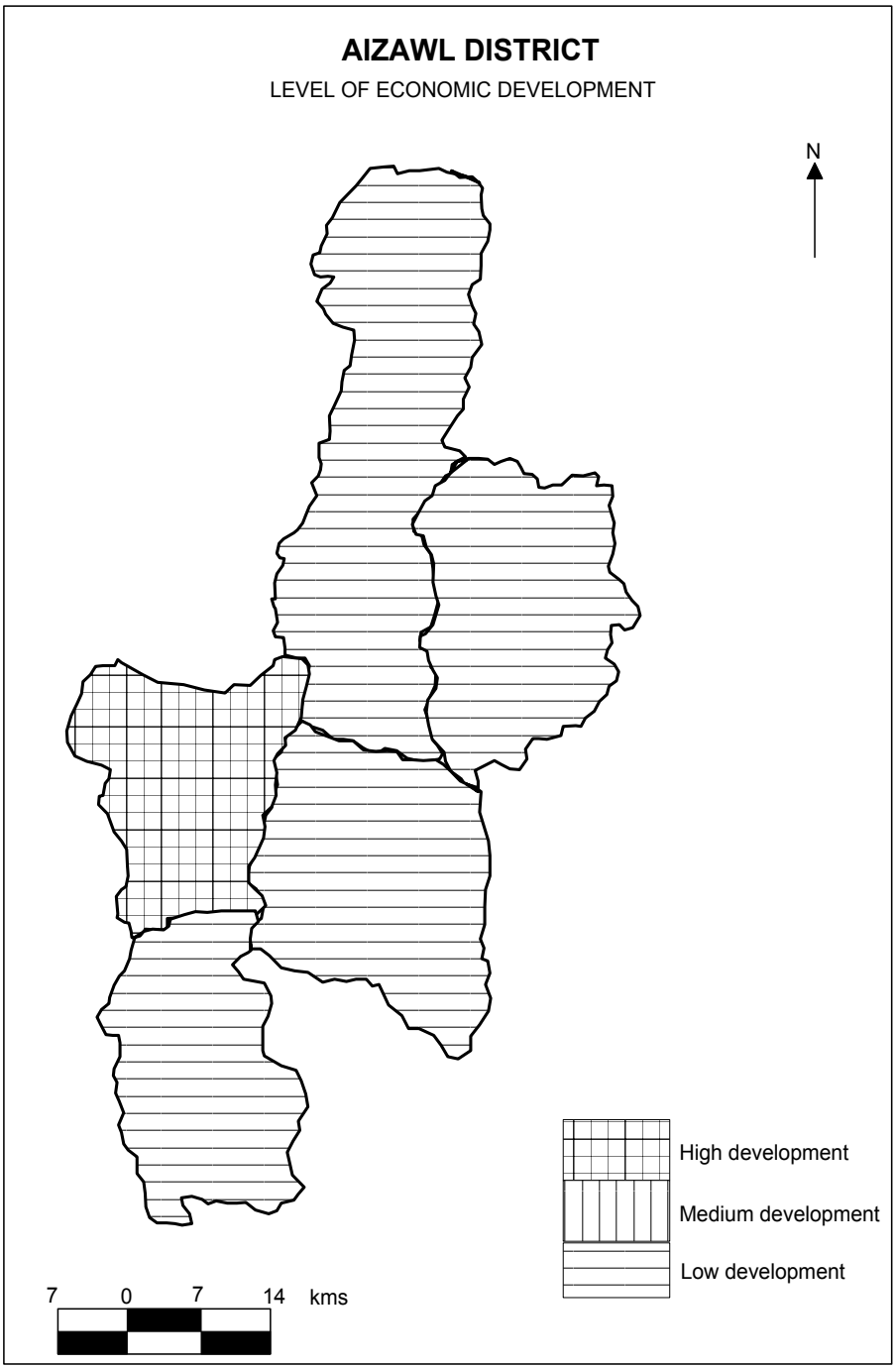
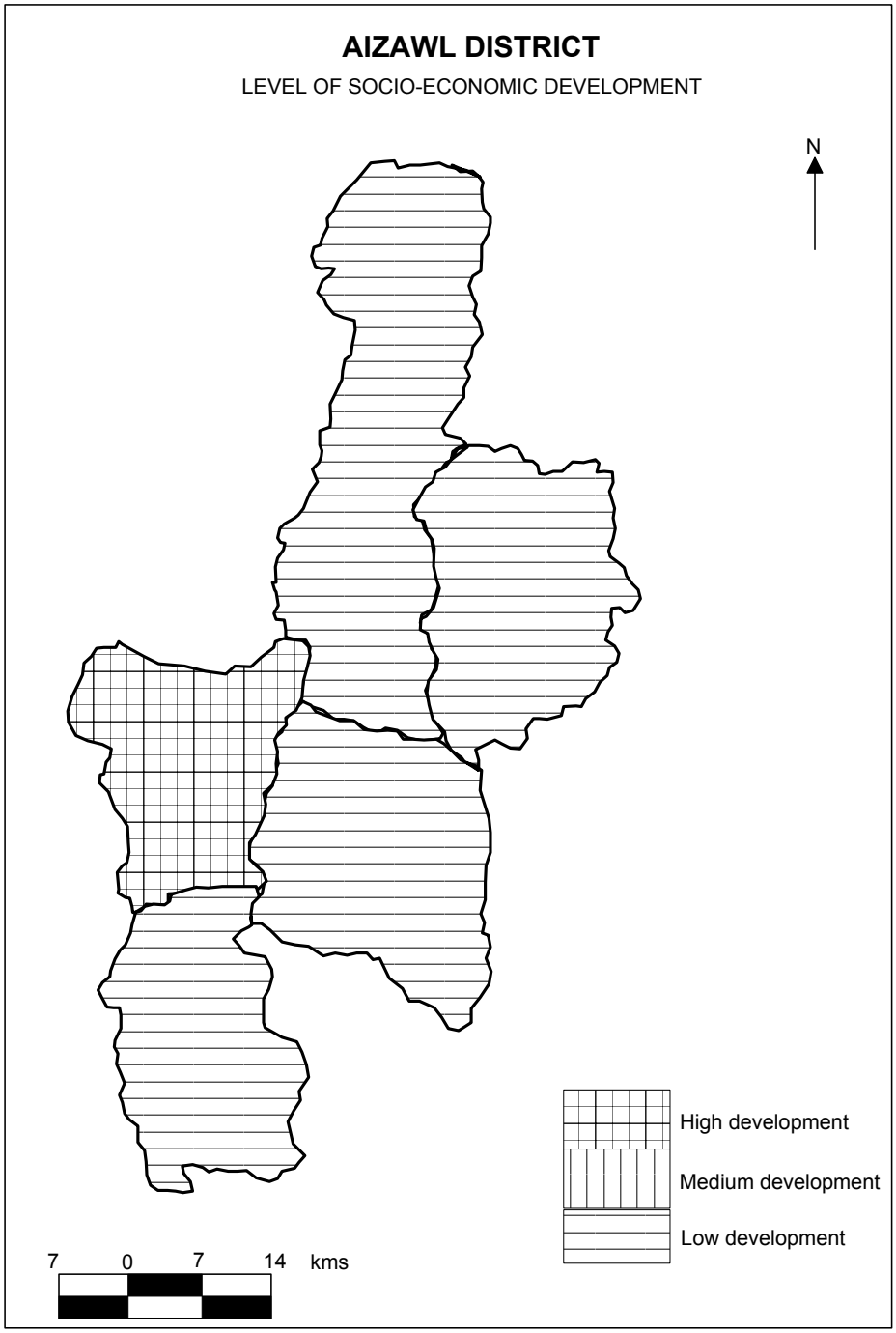

AIZAWL DISTRICT
LEVEL OF ECONOMIC DEVELOPMENT
N
High development
Medium development
Low development
7 0 7 14 kms

Fig.3.4


AIZAWL DISTRICT
LEVEL OF SOCIO-ECONOMIC DEVELOPMENT
N
High development
Medium development
Low development
7 0 7 14 kms

REFERENCES

1. Boudeville, J.R., (1966): *Problems of Regional Economic Planning,* University Press, Edinburgh.
2. Chakravorty, Sanjoy., (2005): "The history and geography of regional development theory: A futile search for a paradigm', *Development, Displacement and Disparity*, Nirmala Banerjee and Sugata Manjit, (eds.), Orient Longman, p.33.
3. Dutta, P.C and Choudhury, H., (1995): "Per capita household consumption inequalities in the north east region of India", IJRS, Vol. 27, pp.1-2.
4. Dutta, P.C and Choudhury, H., (1996): "A note on Inter-state variation in per capita non-food household items of consumption in the North east India", IJRS, Vol. 28, p.2.
5. Emmanuel, A., (1972): "Unequal Exchange", *New Left Book*.
6. Friedman, J.P., (1966): *Regional Development Policy*: *A Case study of Venezuela*, Cambridge, M.I.T Press.
7. Friedman, J.P., (1973): "A theory of polarized development", *Urbanization, Planning and National Development*, J.Friedman, (ed.), pp.41-46, Sage.
8. Gonzalez Casanova, P., (1969): "Inter Colonialism and National Development", *Latin American Radicalism*, Horowitz, I.L, Decastro, J.I and Gerassi, J., (eds.), New York.
9. Griffin, K., (1969): *Underdevelopment in Spanish America*, London.
10. Hirschman, A., (1958): *The Strategy of Economic Development*, Yale University Press, New Haven.
11. Kuznets, S., (1963): "Quantitative aspect of economic growth of nation: distribution by size", *Economic Development and Cultural change*, Vol.II,pp.1-71
12. Kuznets, S., (1973): "Modern Economic Growth: Findings and Reflections", *American Economic Review*, Vol.63,pp.247-258
13. Lekhi, R.K., (2005): *The Economics of Development and Planning,* Kalyani Publishers, p.34/VII
14. Lianzela (1991): *Economic Development of Mizoram*, Spectrum Publications, Guwahati, p.142.
15. Lalrinmawia (1999): *Levels of Regional Development in Mizoram*, M.phil Dissertation, Unpublished, Dept. of Geography, North Eastern Hill University.
16. Lipton, Michael., (1977): *Why Poor People Stay Poor Urban Bias in World Development*, Harvard University Press, Cambridge, Massachusetts.
17. Mathur, A., (1983): "Regional development and income disparities in India", *Economic Development and cultural Change*, Vol.31, pp.475-505.
18. Myrdal, G., (1957): *Economic Theory and Underdeveloped Regions*, Gerald Duckworth & Co, London.
19. Ojha. and Bhat., (1964): "Pattern of income distribution in an under developed economy: A case study of India", *American Economic Review*, Vol.54, pp.711-719.
20. Patnaik, S.C., (1981): *Economics of Regional Development and Planning in Third World Countries*, Associated Publishing House, New Delhi, p.1.

21. Rao, Hemlata., (1972): "Identification of backward regions and the study of trends in regional disparities in India", (Paper presented at a seminar on regional imbalances, IIPA)

22. Rao, S.K., (1973): "A note on measuring economic distances between regions in India", *Economic and Political Weekly*,Vol.17,pp.226-234.

23. Rao, T.N.A., (1993): *Balanced Regional Development, Levels of Development of Karnataka,* Academy of Regional Science and Humanities. (ACARSH) Belgaum, p.16

24. Saitluanga, B., (2008): *Urbanization and Regional Development in the Patkai Hills*, M.Phil Dissertation, Unpublished, Jawaharlal Nehru University, Center for the Study of Regional Development, School of Social Sciences, New Delhi.

25. Sampath, R.K., (1977): "Inter-state inequalities in income in India", *Indian Journal of Regional Science*, Vol.9.

26. Sarker, P.C., (1994): "Regional imbalances in Indian economy over plan periods", *Economic and Political Weekly*, Vol.29, No.11, March, pp.621-633.

27. Swamy, S., (1967): "Structural change and distribution of income by size", *Review of Income and Wealth*, pp.155-170.

28. Young, C.E., (1971): "Rural-Urban Terms of Trade", *African Social Research*, No.12, December.

29. Williamson, J.G., (1965): "Regional Inequality and the Process of National Development: A Description of the Pattern", *Economic Development and Cultural Change,* Vol. 13, No.4, Part II, July.

CHAPTER – IV

SERVICE CENTERS/CENTRAL PLACES

- Introduction
- Selected functions/services
- Distribution pattern of functions/services at block level
- Range of functions/services (maximum travel distance)
- Threshold population of functions/services
- Hierarchy of functions/services
- Identification and hierarchical order of service centers/central places
- Complementary regions of service centers/central places
- Conclusion

4.1 Introduction

The term 'central place' was first used by Jefferson (1931) for a settlement which is necessarily a focus of various activities such as economic and social for the surrounding hinterland (Mandal, 2000:146). Later, Christaller (1933) advanced 'central place' (Zentralort) on a scientific lines in his search for laws governing the distribution and size of towns, the function they perform and their spatial arrangement (Tiwari, 1988). In fact, Christaller's seminal study of central places in southern Germany was totally ignored at that time and it was not until thirty years later that the significance of central place theory was appreciated (Holt-Jensen, 1988). Losch (1939) following Christaller's work presented central place model in a more dynamic and diversified form and these two works viz. Christaller and Losch come under classical central place theory. Central place theory was further elaborated, enriched and advanced by Dickinson (1929 and 1934), Smailes (1944), Berry and Garrison (1958) where all urban centers have been treated as central places.

Service center/central place is the settlements which have some distinctive public utility services distinguish themselves from other neighbouring settlement. In other words, any settlement of focal character in terms of various socio-economic activities, which serves the surrounding area along with its own settlement is called service center/central place. Thus, service center/central place is a place where central function viz. retail business, medical services, administrative services, repair works, schools, colleges and industrial activities are found in which labourers are employed largely from the surrounding zone of influence of a town (Clark, 1968:386). In fact, central place is a settlement providing services for the population of its hinterland (known as complementary region), supplying it with central goods and services such as administrative, banking, and professional services, educational, leisure, and cultural facilities, as well as those of retail and wholesale trade. Central place vary in importance, depending upon the central function

performed by them and the population served, they can be classified as high order centers or low order centers. High order centers stock a wide array of goods and services and serve a large population; lower order centers stock a smaller range of goods and services and serve a smaller population (Chand and Puri, 2005; 138).

Three concepts in central place theory, *function* (service), *range,* and *threshold*, are basic to the present study. Function is any type of institutions, service etc. which serves a population. The range of a function is the maximum distance people are normally willing to go to obtain a function. The concept of threshold is related to minimum size of an agglomeration of people necessary for a function (Forbes, 1962:15).

Service centers/central places and their spatial organization play the most important role in the regional development of a region (Singh & Pandey, 1986). A service center/central place is focal points of interaction which act as growth promoting center for a region as it provides several services including education, health, communication and veterinary etc., to the population of surrounding settlements (Tiwari, 1988:32). Hence, service center/central place function as regional centers or regional capitals of surrounding areas and it also act as the major control points for spatial interaction and linkages operating in their surrounding region.

On the other hand, since resources or developmental input in the form of socio-economic facilities or infrastructural facilities are scarce and all settlements may not be efficiently provided such facilities, therefore selection of settlement becomes essential for provision and optimum location of those socio-economic facilities. Service center/central place provide a spatial framework for scientific planning of socio-economic facilities as planning of developmental processes should be based on study of areas with social, economic and spatial consisting of central place and a cluster of dependent settlements surrounding it (Tiwari, 1988:32).

The arrangement and hierarchical order of central place or service centre can be utilized in order to facilitate balanced regional development in a region as service centers are believed to disseminate the process of regional development throughout the region as growth centers of Misra**,** *et al.*, (1974), through spread effect of Perroux (1955), trickle down process of Hirschman (1958) and also diffusion of innovation by Hagerstrand (1967) (Singh & Singh, 2001:147). Therefore, rationalization/reorganization of service center/central place and their planned spatial organization is necessary for ensuring a balanced development of a region. Hence, an attempt has been made in this chapter to identify hierarchical orders of service centers and their complementary regions in Aizawl district.

4.2 Selected functions/services

Service center/central place performs functions/services for its complementary region in addition to its own population. Functions are performed only by a few places but are availed of by a number of other settlements surrounding them. Functions are of varying importance and classified into hierarchical orders, where low order functions belong to a low order central place and high order functions belong to high order central places. It is true that functions/services of a center depend on the demand of the residents as well as its surrounding settlement and their demand depends on their economy i.e, the significance of central place(s) depends on the economies, social and cultural status of the people.

The study area i.e., Aizawl district is characterized by hilly and rugged terrain where the connectivity and population distribution are largely controlled and regulated by topography. As such the distributional pattern of functions in the district does not appear always rational. It seems to require careful selection of function/services to disseminate the process of regional development. Selection of functions/services also necessitates

indicating the centrality of the centre in relation to surrounding areas. Hence selection of central function or service must be in cohesion with the idea of centrality of the center. Though, there is no full proof method of selecting the variable for studying centrality (Bhat., et ,al,2003), it may be defined as the existence of important services/functions located in a settlement but also their potentialities.

In the present study six functions/services viz. education, health, communication, veterinary, recreation, banking and police have been considered and those functions/services are further divided into twenty two (22) sub-functions/services. The sub functions of education consist of primary school, middle school, high school, higher secondary school, college and university. Health sub functions comprise sub health center, primary health center/urban health center, community health center and hospital. Communication sub functions include branch post office, sub post office and post and telegraph office. Rural animal health center, veterinary dispensary and veterinary hospital constitute veterinary sub functions. Recreation sub functions also comprise public library, public playground and cinema hall. Banking and police sub function are bank, police outpost and police station (table 4.1). The availability of selected functions/services and number of settlements found to have particular function/service are compiled after analyzing each of the selected 92 settlements. It can be observed from the table that more rudimentary functions occur in large number of settlements whereas more complex functions are found in lesser number of settlements.

Table- 4.1 Selected functions/services (Aizawl district)

Central functions /services and sub functions	Number of functions/services	Number of settlements where they occur
EDUCATION		
X1. Primary school	407	92
X2. Middle school	320	84
X3. High school	161	45
X4. Higher secondary school	47	3
X5. College	13	2
X6. University	1	1
HEALTH		
X7. Sub-Centre	96	53
X8. P.H.C	12	9
X9. C.H.C	3	3
X10.Hospital	13	1
COMMUNICATION		
X11. Branch post Office	63	44
X12. Sub-Post Office	19	11
X13. Post & Telegraph Office	1	1
VETERINARY		
X14. RAHC	31	14
X15. Veterinary Dispensary	7	6
X16. Veterinary Hospital	1	1
RECREATION		
X17. Public Library	177	78
X18. Play Ground	128	74
X19. Cinema Hall	2	1
BANKING & POLICE		
X20. Bank	21	12
X21. Police Outpost	9	9
X22. Police Station	8	5

4.3 Distribution pattern of functions/services at block level

The distribution pattern of functions/services is uneven in the study area. It is found that rudimentary function/service like primary schools are ubiquitously distributed. On the other hand, complex function like college is highly localized. (Distribution pattern of functions/services at the block levels in Aizawl district has been shown in appendix-4)

(a) Darlawn Block

(i) Education: All the settlement are found to have primary schools, while twenty five settlements (89.28%) are having middle school. The percentage of settlement having high schools and higher secondary schools are found only in about 39.28% and 7.14 % of settlements. There is no higher education institutions viz. College and University in Darlawn block. The calculated coefficient of variation is highest in Primary school. It is about 0.8, followed by middle school 0.72 and high school 0.67.

ii) Health: It is found that only 60.71% of the settlements are having sub health center. There are only two primary health centers and one community health center in the block and the percentage of settlements having them decline sharply to 7.14 and 3.6 respectively. The coefficient of variation of sub health center and primary health center is found to be 0.

iii) Communication: 64.28% of the settlements are having branch post office and the coefficient of variation is calculated to be 0. Post and telegraph office is not available in the block. There is only one settlement with sub post office in this block. Thus, only 3.57% of the settlement has this facility.

iv) Veterinary: Veterinary facilities are not adequately distributed in Darlawn block. Only one settlement accounting for 3.57% of the settlement is having a rural animal health center. Two settlements (7.15%) are having veterinary dispensaries. Veterinary hospital is

not available. The coefficient of variation is 0 in respect of veterinary dispensaries in the block.

v) Recreation: Most of the settlements in the block appear to have the recreation facilities like public library and public playground. About 82.14% and 92.85% of the settlements are having public libraries and public playgrounds respectively. There is no cinema hall in this block. The calculated coefficient of variation in respect of public libraries in the block is 0.54 and for public playgrounds is 0.

vi) Banking and Police: Only three settlements are having banking facility in this block. It suggests that only about 10.71% settlements have this facility. Four settlements (14.28%) are having police outpost and only one settlement (3.6%) is having police station. The calculated coefficient of variation in respect of these facilities is 0 in the block.

(b) *Phullen block*

i) Education: It is apparent to mention that Phullen block has no education facilities like higher secondary school, college and university. Moreover, it is noteworthy that all the settlements in this block are having primary school and middle school. The coefficient of variation of primary school is 0.58. There are four settlements (33.33%) having high school. The calculated coefficient of variation of high school and middle school are 0 and 0.37 respectively.

ii) Health: Only 83.33% of the settlements are having sub health centers in Phullen block. The percentage of settlements decline sharply to about 25% in respect of primary health center. There is no community health center as well as hospital in Phullen block. Sub health center and community health center have the coefficient of variation of about 0 respectively.

iii) Communication: Phullen block has limited number of communication facility i.e., branch post office, sub post office and post & telegraph office. Only two settlements are

having branch post office and sub post office. The percentage of settlements having branch post office and sub post office is 16.7% only. However, the coefficient of variation of branch post office and sub post office is 0.

iv) Veterinary: Only rural animal health center (RAHC) is available in Phullen block. Four settlements are having rural animal health centers. There is no veterinary dispensary and veterinary hospital in this block. About 33.33% of settlements are found to have rural animal health centers. The calculated coefficient of variation of rural animal health centers is 0.

v) Recreation: Public libraries are found in all the settlements in Phullen block. In respect of public playground only one settlement is devoid of such facility. Cinema hall is not available in Phullen block. The coefficient of variation of public libraries and public playgrounds are 0.36 and 0 respectively.

vi) Banking and Police: Banking facility and police station are not available in Phullen block. About 15% of the settlements are having police outpost. The coefficient of variation of police outpost is 0.

c) *Tlangnuam block*

i) Education: All the settlements are found to have primary school and middle school in Tlangnuam block. Settlements with the facility of high school are 58.33% and decline sharply in respect of higher secondary school, college and university. Middle school has the highest coefficient of variation about 3.09%, followed by primary school 3% and high school 2.4% respectively. The high coefficient of variation of primary schools, middle schools and high schools may be attributed to the cluster of such facilities in Aizawl NT.

ii) Health: Sub health centers are found at five settlements in Tlangnuam block. Primary health center/ urban health center are found at two settlements (16.71%) and only one

settlement (8.3%) is having hospital. Sub health centers and primary health centers/ urban health centers have a coefficient of variation of 1.97 and 0.85 respectively.

iii) Communication: Communication facilities like branch post office, sub post office and post and telegraph office are available in Tlangnuam block. About 41.7 % of settlements are having branch post office, followed by sub post office (16.7%) and post & telegraph office (8.33%).The calculated coefficient of variation of branch post offices is 1.82 and sub post offices is 1.13.

iv) Veterinary: Two settlements are found to have rural animal health centers and veterinary dispensaries in Tlangnuam block. There is only one veterinary hospital. The coefficient of variation of rural animal health centers is 1.23.

v) Recreation: Tlangnuam block has all recreation facilities. About 75% and 41.7% of the settlements are having public library and public playground. Only one settlement (8.33%) is having cinema hall. As a cluster of facility is observed in Aizawl NT in respect of public libraries and public playgrounds, the coefficient of variations of public libraries and public playgrounds is about 2.65 and 2.06 respectively.

vi) Banking & Police: Three settlements are found to have banking facility in this block. There is one police outpost and two settlements are found to have police stations in Tlangnuam block. The percentage of settlements having banking facility is 25, police station is 16.7 and police outpost is 8.33.

(d) *Thingsulthliah block*

i) Education: Primary school, middle school and high school are available in Thingsulthliah block. About 95.23% of the settlements are having primary school. The percentage of settlement having middle school and high school is 85.71 and 52.38 respectively. It is observed that only one settlement is having higher secondary school and

college i.e., Saitual NT. The coefficient of variation of primary schools, middle schools and high schools are 1.13, 1.51 and 1.46 respectively.

ii) Health: Among the health facilities, sub health center and community health center are available in this block. About 52.38 % and 9.52% of the settlements are having sub center and community health center. The coefficient of variation of sub health center and community health center is 0.51and 0 respectively.

iii) Communication: It is observed that eight settlements (38.01%) are found to have branch post office and two settlements (9.52%) are having sub post office. The coefficient of variation of branch post offices is 0.31 and sub post offices are found to be 0.

iv) Veterinary: It is pertinent to mention that three settlements are having rural animal health centers and veterinary dispensaries are found in two settlements in this block. About 14.28% and 9.52% of the settlements are having rural animal health center and veterinary dispensary. Veterinary hospital is not available in Thingsulthliah block. The coefficient of variations is 0 in respect of rural animal health centers and veterinary dispensaries.

v) Recreation: About 76.19 % and 711.42% of the settlement are having public library and public playground. Cinema hall is not available in Thingsulthliah block. The calculated coefficient of variation of public library is 1.14 and public playground is 1.1.

vi) Banking & Police: Four settlements are found to have banking facility in this block. The percentage of settlements having banking facility is 19.04. Police outpost and police station are found only at one settlement. The coefficient of variation of banking facility is 0.4.

(e) *Aibawk block*

i) Education: Among the education facilities, primary school, middle school and high school are available in Aibawk block. Higher secondary school, college and university are not available in this block. It is pertinent to mention that all the settlements in this block are

found to have primary school. The percentage of settlements having middle school and high school is 95.23 and 61.9 respectively. The coefficient of variation of primary school is 0.51, middle school is 0.44 and high school is 0.

ii) Health: About 61.9 % of settlements are having sub health center. There is only one Primary health center. About 4.76% of the settlements are having primary health center. Community health center is not available in Aibawk block. The calculated coefficient of variation of sub center is 0.

iii) Communication: About 61.9 % and 14.28 of the settlements are having branch post office and sub post office. There is no post & telegraph office in Aibawk block. The calculated coefficient of variation of branch post office and sub post office is 0.

iv) Veterinary: Only rural animal health center is available in Aibawk block. About 33.33 % of the settlements are having rural animal health center. The coefficient of variation rural animal health center is 0.

v) Recreation: Public library and public playground are available in this block. About 95.23% and 90.47% of the settlements are having public library and public playground. The calculated coefficient of variation of public libraries and public playgrounds is 0.

vi) Banking & Police: Two settlements are having banking facility and only one settlement is found to have police outpost in this block. About 9.52 % and 4.76 % of the settlements are having banking facility and police outpost. Coefficient of variation of banking facility is calculated to be 0.

Table 4.2 Coefficient of variation of functions/services in Aizawl District.

Sl. no	Service/function	Coefficient of Variation
1	Primary School	4.74
2	Middle School	5.05
3	High School	4.27
4	Higher secondary School	1.22
5	Degree college	1.21
6	University	-
7	Sub center	3.11
8	Primary health center/Urban health center	1.09
9	Community health center	0.89
10	Hospital	-
11	Branch post office	2.41
12	Sub post office	1.78
13	Post & telegraph office	-
14	Rural Animal Health Center	2.12
15	Veterinary Dispensary	0.77
16	Veterinary Hospital	-
17	Public Library	3.84
18	Public Playground	3.7
19	Cinema hall	-
20	Bank	1.69
21	Police Outpost	0.44
22	Police Station	1.44

Table 4.2 shows the calculated coefficient of variation of services/functions in Aizawl district. It is found that middle schools have the highest coefficient of variation which is about 5.05. It is pertinent to mention that primary schools, middle schools and high schools are found to have high coefficient of variation indicating the uneven distribution of such facilities among the settlements.

In respect of health facilities, sub center has the highest coefficient of variation about 3.11, followed by primary health center/urban health center (1.09) and community health center (0.89). The coefficient of variation of branch post offices is 2.41 and sub post offices is 1.78 in Aizawl district. Rural animal health center has the coefficient of variation about 2.12 and veterinary dispensaries is 0.77. Two recreation facility viz. public library

and public playground have high coefficient of variation about 3.84 and 3.7 respectively in the study area. Bank and police outpost are found to have coefficient of variation about 1.69 and 0.44 respectively

It is apparent to mention that rudimentary services/functions are found to have high coefficient of variation than the complex services/functions. Rudimentary functions/services are widely distributed in the district; however their distribution pattern is uneven among the settlements. Therefore, the coefficient of variation is high among the rudimentary services/functions, while the complex functions/services are found to have low coefficient of variation.

4.4 Range of functions/services (maximum travel distance)

Range of functions/services is the distance where the consumer travels to buy a goods offered by a central place. The range of function/service or the maximum travel distance of a particular function/service has been observed after visiting all the settlements (92) asking the people about the center which they had visited for a particular service. It is observed that there are variations in the range of functions/services at different settlements. Thus, in the present study the maximum travel distances of functions/services is taken into account. (The travel distance of twenty two (22) functions/services at block levels in Aizawl district has been shown in the Appendix-5).

The observed maximum travel distances of the twenty two (22) selected functions (table-4.3) reveal that rudimentary functions are found to have shorter travel distances while complex functions/services are associated with longer distances. No travel distance is observed for primary school as all the settlements are having primary school. The maximum travel distance (10km) of middle school is observed between Mualmam and Sesawng. High school has a maximum travel distance about 29 km between Lenchim and

Mualpheng. Higher secondary school has a maximum travel distance about 87 km (between N.Khawlek and Darlawn NT). College and University have maximum travel distances of 184 km (N.Tinghmun- Aizawl NT) respectively.

The observed maximum travel distances of sub health center, primary health center, Community health center and hospital are 27 km (between Tuirial and Aizawl NT), 43km (between Thiak and Aizawl NT), 69 km (between Daido and Saitual NT) and 184 km (between N.Tinghmun and Aizawl NT) respectively. The maximum travel distance of branch post office is found between Tuikhurhlu and Aizawl NT, which is about 29 km. About 58 km (N.Tinghmun – Darlawn NT) and 184 km (N.Tinghmun to Aizawl NT) are the observed maximum travel distances of sub post office and post and telegraph office.

The maximum travel distance in respect of rural animal health center is observed between Tuikhurhlu to Aizawl NT, which is about 29 km. Maximum travel distances of Veterinary dispensary and Veterinary hospital are found between N.Khawlek to Darlawn NT (87 km) and N.Tinghmun to Aizawl NT (184 km) respectively. Tuirial jail to Aizawl NT with a distance of about 24 km is the observed maximum travel distance in respect of Public library. Public playground and Cinema hall are found to have maximum travel distances about 27 km (between Tuirial and Aizawl NT) and 184 km (between N.Tinghmun and Aizawl NT). N.Khawlek to Darlawn NT is the observed maximum travel distance (87 km) in respect of Bank. Police outpost and Police station are found to have maximum travel distances about 87 km (N.Khawlek to Darlawn NT) respectively.

Table- 4.3 Observed range of functions/services (maximum travel distance)

Service/function	Range (maximum travel distance) in kms
1. EDUCATION	
X1. Primary school	Nil
X2. Middle school	10 (Mualmam - Sesawng)
X3. High school	27 (Tuirial - Aizawl NT & Lenchim -Mualpheng)
X4. Higher secondary school	87 (N.Khawlek - Darlawn NT)
X5. College	184 (N.Tinghmun - Aizawl NT)
X6. University	184 (N.Khawlek - Aizawl NT)
2. HEALTH	
X7. Sub-Centre	27 (Tuirial - Aizawl NT)
X8. P.H.C/UHC	43 (Thiak - Aizawl NT)
X9. C.H.C	69 (Daido - Saitual NT)
X10.Hospital	184 (N.Tinghmun - Aizawl NT)
3. COMMUNICATION	
X11. Branch post Office	29 (Tuikhurhlu- Aizawl NT)
X12. Sub-Post Office	58 (N.Tinghmun - Darlawn NT)
X13. Post & Telegraph Office	184 (N.Tinghmun - Aizawl NT)
4. VETERINARY	
X14. Rural animal health center	29 (Tuikhurhlu - Aizawl NT)
X15. Veterinary Dispensary	87 (N.Khawlek - Darlawn NT)
X16. Veterinary Hospital	184 (N.Tinghmun - Aizawl NT)
5. RECREATION	
X17. Public Library	24 (Tuirail Jail - Aizawl NT)
X18. Play Ground	27 (Tuirail - Aizawl NT)
X19. Cinema Hall	184 (N.Tinghmun - Aizawl NT)
6. BANKING & POLICE	
X20. Bank	87 (N.Khawlek - Darlawn NT)
X21. Police Outpost	87 (N.Khawlek - Darlawn NT)
X22. Police Station	87 (N.Khawlek - Darlawn NT)

4.5 Threshold Population of functions/services

The threshold population of a function/service refers to the availability of the minimum population to sustain function economically. Due to different topographical settings and socio-cultural factors, there could not be fixed threshold population for a particular service/function as region differs from each other. The distribution of population according to size of settlement (table-4.4) in Aizawl district shows that six settlements (6.52 %) are having population above 3000. 34 settlements (36.95 %) are found in a population size of settlement between 500 to 1000. Moreover, 33 settlements (35.86%) are found in a population size of settlement below 500. It is pertinent to mention that about 72.82% of the settlements are found to have population size below 1000.

Table- 4.4 Population distribution according to size of settlement

Sl. no	Settlement size	Total number of settlements	In percentage (%)
1	>3000	6	6.521
2	2000 – 3000	7	7.608
3	1000 – 2000	12	13.04
4	500 – 1000	34	36.956
5	<500	33	35.869
6	Grand Total	92	100

In the present study the entry point method (Sen et. al., 1971) has been considered for the threshold population of functions/services. Function appears at the minimum size of population is the entry threshold population for that function (table 4.5). Thus, the entry threshold population of selected twenty two functions/services has been identifed for the study area. It is observed that settlement having primary school with a minimum population is found at Mualmam in Aizawl district. Thus, the observed entry threshold population of primary school is 82. The minimum size of population of settlements having middle school is found at Aichalkawn. The observed entry threshold population of middle school is 116. Similarly, high school has an entry threshold population about 151

(Bungbangla), higher secondary school about 3865 (Darlawn NT), College about10966 (Saitual NT) and University about 228280 (Aizawl NT).

The entry threshold population of sub health center about 233 is observed at Thingsat. Primary health center/Urban health center is found to have entry threshold population of 1695 (Phullen). The observed entry threshold population in respect of Community health center and Hospital are 1998 (Lower Sakawrdai) and 228280 (Aizawl NT) respectively. Settlements having branch post office with a minimum size of population is found at Hmuifang. Hence, the entry threshold population of branch post office is 200. Sub post office and Post and Telegraph office are found to have entry threshold population of about 893 (Tachhip) and 228280 (Aizawl NT) respectively.

The minimum size of population of rural animal health center is observed at Hmuifang with a population 200. About 1340 and 228280 are the observed entry threshold population in respect of Veterinary dispensary and veterinary hospital found at Thingsul Tlangnuam and Aizawl NT. Damdiai, Kani and Aizawl NTare the settlements where the minimum size of population of Public Library, Play ground and Cinema hall are found. Thus, the observed entry threshold population of Public Library, Play ground and Cinema hall are 213, 127 and 228280 respectively. The observed entry threshold population of bank is 1318 (Aibawk). The minimum sizes of population in respect of police outpost and police station have been observed at N.Vervek and Darlawn NT. Therefore, the entry threshold population of police outpost and police station are 833 and 3865 respectively.

Table 4.5 Services /functions and their observed entry threshold population

Service/function	Threshold of service/function (minimum population)	
1. EDUCATION		
X1. Primary school	82	Mualmam
X2. Middle school	116	Aichalkawn
X3. High school	151	Bungbangla
X4. Higher secondary school	3865	Darlawn NT
X5. College	10966	Saitual NT
X6. University	228280	Aizawl NT
2. HEALTH		
X7. Sub-Centre	233	Thingsat
X8. P.H.C/UHC	1695	Phullen
X9. C.H.C	1998	L.Sakawrdai
X10.Hospital	228280	Aizawl NT
3. COMMUNICATION		
X11. Branch post Office	200	Hmuifang
X12. Sub-Post Office	893	Tachhip
X13. Post & Telegraph Office	228280	Aizawl NT
4. VETERINARY		
X14. Rural animal health center	200	Hmuifang
X15. Veterinary Dispensary	1340	T.Tlangnuam
X16. Veterinary Hospital	228280	Aizawl NT
5. RECREATION		
X17. Public Library	213	E.Damdiai
X18. Play Ground	127	Kani
X19. Cinema Hall	228280	Aizawl NT
6. BANKING & POLICE		
X20. Bank	1318	Aibawk
X21. Police Outpost	833	N.Vervek
X22. Police Station	3865	Darlawn NT

PHC=Primary Health Center. UHC=Urban Health Center, CHC=Community Health Center

4.6 Hierarchy of functions/services

The concept of hierarchy is the most basic and fundamental in central place theory. In fact, the hierarchical order in central place theory refers to the hierarchical order of functions/services implying that order of functions/services require different population size i.e, above threshold population to sustain them. Hierarchical orders of functions/services also include the identification of discontinuous pattern of relationship between population size and functional range (Maithani, 1986:111).

In the present study the hierarchical order of selected functions/services has been identified following on the basis of 'entry point'. This technique is found to measure the importance of the functions on the basis of their entry to population in a settlement system. The population of a settlement where a facility appears for the first time is known as entry point for that particular function. On the basis of the entry point, functions/services are then grouped into different hierarchy after arranging the entry points of population in ascending order. However, there is a break in the entry point of various functions/services as it is found in Aizawl district. For example, Function having entry point in population size between 80 - 300 is put in one group and fall in the category of low Sen., et al, (1971) order functions as no settlement is associated with a population size between 300 to 800, there exist a break in entry point of functions in the study area. Functions having entry point in population size between 800-4000 are put in second category and are identified with middle order functions. The high order functions are suggested to cluster at a settlement with a population size of over 4000. Thus, only three orders of functions/services have been indentified for the purpose of the present study. The hierarchical orders of selected functions/services are as follow-

Table 4.6 Hierarchy of functions/services

1	Low order service/function
	(a) Primary school
	(b) Middle school
	(c) High school
	(d) Sub health centre
	(e) Branch post office
	(f) Rural animal health centre
	(g) Public library
	(h) Playground
2	Middle order service / function
	(a) Higher secondary school
	(b) Primary health center/Urban health center
	(c) Community health center
	(d) Sub post office
	(e) Veterinary dispensary
	(f) Bank
	(g) Police Outpost
3	High order service/ function
	(a) Degree College
	(b) University
	(c) Hospital
	(d) Post and telegraph office
	(e) Veterinary hospital
	(f) Cinema hall
	(g) Police Station

4.7 Identification and hierarchical order of service centers/central places

Identification of service center/central place is one of the basic exercises in central place theory. A number of works on central place theory is related to identification of central place. All the settlements cannot be regarded as central place/service center. A center which performs function/service not only for its own population but also provides goods/services to an area larger than itself (other settlement) is termed as central place/service center.

Determination of the importance of central place is universal problem in the study of space economic (Mandal, 2000). In the central place theory, a centrality is referred to as the attractive power or importance of settlements. Not merely the population or area which accounts for the centrality of a settlement but rather it is the functions which express the meaning of the term importance or centrality in its real sense. Centrality can also be defined as the functional importance of a center over other settlements that surround it. Moreover, it is not only the functional presence which signifies centrality of a settlement but also the population of surrounding settlements which interacts frequently with that settlement/center in order to avail function/service provided by that settlement/center. Settlement having functions cannot be simply designated as a central place/service center, unless it provides function/goods to additional population/settlement besides its own population. Therefore, centrality of a settlement can be examined in terms of quality, quantity and extent of influence performed by the center/settlement.

There have been various method and criteria to identify service center/central place suggested by scholars, researchers and regional planners etc. In fact, the function performed and the service provided to other settlement formed the base of identifying service center/central place. As service center/central place exist because of their service/function, which are availed not only by its own population but also by their

surrounding population. Hence, in this regard an attempt has been made to identify service center/central place on the basis of functional presence (availability of functions/services) and magnitude of settlement served (number of dependent settlement).

On the basis of 'entry point' method (Sen., et, al,1971), the selected function/service has been categorized into three orders viz. low, middle and high order functions/services (table-4.6). These three hierarchical orders of functions/services have been used for the identification as well as the hierarchical order of service center/central place in the study area. Hence, keeping in view the functional presence and magnitude of settlement served, the present study pertain to adopt the method used by Wanmali (1992) for the identification and hierarchical ordering of central place / service centre are as follow-

(a) If the settlement has more than 50% of the services that constitute a given order and,

(b) Provides any of those services to other settlement, then it is considered to be a service center for that order of functions/services. If only first criterion is met, the settlement is deemed to be self- sufficient for that order and thus serve only itself. Conversely, a settlement that depends upon any services more than 50% of the services associated with a given order is considered to be dependent settlement for that order of functions/services.

Based on the above mention criteria, 26 low order service centers, 3 middle order service centers and one high order service center have been identified in the study area. The identified hierarchical order of service centers / central places in the study area are as follow –

Table 4.7 Hierarchical order of service centers/central places

A	High order service center
	1. Aizawl N.T
B	Middle order service center
	1. Aizawl N.T
	2. Darlawn N.T
	3. Saitual N.T
C	Low order service center
	1. Suangpuilawn
	2. Phullen
	3. Khawlian
	4. Thingsulthliah
	5. Mualpheng
	6. Tlungvel
	7. Sesawng
	8. Saitual N.T
	9. Falkawn
	10. Aibawk
	11. S. Maubuang
	12. Samlukhai
	13. Lamchhip
	14. Sialsuk
	15. Hmuifang
	16. Zohmun
	17. N.Tinghmun
	18. L.Sakawrdai
	19. Vaitin
	20. N.Vervek
	21. E. Phaileng
	22. Khanpui
	23. Khawruhlian
	24. Darlawn N.T
	25. Sihphir
	26. Aizawl N.T

(a) Low order service centers

There are twenty six settlements in the study area that qualify as service centers of low order, having more than 50% of the service/function of low order function/service and serving at least one additional settlement. There are three low order service centers in Phullen block. Five low order service centers are also observed in Thingsulthliah block and seven low order service centers in Aibawk block. Darlawn block is found to have nine low order service centers and two low order service centers are found in Tlangnuam block. It is imperative to mention that there are fourty one (41) self sufficient settlements and twenty five (25) dependent settlements in the study area.

(b) Middle order service centers

Three settlements have been identified as middle order service centers in the study area. These settlements are Aizawl N.T, Saitual N.T and Darlawn N.T. It is observed that the distribution pattern of functions/services associated with middle order service center is found to be not uniform in the study area. Thus, middle order service centers in the study area are lesser in number. There is no self sufficient settlement of middle order service center. However, there are eighty nine (89) dependent settlements observed in Aizawl district.

(c) High order service centre

There is only one high order service center in the study area i.e. Aizawl N.T. Thus,the existing high order service center is found to serve all the settlements in the district. Self sufficient settlement of high order service center is not observed in the study area. There are ninety one (91) dependent settlements of high order service center in Aizawl district.

Figure- 4.1

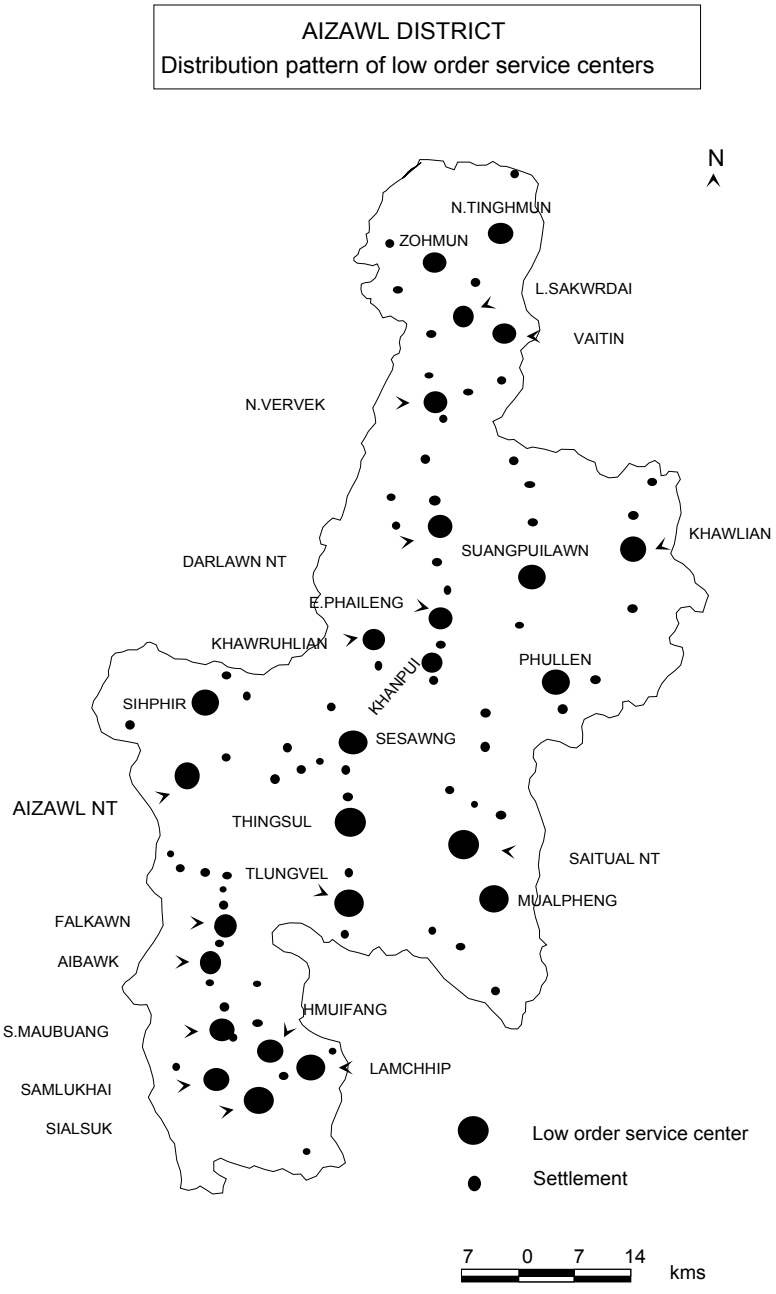

AIZAWL DISTRICT
Distribution pattern of low order service centers
N
N.TINGHMUN
ZOHMUN
L.SAKWRDAI
VAITIN
N.VERVEK
KHAWLIAN
SUANGPUILAWN
DARLAWN NT
E.PHAILENG
KHAWRUHLIAN
PHULLEN
KHANPUI
SIHPHIR
SESAWNG
AIZAWL NT
THINGSUL
SAITUAL NT
TLUNGVEL
MUALPHENG
FALKAWN
AIBAWK
HMUIFANG
S.MAUBUANG
LAMCHHIP
SAMLUKHAI
SIALSUK
Low order service center
Settlement
7 0 7 14
kms

Figure-4.2

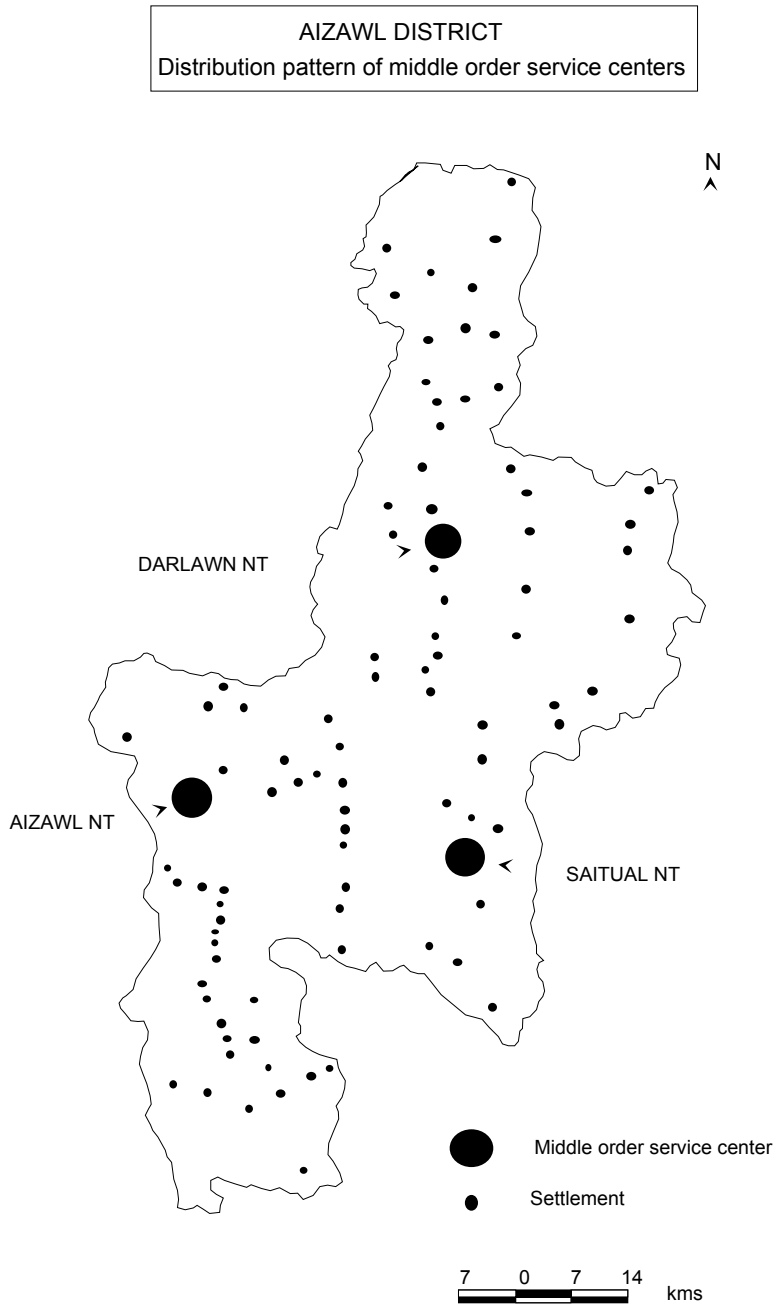

AIZAWL DISTRICT
Distribution pattern of middle order service centers
N
DARLAWN NT
AIZAWL NT
SAITUAL NT
Middle order service center
Settlement
7 0 7 14
kms

Figure-4.3

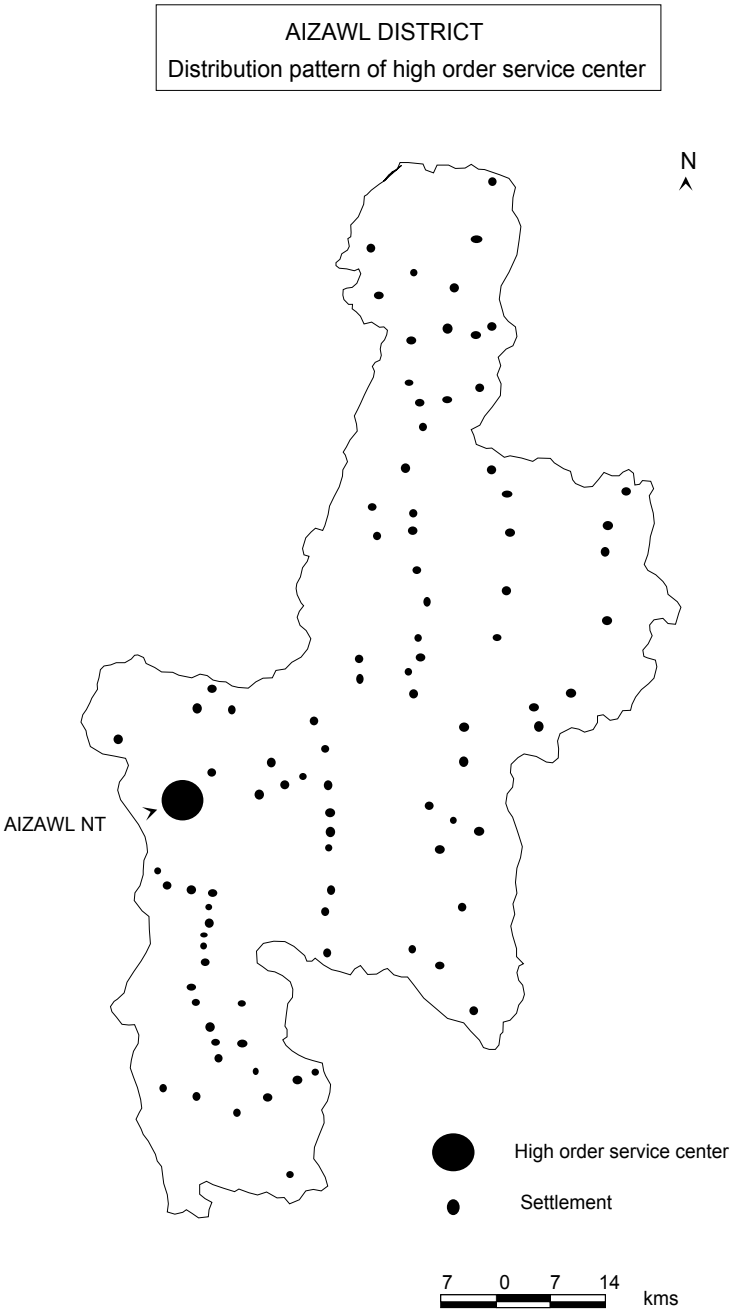

AIZAWL DISTRICT
Distribution pattern of high order service center
N
AIZAWL NT
High order service center
Settlement
7 0 7 14
kms

Table - 4.8 Self sufficient & dependent settlements of low, middle and high order service centers of Aizawl district.

Low order service center		Middle order service center		High order service center	
Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement
1. N.Khawlek	1.Thanglailung	Nil	1. N.Khawlek	Nil	1.N.Khawlek
2.Vanbawng	2.N.E Tlangnuam		2.Vanbawng		2.Vanbawng
3.Lamherh	3.Mualmam		3.Lamherh		3.Lamherh
4.Zawngin	4.Tuikhurhlu		4.Zawngin		4.Zawngin
5.Luangpawn	5.Aichalkawn		5.Luangpawn		5.Luangpawn
6.Daido	6.Darlawng		6.Daido		6.Daido
7.Buhban	7.Phulmawi		7.Buhban		7.Buhban
8. Tualbung	8.Tawizo		8.Sesawng		8.Sesawng
9. N.Lungpher	9.Maite		9Tualbung		9Tualbung
10.Sihfa	10.Muallungthu		10.N.Lungpher		10.N.Lungpher
11.Seling	11.N.Lungsai		11.Sihfa		11.Sihfa
12.T.Tlangnuam	12.Lungsei		12.Seling		12.Seling
13.Lenchim	13.U.Sakawrdai		13.T.Tlangnuam		13.T.Tlangnuam
14.Maite	14.kani		14.Lenchim		14.Lenchim
15.Hualngohmun	15.E.Damdiai		15.Maite		15.Maite
16.Mel-8	16.Sunhluchhip		16.Hualngohmun		16.Hualngohmun
17.Kelsih	17.C.C khawpui		17.Mel-8		17.Mel-8
18.Tachhip	18.Hmungnhak		18.Kelsih		18.Kelsih
19.Sateek	19.Lailak		19.Tachhip		19.Tachhip
20.Phulpui	20.Neihbawi		20.Sateek		20.Sateek
21.Thiak	21.Nausel		21.Phulpui		21.Phulpui
22.Sumsuih	22.Tuirial		22.Thiak		22.Thiak
23.Chamring	23.Tuirial Jail		23.Sumsuih		23.Sumsuih

Low order service center		Middle order service center		High order service center	
Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent Settlement
24.Chawilung	24.Bungbangla		24.Hmuifang		24.Hmuifang
25.Sailam	25.Samtlang		25.Chamring		25.Chamring
26.Palsang			26.Chawilung		26.Chawilung
27.Vaitin			27.Sailam		27.Sailam
28.Mauchar			28.N.Tinghmun		28.N.Tinghmun
29.Khawpuar			29.Palsang		29.Palsang
30.Thingsat			30.Vaitin		30.Vaitin
31.Lungsum			31.Mauchar		31.Mauchar
32.Sailutar			32.Khawpuar		32.Khawpuar
33.N.Serzawl			33.Thingsat		33.Thingsat
34.Sawleng			34.N.Vervek		34.N.Vervek
35.Kepran			35.Lungsum		35.Lungsum
36.Muthi			36.Sailutar		36.Sailutar
37.Lungleng-I			37.N.Serzawl		37.N.Serzawl
38. N.Lunglenng			38.Sawleng		38.Sawleng
39.Sairang N.T			39.Kepran		39.Kepran
40.Ratu			40.Muthi		40.Muthi
41.Phuaibuang			41.Lungleng-I		41.Lungleng-I
			42.N.Lungleng		42.N.Lungleng
			43.Thanglailung		43.Thanglailung
			44.N.E Tlangnuam		44.N.E Tlangnuam
			45.Mualmam		45.Mualmam
			46.Tuikhurhlu		46.Tuikhurhlu
			47.Aichalkawn		47.Aichalkawn

Low order service center		Middle order service center		High order service center	
Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement
			48.Darlawng		48.Darlawng
			49.Phulmawi		49.Phulmawi
			50.Tawizo		50.Tawizo
			51.Maite		51.Maite
			52.Muallungthu		52.Muallungthu
			53.N.Lungsai		53.N.Lungsai
			54.Lungsei		54.Lungsei
			55.U.Sakawrdai		55.U.Sakawrdai
			56.kani		56.kani
			57.E.Damdiai		57.E.Damdiai
			58.Sunhluchhip		58.Sunhluchhip
			59.C.C khawpui		59.C.C khawpui
			60.Hmungnhak		60.Hmungnhak
			61.Lailak		61.Lailak
			62.Neihbawi		62.Neihbawi
			63.Nausel		63.Nausel
			64.Tuirial		64.Tuirial
			65.Tuirial Jail		65.Tuirial Jail
			66.Bungbangla		66.Bungbangla
			67.Suangpuilawn		67.Suangpuilawn
			68.Phullen		68.Phullen
			69.Phuaibuang		69.Phuaibuang
			70.Khawlian		70.Khawlian
			71.Thingsulthliah		71.Thingsulthliah

Low order service center		Middle order service center		High order service center	
Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement	Self sufficient settlement	Dependent settlement
			72.Mualpheng		72.Mualpheng
			73.Tlungvel		73.Tlungvel
			74.Falkawn		74.Saitual N.T
			75.Aibawk		75.Falkawn
			76.S.Maubuang		76.Aibawk
			77.Samlukhai		77.S.Maubuang
			78.Lamchhip		78.Samlukhai
			79.Zohmun		79.Lamchhip
			80.L.Sakawrdai		80.Sialsuk
			81.N.Vervek		81.Zohmun
			82.Ratu		82.L.Sakawrdai
			83.E.Phaileng		83.N.Vervek
			84.Khanpui		84.Ratu
			85.Khawruhlian		85.E.Phaileng
			86.Sihphir		86.Khanpui
			87.Sairang		87.Khawruhlian
			88.Samtlang		88.Darlawn N.T
			89.Sialsuk		89.Sihphir
					90.Sairang N.T
					91.Samtlang

4.8 Complementary regions of service centers/ central places

Complementary region refers to the extent over which a service center exerts its influence in a region. The surrounding areas around a central place which are socially, economically and culturally interrelated with that place are collectively known as the complementary region of that central place (Tiwari, 1988:168). It is thus the area encircling a service centre and served by that service centre. A complementary region is an organized space surrounding a central place which is interrelated with it by means of socio- economic interactions.

It is the range of function/service that determine the size of complementary region. However, it is observed that there are variations in the range of individual function/service in the study area. Therefore, instead of delineating complementary region of individual function/service, the present study attempts to delineate complementary region jointly in respect of the hierarchical orders of functions/services.

An attempt has been made in the present study to adopt qualitative technique to delineate complementary regions of service centers as quantitative technique may not be apply efficiently in a small area (Sharma & Sharma, 1985:12-20). However, an application of qualitative technique requires an intensive field study of people's choice of center of function/service. It is also suggested by Marshall (1964) that a technique involving interview is suitable to identify inter-center linkages (Thakur, 1985:92) and a form of interrelation between the centers and the complementary region of a center is expected to be manifested in consumer travel patterns (Carol, 1969:18).

The people's choice of center for function/service has been collected from an intensive field survey with the help of questionnaire framed to gather the required information. (People's choice of center of low, middle and high order functions at block levels in Aizawl district has been shown in the Appendix-5). During the field survey it was

recorded whether a settlement has any specific function and if not, where majority of the people go to avail of that particular function/service. The answer to this question has been referred to as people's choice of center. If the majority of people in a particular settlement prefer a center for a particular service / function, which is not available in their settlement, then a desire line can be drawn indicating the people's choice of center. After ray diagram has been prepared by constructing desired lines from the settlement (origin) to the center (destination), the complementary regions of different orders of service centers have been delineated by drawing lines which pass through the gaps left by the desired lines.

It is pertinent to mention that there are three middle order service centers in Aizawl district. However, there are five (5) complementary regions of middle order service centers in the study area. It is observed that two settlements viz. L.Sakawrdai and Sialsuk have been emerged as the people's choice of center for middle order function. This implies that in spite of having 50 % of the middle order functions/services, these two settlements are found to provide some of the middle order functions/services to other settlement.

Figure 4.4

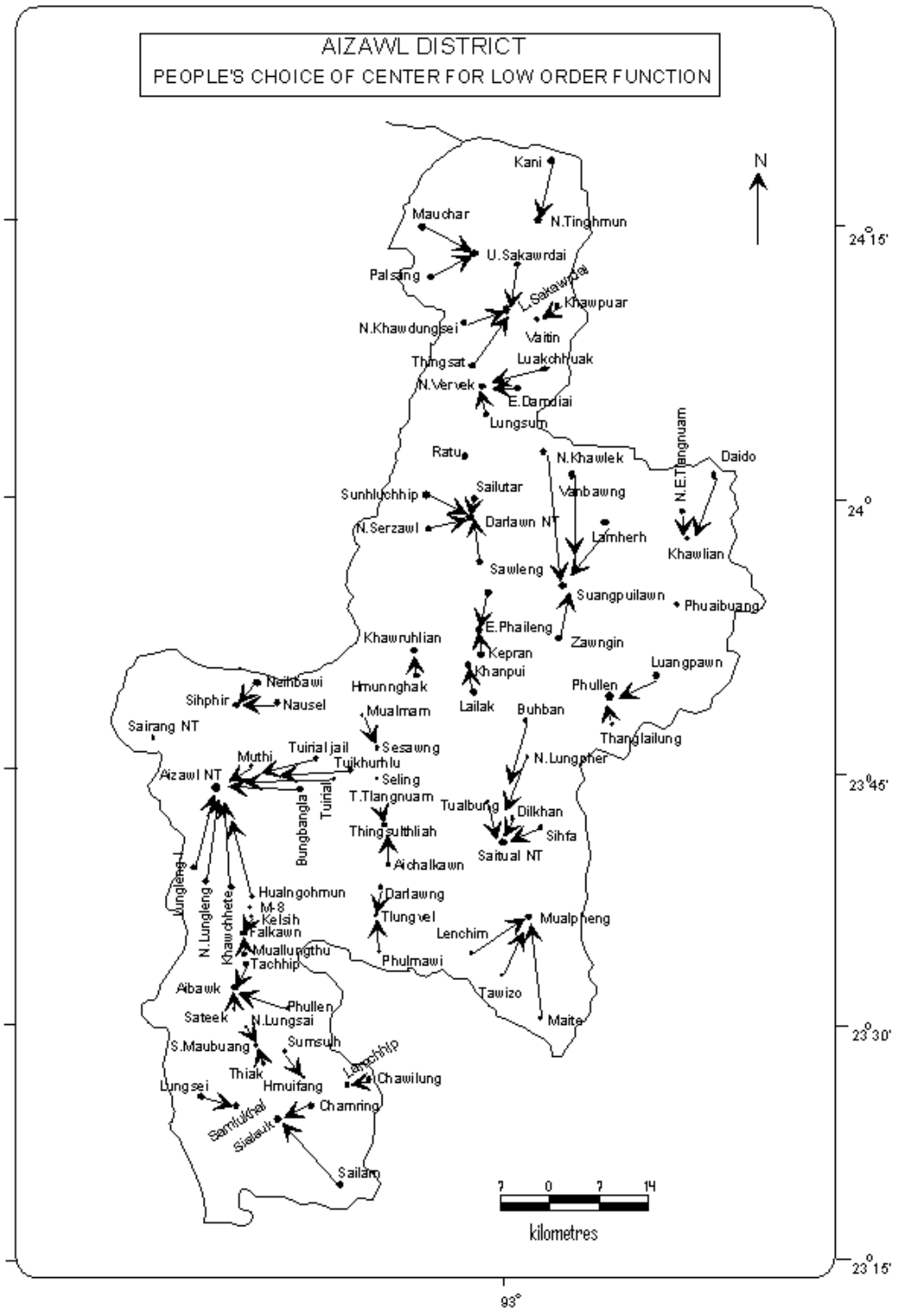

AIZAWL DISTRICT
PEOPLE'S CHOICE OF CENTER FOR LOW ORDER FUNCTION
N
Kani
N.Tinghmun
Mauchar
U.Sakawrdai
Palsang
L.Sakawrdai
Khawpuar
N.Khawdungsei
Vaitin
Thingsat
Luakchhuak
N.Vervek
E.Dampuiai
Lungsum
Ratu
N.Khawlek
Daido
N.E.Tlangnuam
Sunhluchhip
Sailutar
Vanbawng
N.Serzawl
Darlawn NT
Lamherh
Khawlian
Sawleng
Suangpuilawn
Phuaibuang
E.Phaileng
Zawngin
Khawruhlian
Kepran
Khanpui
Luangpawn
Hmunnghak
Phullen
Neihbawi
Sihphir
Nausel
Lailak
Buhban
Mualmam
Thanglailung
Sairang NT
Tuirial jail
Sesawng
N.Lungpher
Muthi
Tuikhurhlu
Aizawl NT
Seling
T.Tlangnuam
Tualbung
Dilkhan
Tuirial
Bungbangla
Thingsulthliah
Sihfa
Saitual NT
Aichalkawn
Jungleng
Darlawng
Hualngohmun
M-8
Tlungvel
Mualpheng
N.Jungleng
Khawchhete
Kelsih
Falkawn
Lenchim
Muallungthu
Phulmawi
Tachhip
Aibawk
Tawizo
Phullen
Sateek
N.Lungsai
Maite
S.Maubuang
Sumsuh
Thiak
Hmuifang
Chawilung
Lungsei
Chamring
Sialsuk
Sailam
7 0 7 14
kilometres
24°15'
24°
23°45'
23°30'
23°15'
93°

Figure 4.5

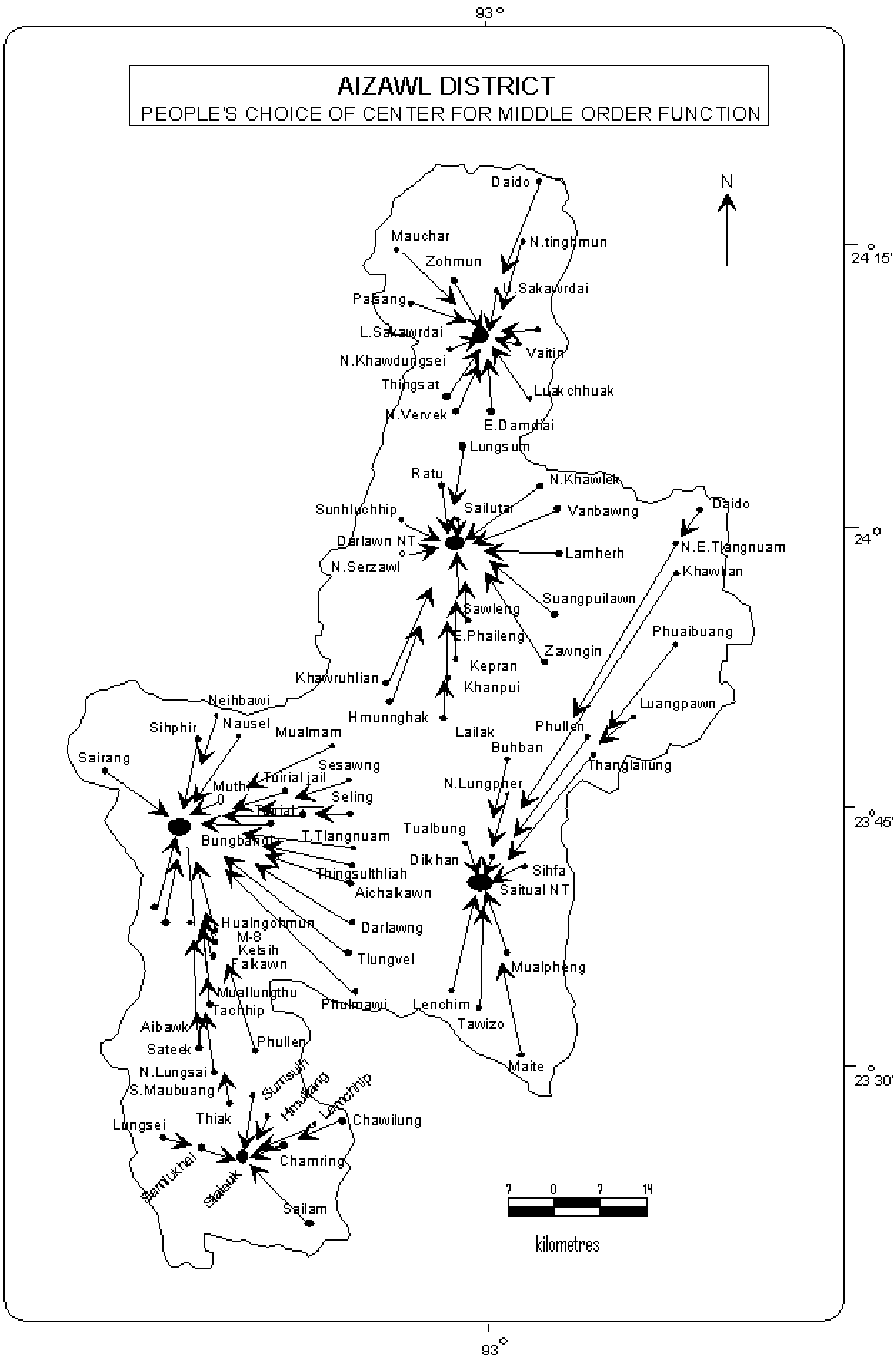

93°
AIZAWL DISTRICT
PEOPLE'S CHOICE OF CENTER FOR MIDDLE ORDER FUNCTION
N
24°15'
24°
23°45'
23°30'
Daido
Mauchar
N.tinghmun
Zohmun
U.Sakawrdai
Pabang
L.Sakawrdai
Vaitin
N.Khawdungsei
Thingsat
Luakchhuak
N.Vervek
E.Damdai
Lungsum
Ratu
N.Khawlek
Sunhluchhip
Sailutar
Vanbawng
Darlawn NT
N.E.Tlangnuam
N.Serzawl
Lamherh
Khawlian
Suangpuilawn
Sawleng
Phuaibuang
E.Phaileng
Zawngin
Kepran
Khawruhlian
Khanpui
Neihbawi
Luangpawn
Hmunnghak
Sihphir
Nausel
Lailak
Phullen
Mualmam
Buhban
Sairang
Thanglailung
Sesawng
Tuirial jail
Muthi
N.Lungpher
Seling
Tuirial
Tualbung
Bungbangh
T.Tlangnuam
Dikhan
Sihfa
Thingsulthliah
Saitual NT
Aichalkawn
Hualngohmun
Darlawng
M-8
Kelsih
Tlungvel
Falkawn
Mualpheng
Muallungthu
Phulmawi
Lenchim
Tachhip
Tawizo
Aibawk
Phullen
Sateek
Maite
N.Lungsai
S.Maubuang
Chawilung
Thiak
Lungsei
Chamring
Sailam
kilometres

Figure 4.6

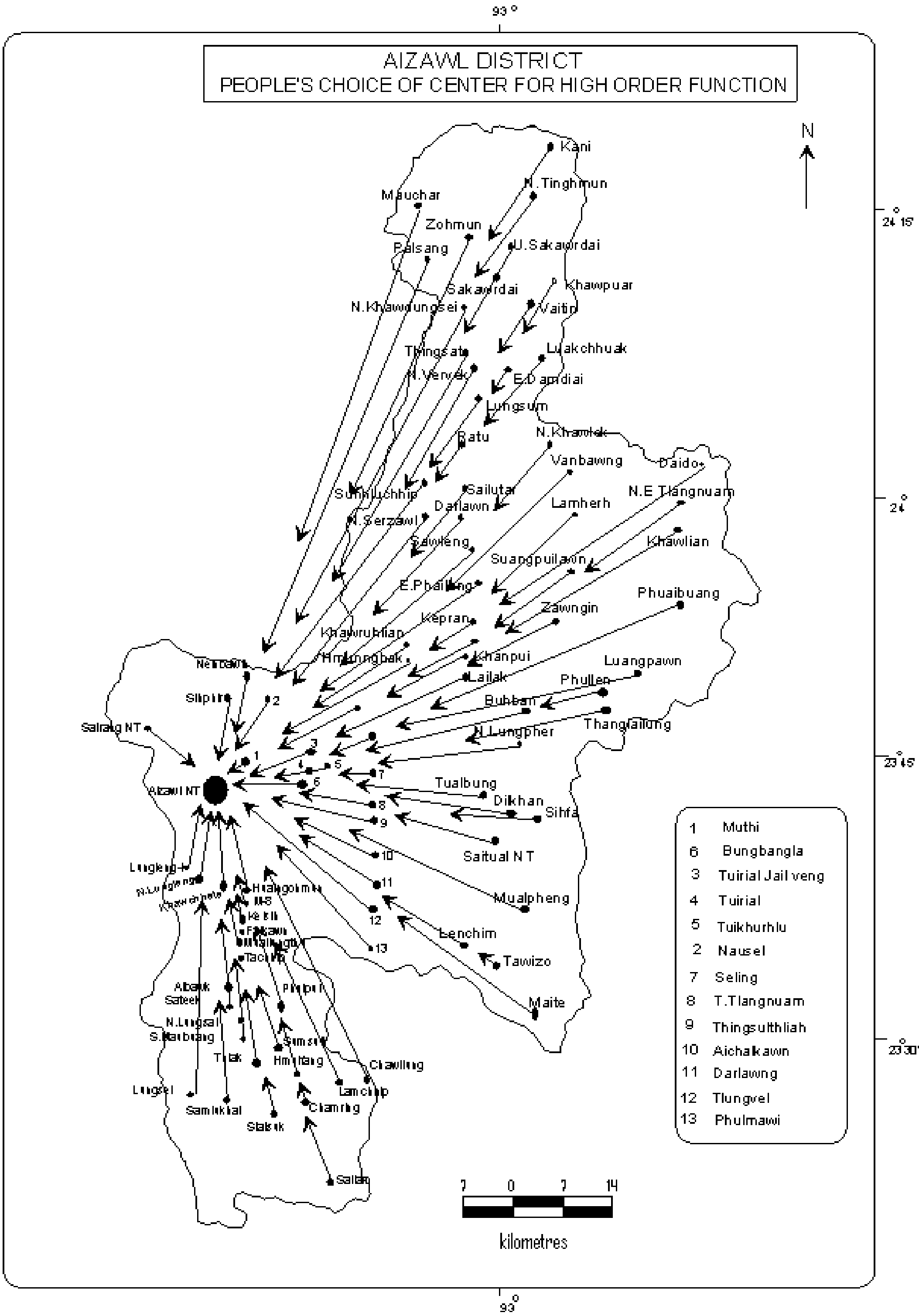

AIZAWL DISTRICT
PEOPLE'S CHOICE OF CENTER FOR HIGH ORDER FUNCTION
N
93°
24°15'
24°
23°45'
23°30'
Kani
N.Tinghmun
Mauchar
Zohmun
Palsang
U.Sakawrdai
Sakawrdai
Khawpuar
N.Khawdungsei
Vaitin
Thingsat
Luakchhuak
N.Vervek
E.Damdiai
Lungsum
Ratu
N.Khawlek
Vanbawng
Daido
Sunhluchhip
Sailutar
N.E Tlangnuam
Darlawn
Lamherh
N.Serzawl
Khawlian
Sawleng
Suangpuilawn
E.Phaileng
Phuaibuang
Zawngin
Kepran
Khawruhlian
Hmuifang
Khanpui
Luangpawn
Lailak
Phullen
Buhban
Thanglailung
N.Lungpher
Sairang NT
Aizawl NT
Tualbung
Dikhan
Sihfa
Saitual N T
Mualpheng
Lenchim
Tawizo
Maite
Chawilung
Lamchip
Chamring
Saitah
1 Muthi
6 Bungbangla
3 Tuirial Jail veng
4 Tuirial
5 Tuikhurhlu
2 Nausel
7 Seling
8 T.Tlangnuam
9 Thingsulthliah
10 Aichalkawn
11 Darlawng
12 Tlungvel
13 Phulmawi
7 0 7 14
kilometres

Figure 4.7

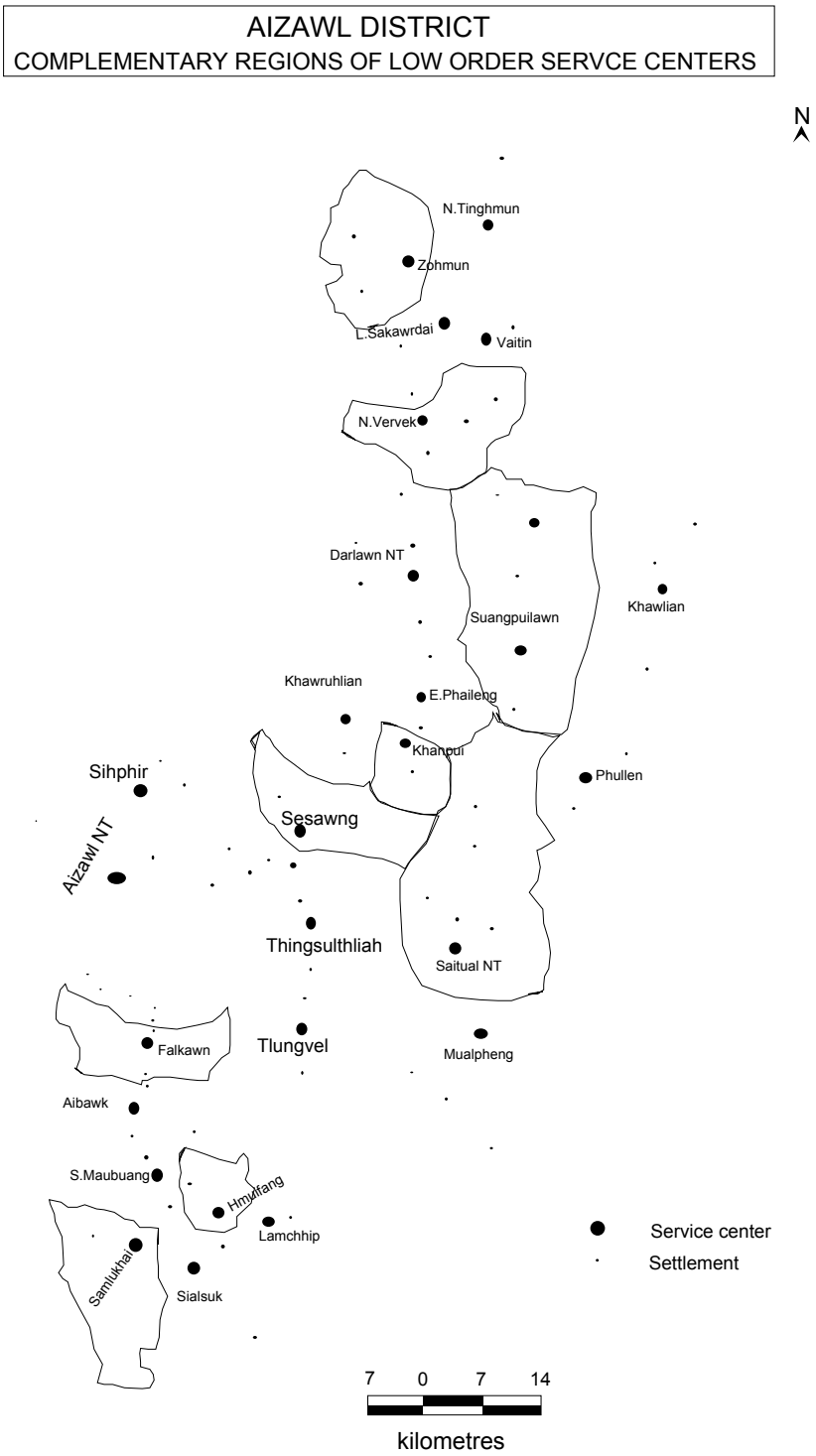

AIZAWL DISTRICT
COMPLEMENTARY REGIONS OF LOW ORDER SERVCE CENTERS
N
N.Tinghmun
Zohmun
L.Sakawrdai
Vaitin
N.Vervek
Darlawn NT
Suangpuilawn
Khawlian
Khawruhlian
E.Phaileng
Khanpui
Phullen
Sihphir
Sesawng
Aizawl NT
Thingsulthliah
Saitual NT
Falkawn
Tlungvel
Mualpheng
Aibawk
S.Maubuang
Hnuifang
Lamchhip
Samlukhai
Sialsuk
Service center
Settlement
7 0 7 14
kilometres

Figure 4.8

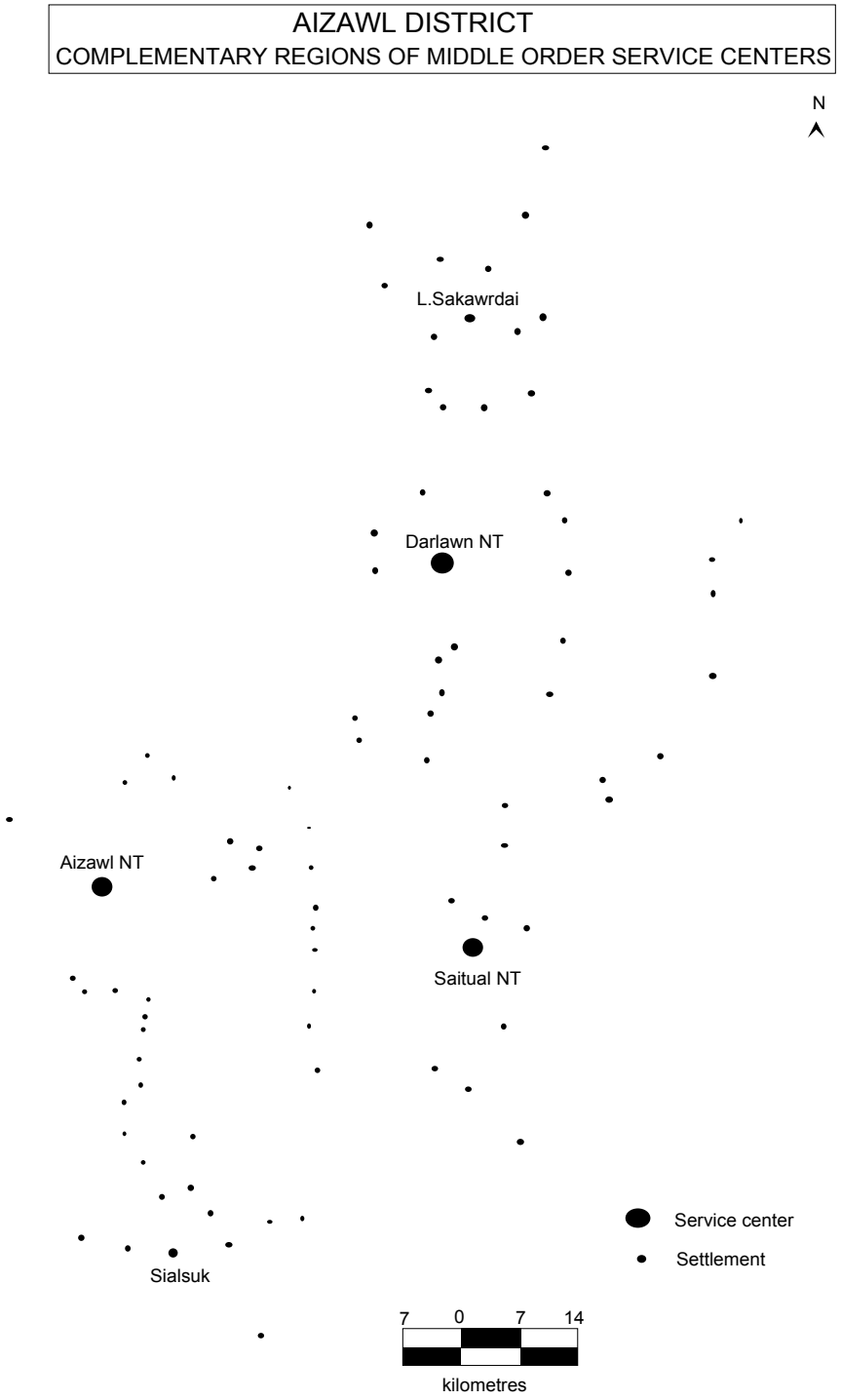
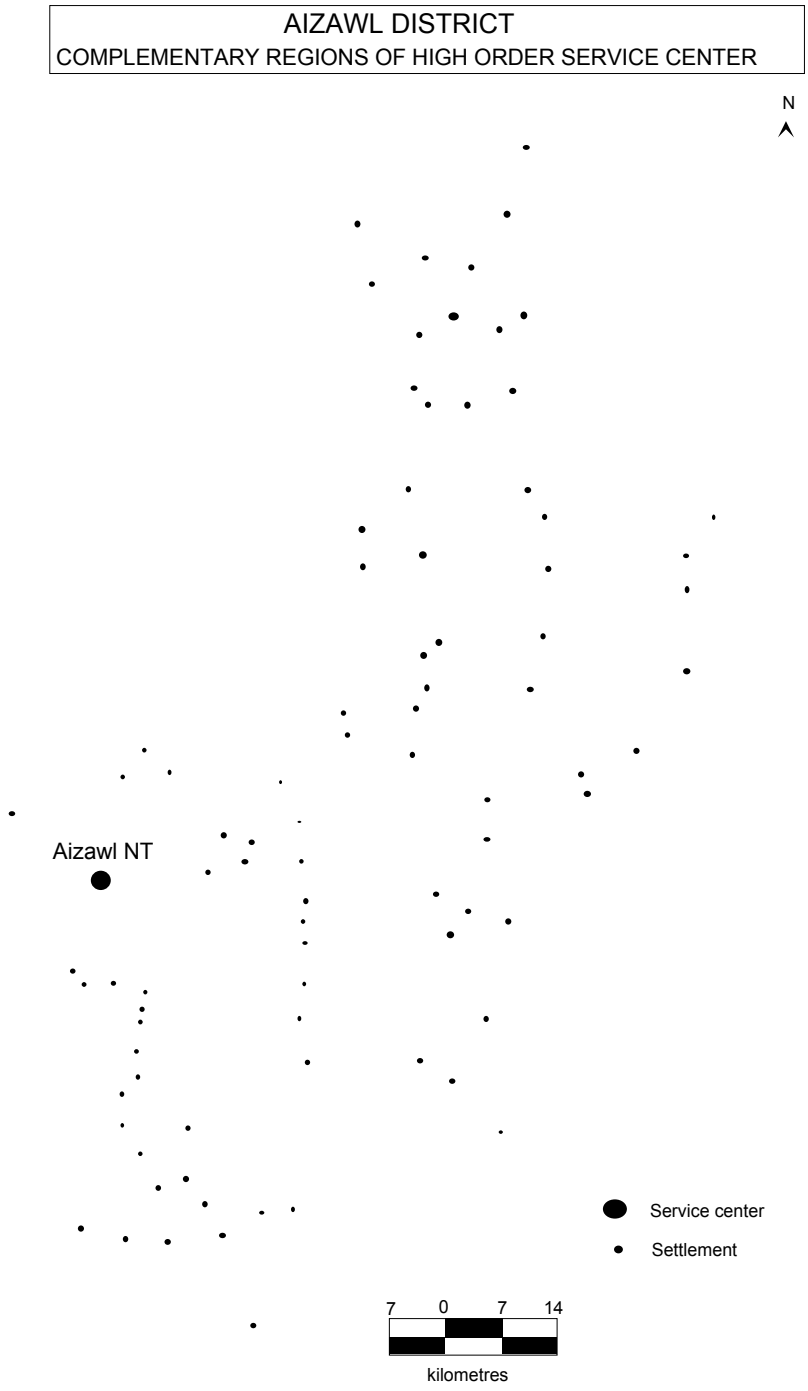

AIZAWL DISTRICT
COMPLEMENTARY REGIONS OF MIDDLE ORDER SERVICE CENTERS
N
L.Sakawrdai
Darlawn NT
Aizawl NT
Saitual NT
Sialsuk
Service center
Settlement
7 0 7 14
kilometres

Figure 4.9


AIZAWL DISTRICT
COMPLEMENTARY REGIONS OF HIGH ORDER SERVICE CENTER
N
Aizawl NT
Service center
Settlement
7 0 7 14
kilometres

4.9 Conclusion

The present analysis of service centers/central places in Aizawl district brings out the following generalization.

Firstly, the selected six functions/services - education, health, communication, veterinary, recreation, police and banking are further divided into twenty two sub-functions. The sub functions of education consist of primary school, middle school, high school, higher secondary school, college and university. Health sub functions comprise sub health center, primary health center/urban health center, community health center and hospital. Communication sub functions include branch post office, sub post office and post and telegraph office. Rural animal health center, veterinary dispensary and veterinary hospital constitute veterinary sub functions. Recreation sub functions also comprise public library, public playground and cinema hall. Banking and police sub function are bank, police outpost and police station. It is found that more rudimentary functions are occur in large number and more complex functions occur in lesser number.

Secondly, the distributional pattern of services /functions at the block levels is found to be not uniform. It is apparent to mention that rudimentary services/functions are found to have high coefficient of variation than the complex services/functions. However, rudimentary functions/services are widely distributed in the district, but their pattern of distribution is uneven among the settlements. Therefore, the coefficient of variation is found to be high among the rudimentary services/functions. On the other hand the complex functions/services are found to have low coefficient of variation. It is found that middle schools have the highest coefficient of variation which is about 5.05.

Thirdly, range of functions/services have been identify on the basis of space preferences of the people in availing various functions/services. The observed maximum travel distances of twenty two (22) functions reveal that rudimentary functions are found to have shorter travel distances while complex functions/services are associated with longer distances. On the basis of entry point method (functions first appear at the minimum size of settlement), the entry threshold population of selected functions/services has been determine and functions/services has been grouped into three hierarchical order viz. low order service/function, middle order service/function and high order service/function. The low order services/functions are- primary school, middle school, high school, sub center, branch post office, rural animal health center, public library and public play ground. The middle order functions/services comprises higher secondary school, primary health center/urban health center, community health center, hospital, sub post office, veterinary dispensary, bank, police outpost, and police station. The higher order services/functions also include college, university, post & telegraph office, veterinary hospital and cinema hall.

Fourthly, there are twenty six (26) low order service centers, three (3) middle order service centers and one (1) high order service center in Aizawl district. There are fourty one (41) self sufficient settlements and twenty five (25) dependent settlements of low order service centers. There is no self sufficient settlement in respect of middle order service center and high order service center. Eighty nine (89) dependent settlements of middle order service centers and ninety one (91) dependent settlements of high order service center have been observed in the study area.

Fifthly, the complementary region of low, middle and high order service center has been identified on the basis of space preference of the people in availing various service/function. It is observed that middle order service center complementary region has cover larger area and also having more population than low order service center. Similarly, high order service center complementary region has cover larger area and more population than low and middle order service centers. Besides, the existing three middle order service centers there are two settlements that appeared as the choice of center for middle order function/service viz. Sialsuk and Lower Sakawrdai. Thus, it is pertinent to mention that these two settlements be function as middle order service center by providing more function/service as it has been providing middle order function to other settlement.

Lastly, it is imperative to mention that the distributional pattern of service centers is found to have an impact in the level of socio-economic development in the study area. Tlangnuam block having all the three orders of service centers (one high order service center, one middle order service center and two low order service centers) has been designated as high development. On the other hand, Phullen block (having three low order service centers), Darlawn block (one middle order service center and nine low order service centers), Thingsulthliah block (having one middle order service center and five low order service centers), Aibawk block (having seven low order service centers) are categorized as low development. Thus, it is pertinent to mention that the presence of various order of service centers are conducive to high level of development.

.

REFERENCES

1. Berry, B.J.L and Garrison, W.L., (1958): *Recent Development of Central Place Theory,* Papers and Proceedings of the Regional science Association, Vol.4, p.111.
2. Bha, L.S. et. al*.,* (2003): *Micro level planning, A case study of Karnal Area, Haryana. India*. Rajesh publications, New Delhi, p.45.
3. Carol, H., (1969): "Development Regions in Southern Ontario based on city centered region", *Ontario Geography*, No-4, p.18.
4. Christaller, Walter., (1933): *Die Zentralen Orle in Suddeutschland,* Fischer, Jena; translated by C.W. Baskin as:*Central places in Southern Germany,* Prentice Hall, New Jersey, 1966.
5. Chand, Mahesh and Puri, V.K., (2005): *Regional Planning in India*, Allied Publishers Pvt. Ltd, p.138.
6. Clark, W.A.V., (1968): "Consumer Travel Patterns and the Concept of Range", *Annals of the Association of American Geographers*, Vol. 58, June, p.386.
7. Dickinson, R.E., (1929): "The Regional Functions and zones of Influence of Leeds and Bradford", *Geography*, Vol.15, pp.548-557.
8. Dickinson, R.E., (1934): "The Metropolitan regions of the United States", *Geographical Review*, Vol.24, pp.278-291.
9. Forbes, J.D., (1962): "Central place Theory-An Analytical Framework for Retail Structure", *Land Economics*, Vol. 48, No.1, p.15, University of Wisconsin Press.
10. Hirschman, A., (1958): *The Strategy of Economic Development*, Yale University Press, New Haven.
11. Hagerstrand, T., (1967): *Innovation diffusion and Spatial Processes*, University of Chicago Press, Chicago.
12. Holt-Jensen, A., (1988): *Geography: History and Concepts*, London, Paul Chapman Publishing, trans. B.Fullerton.
13. Jafferson, M., (1931): "The Distribution of Worlds City's Folk", *Geographical Review,* Volume XXI, p.453.
14. Losch, A., (1939): *The Economics of Location*, Trans. By W.H Wonglom and W.F. Stolper, Yale University Press, New Haven, 1954 (Originally published in Germany by Fisher, Jena, 1939).
15. Mandal, R.B., (2000): *Urban Geography, A Text Book*, Concept Publishing Company, New Delhi, p.146.
16. Maithani, B.P., (1986): *Spatial Analysis in Micro Level Planning*, Omsons Publication, New Delhi, p.111.
17. Marshall, J.U., (1964): "Models and Realities in Central Place Studies", *The Professional Geographers,* Vol.16, pp.5-8.

18. Misra, R.P. Sundaram K.V. and Rao, Prakasa. V.L., (1974): *Regional Development Planning in India*, Vikas Publishing House, New Delhi, p.201.

19. Perroux, F.,(1955): Note sur la notion de pole de Croissance, Economic Appliqué 8 (1-2), Jan.- june, Also, idem (1955), 'Economic Space Theory and Application', *Quaterly Journal of Economics.*

20. Sharma, P., & Sharma, H.N., (1985): "Identification, ranking and grouping of service centers-A case study of Nowgong District", *The North Eastern Geographers*. Vol-17, No. 1& 2, pp. 12-20.

21. Sen, L.K. et al., (1971): *Planning Rural Growth Centers for Integrated Area Development: A Study of Miryalguda Taluka of Andhra Pradesh*, NICD, Hyderabad.

22. Singh,O.P & Singh,Raj L., (2001): "A Framework of spatial planning with an example", *Essays in Indian Geography, continuity of Traditions,* R. Gopalakrishnan & Ali Ahmed, (eds.), pp. 147.

23. Singh, O.P and Pandey, D.C., (1986): *Development Planning: Theory and Practice*, Gyanodaya Prakashan, Nainital, pp.7-36.

24. Smailes, A.E., (1944): "The Urban Hierarchy in England and Wales", *Geography*, Vol.29, pp.41-51.

25. Thakur, R.N., (1985): "*Micro regional central place system in India (A case study of the Region)",* Inter-India publications, New Delhi, p.92.

26. Tiwari, P.C., (1988): *Regional development and planning in India*, Criteria publications, New Delhi, p.5

27. Tiwari, P.C., (1988): op. cit, p.168

28. Wanmali, S., (1992): *Rural Infrastructure, The settlement system and development of the Regional economy in Southern India,* Research report 91, International Food Policy Research Institute, p.11.

CHAPTER – V

SPATIAL PLANNING FOR BALANCED DEVELOPMENT

- Introduction
- Equity (maximum travel distance) and efficiency (threshold population)
- Identification and organization of spatio-functional gap
- Spatial development framework
- Conclusion

5.1 Introduction

A realistic planning should have three dimensions i.e, economic, social and spatial (Misra, 1990:181-183). The dimension of space/region in development studies has found expression even in Keynesian form of development policies, where emphases have been laid on a process of trickle-down in order to have spread effect on different regions (Willis, 2005:43). Christaller's central place theory (1933) and its modification by Losch (1939) is also the testimony of arrangement of settlements within a space/region. Since then, analyses of development studies on the regional/spatial dimension have also been found in the works of Perroux (1950), Myrdal (1957), Hirschman (1958), Berry and Garrison (1958), Friedman, (1966 & 1973), Boudeville (1966), Richardson (1980).

Spatial planning is the sum total of the concepts, approaches, methods and techniques for evolving a desired spatial organization and structure as spatial planning is also defined as locational planning or the systematic planning of locations in a geographical space (Singh and Pandey, 1986:7-36). In short, selection of 'things for places and places for things' is the essence of spatial planning (Tiwari, 1988:13). Spatial planning also tries to organize space in a suitable manner where developmental inputs may be located at the optimum and appropriate places to maximize the access of service/function to the people, and minimize distance for availing particular facility or group of facilities. It is also important to mention that spatial organization and appropriate/optimum location of socio-economic facilities is closely related and embedded in the desired spatial development framework of an area or a region. Spatial development frame refers to focusing of investment on socio-economic infrastructure at appropriate places, which has to be chosen in terms of maximum access to the beneficiaries at the minimum cost. In

other words, spatial development is concerned with the process of decision making about location and allocation of resources aiming at functionally coherent spatial system. It aims at locating services and people at points where they can be used or function most efficiently to attain the objective of balanced development of an area (Singh and Singh, 2001:149). Therefore, spatial planning involves selecting sets of mutually interacting and inter-dependent service centers as well as demarcating their complementary regions. Rational organization of development process at central places/service centers is believed to be the only way for ensuring balanced development of a region. This may be attained through evolving a systematic spatial development framework based on scientific spatial planning (Singh and Singh, 2001:148).

Disparity and inequality of regions are old and persisting problems. It is contrary to the concept of development where-in equitable benefits to the people in terms of opportunities, choice, self respect, social justice are implied. It is the degree of variance in terms of actual and potential use of resources to attain these humane conditions that lies behind the concept of regional imbalance. Thus, there do co-exist relatively developed and depressed states and even regions within each state on development parameters. In fact regional imbalance may be caused due to conditions of unequal utilization of natural or man-made endowments. It is found to have led to the neglect of some regions and preference of others for investment and development efforts (Misra & Puri, 2006:924).

The regional imbalance in the level of socio-economic development is found to be glaring in Aizawl district. Inter-block disparity in the district also signifies that there continually exists inter-village disparity in the level of socio-economic development. It is,

however necessary to find out a mechanism in order to reduce the disparity at inter and intra- block level under a suitable spatial development framework in the study area.

It is found that, there is negligence of spatial factors in the planning process in India as well as in the state in general and in the district in particular. It is observed that function/service is distributed unevenly among the settlements without the consideration of their linkages and hierarchical order as well as the capacity of settlements to retain such function/service. It is believed that through the linkage of service centers of different order in terms of functions a balanced regional development may be achieved in the region (Misra & Puri, 2006:929).

The significance of linkage of hierarchically patterned lies in the fact that spatially integrated functions may generate impulses of socio-economic development till the lowest order of settlements in the hierarchy. In addition, it may help in the expansion and addition of functions/facilities if locational attributes are given due consideration. This is particularly important in the study area where the socio-economic facilities are scarce and limited. Since, it is not possible to provide socio-economic facilities to each and every settlement by any other agency including the government there have to be few favoured points around which service /function have to cluster. Hence, it is imperative to find out the suitable points i.e., hierarchical order of service centers for the optimum location of service/function of balanced regional development.

In case of Aizawl district, it appears that there are 26 low order service centers, 3 middle order service centers and one high order service center. The hierarchical order of service centers may provide the framework under which necessary socio-economic facilities are developed or located to bring about socio-economic development. It is also

pertinent to mention that the existing system of service centers may be re-organized to attain desirable spatial organization in the study area.

It is in this light that an attempt has been made in this chapter to identify desired spatial organization through the technique of spatial planning for balanced regional development in Aizawl district.

5.2 Equity (maximum travel distance) and Efficiency (threshold population)

Equity and efficiency are the twin concepts, which are considered as basic technique in the formulation of spatial development framework for a geographical region. The formulation of spatial development framework which is usually expressed in settlement linkages is conceived as hierarchical orders of settlements based on the rational standards of equity and efficiency. In fact, the equity is referred to as ranges which relates to the maximum travel distance which the beneficiaries of a proposed development scheme should travel or can travel to reach a service center offering service and facilities; whereas efficiency is expressed in terms of the availability of minimum population within the prescribed range or maximum travel distance so that a process of self sustainable growth would be generated in the entire complementary area from the facility center (Singh & Singh, 2001).

However, due to variable condition different functions/services are having different maximum travel distances and threshold population in the study area. Consideration of individual function/service for prescribing standard of distance (equity) and population (efficiency) is against the principle of clusterization and therefore instead of selecting individual function/service, hierarchical orders of service centers and their associated functions/services have been selected for the provision of equity and efficiency in the

present study. For the purpose, therefore, service centers based on the order of functions are grouped into three broad categories as follows –

Table 5.1 Hierarchical order of service centers and associated functions/services

Hierarchical order	Function
Low order	Primary School, Middle School, High School, Branch Post Office, Sub Centre, Rural Animal Health Center, Public Library, and Public Playground.
Middle order	Primary Health Center/Urban Health Center, Community Health Center, Sub Post Office, Bank, Higher Secondary School, Veterinary Dispensary, Police Outpost.
High order	College, University, Hospital, Veterinary hospital, Cinema Hall, Post & Telegraph office, Police Station.

Agencies, planners and researcher have proposed equity and efficiency standard of function and service (table 5.2 & 5.3) for different geographical region taking into account the area personality in respect of physiography, availability of infrastructural facilities and socio-cultural ethos of the people. However, there can be no fixed standard for equity and efficiency for functions /services as regions differ distinctively from each other.

In the present study an attempt has been made to find out the conditions in Aizawl district in terms of equity of (i) maximum travel distance which people may travel or should travel to avail a facility or service provided at a center, and (ii) efficiency – the availability of sufficient beneficiary population within the prescribed range which may sustain the functions economically. In this regard, a detailed and comprehensive survey has been conducted to study the spatial interaction pattern and their spatial preferences for

Table 5.2 Distance and Population standard of function/services for hills (Tiwari, 1988: 209)

Hierarchical order	Threshold population	Maximum travel distance	Group of functions/services
Low order center	4000	3kms	Cloth shop, air price shop, branch post office, junior high school, dairy shop
Middle order center	10,000	5 kms	Primary health center, high school, sub post office bank
High order center	22,000	8 kms	Intermediate college, veterinary hospital, general hospital

Table 5.3 Suggested standard of Spatial planning for hilly area (Singh & Singh, 2001: 158)

Service Center level	Threshold population	Maximum travel distance	Group of functions/eservices
First level	25,000	16 kms	Hospital, post & telegraph office, college, bus depot
Second level	8000	7 kms	Bank, sub post office, primary health center, dispensary, high school, intermediate college
Third level	2500	3 kms	Branch post office, middle school , cloth shop, bus stop
Fourth level	800	1.73 kms	Primary school and other lowest level function

availing a facility provided by different orders of service centers. The study of spatial interaction pattern, it is believed, may provide a concrete basis for prescribing the 'equity' (maximum travel distances). It is also believed that the entry threshold population of functions/services may provide the 'efficiency' (population threshold) of the hierarchical order of functions/services.

a) Equity (Maximum travel distances of low, middle & high order functions/services)

In order to prescribe travel distance for a group of services/functions the travel distances of a particular function/service has been calculated for all the settlements. The average travel distances of low, middle and high order function obtained at the block level determine the travel distance (equity) of Aizawl district. (The maximum/minimum travel distances of functions/services at the block level in Aizawl district has been shown in the Appendix-5)

i) Travel distance of low order functions/services

Darlawn block: The maximum travel distance observed is 15 km between North Tinghmun and Zohmun. The minimum travel distance observed is 2 km between Lungsum and New Vervek. The calculated average travel distance and coefficient of variation is 6.94 and 0.54 respectively.

Phullen block: The maximum travel distance observed is 21 km between North Khawlek village and Suangpuilawn village, while the minimum travel distance (21 km) is found between Thanglailung village and Phullen village. The average travel distance of Phullen block is 8 km and the coefficient of variation is also calculated to be 0.78.

iii) Aibawk block: The maximum travel distance observed is 11 km, while the minimum travel distance is found to be 1 km. The average travel distance is 5.62 kms and the coefficient of variation is 0.70.

iii) Tlangnuam block: The maximum travel distance (27 km) is observed between Tuirial and Aizawl NT. The average travel distance observed in this block is 14.27 km. The minimum travel distance (2 km) is found between Neihbawi and Sihphir. The calculated coefficient of variation is 0.71.

iv) Thingsulthliah block: The maximum travel distance observed is 29 km (between Tuikhurhlu and Aizawl NT) and the observed minimum travel distance is 2 km. The average travel distance is calculated to be 12.71km and the coefficient of variation is 0.78.

In Aizawl district Tlangnuam block has the highest average travel distance about 14.27 km, followed by Thingsulthliah block (12.71 km), Phullen block (8 km),Darlawn block (6.94 km) and Aibawk block has the lowest average travel distance of 5.62 km. The calculated average travel distance of Aizawl district for low order function/service is 9.51 km. The coefficient of variation of the district is 0.40 (table 5.4). Prescribing the maximum travel distance of functions/services associated with low order service center at the distance of about 9.51 km is found to be inappropriate as the people has to travel about 9 km to avail the low order functions/services. Thus, keeping in view the geo-environment of the study area, people's movement pattern and previous suggestions made by various agencies, the prescribe travel distance in respect of low order functions/services for Aizawl district has been estimated to be 5 km.

ii) Travel distance of middle order functions/services

Darlawn block: The maximum and minimum travel distances observed in this block are 42 km and 2 km respectively. The average travel distance is 18.5 km and the coefficient of variation is calculated to be 0.63.

Phullen block: The observed maximum travel distance is 87 km and the minimum travel distance is 38 km. The average travel distance is 60.5 km. The coefficient of variation is calculated to be 0.26.

Aibawk block: The maximum travel distance (43 km) is observed between Thiak and Aizawl NT. The observed minimum travel distance is 2 kms. The calculated average travel distance is 20.65 km and the coefficient of variation is 0.60.

Tlangnuam block: The observed maximum travel distance is 27 km and the minimum travel distance is 5 km. The average travel distance is calculated to be 18.73 km. The coefficient of variation is 0.36.

Thingsulthliah block: The maximum travel distance (58 km) has been observed between Mualmam and Aizawl NT. The minimum travel distance is only 2 km. The average travel distance is 22.37 km and the coefficient of variation is 0.82.

The calculated coefficient of variation of average travel distance of middle order functions/services in Aizawl district is 0.64 (table 5.5). Phullen block has the highest average travel distance (60.5 km) in Aizawl district. This may be attributed to the absent of middle order service center in the block. The minimum average travel distance (18.5 km) observed in Darlawn block may be attributed to the presence of one middle order service center i.e., Darlawn NT and Lower Sakawrdai (not qualified as middle order service center

but offering service associated with middle order function). The average travel distance of middle order functions/services in Aizawl district is calculated to be 28.15kms. Prescribing the travel distance of middle order functions/services at a distance of 28.15 km in the study area seems to be inappropriate as the people has to travel long distance to avail middle order functions /services. Therefore, an attempt has been made to locate the services/functions within the reach of the people the travel distance of middle order functions/services has been estimated to be 15 km.

iii) Travel distance of high order function/service

Darlawn block: The maximum travel distance observed in Darlawn block is 184 km between N.Tinghmun and Aizawl NT. The minimum travel distance is 87 km. The calculated average travel distance of Darlawn block is 168.42 km. The coefficient of variation of travel distance is low 0.11.

Phullen block: The maximum travel distance (161 km) has been observed between N.Khawlek and Aizawl NT. The minimum travel distance is 117 km. The calculated average travel distance is 139.25 km and the coefficient of variation is 0.10.

Aibawk block: The maximum travel distance observed in this block is 81 km (between Sailam and Aizawl NT). The minimum travel distance observed is 10 km. The calculated average travel distance is 42.10 km and the coefficient of variation is 0.51.

Tlangnuam block: The maximum and minimum travel distances are 27 km and 5 km respectively. The average travel distance is 18.73 km. Coefficient of variation of travel distances is 0.36.

Thingsulthliah block: The observed maximum travel distance is 105 km. The minimum travel distance is 29 km. The average travel distance observed in this block is 72.55 km and the coefficient of variation is 0.34.

Since the function associated with high order service center is localized and not uniformly distributed, the calculated average travel distance for Aizawl district is 88.21 km. Prescribing the travel distance of high order functions/services at a distance of 88.21 km is found to be inappropriate and in order to minimize the travel distance, it is estimated to be 30 km.

b) Efficiency (Population threshold)

It is observed that functions/services have different entry threshold population. The efficiency (threshold population) of the hierarchical order of functions/ services has been prescribed from the observed entry threshold population of selected function/service. The average entry threshold population calculated at each hierarchical order of functions/services determine the prescribe threshold population in the study area.

i) Threshold population of low order services/functions

Minimum entry threshold population observed in respect of low order functions/services is 82 (primary school). The maximum entry threshold population is found at sub health center about 233. The calculated average entry threshold population of low order functions/services is 165 (table 5.7). The coefficient of variation is 0.33. Providing low order functions/services at the settlement having a population of 165 would minimize travel distance of the people in the study area. However, keeping in view suggestions made by different scholars for the hilly area and limitation of facilities in the study area the

Table-5.4 Average travel distance of low order functions/services (Aizawl district)

Sl. No	Name of block	Average travel distance (in km)
1	Aibawk	5.62
2	Phullen	8
3	Tlangnuam	14.27
4	Darlawn	6.94
5	Thingsulthliah	12.71
	Average Aizawl District	9.51
	Coefficient of variation	0.40

Table-5.5 Average travel distance of middle order functions/services (Aizawl district)

Sl. no	Name of block	Average travel distance (in km)
1	Aibawk	20.65
2	Phullen	60.5
3	Tlangnuam	18.73
4	Darlawn	18.5
5	Thingsulthliah	22.37
	Average Aizawl District	28.15
	Coefficient of variation	0.64

Table-5.6 Average travel distance of high order functions/services (Aizawl district)

Sl. No	Name of block	Average travel distance (in km)
1	Darlawn	168.42
2	Phullen	139.25
3	Aibawk	42.1
4	Tlangnuam	18.73
5	Thingsulthliah	72.55
	Average Aizawl District	88.21
	Coefficient of variation	0.72

Table 5.7 Entry threshold population of low order services/functions

Sl. no	Service/ function	Entry threshold population
1	Primary school	82
2	Middle school	116
3	High school	151
4	Sub center	233
5	Branch post office	200
6	Rural animal health center	200
7	Public library	213
8	Public playground	127
	Average entry threshold population	165
	Coefficient of variation	0.33

Table 5.8 Entry threshold population of middle order services/functions

Sl. no	Service/ function	Entry threshold population
1	Higher secondary school	3865
2	Primary health center	1695
3	Community health center	1998
4	Sub post office	893
5	Veterinary dispensary	1340
6	Bank	1318
7	Police outpost	833
	Average entry threshold population	1706
	Coefficient of variation	0.61

Table 5.9 Entry threshold population of high order services/functions

Sl. no	Service/ function	Entry threshold population
1	College	10966
2	University	228280
3	Hospital	228280
4	Post & telegraph office	228280
5	Veterinary hospital	228280
6	Cinema hall	228280
7	Police station	3865
	Average entry threshold population	165176
	Coefficient of variation	0.65

prescribe threshold population for low order functions/services has been estimated to be 400.

ii) Threshold population of middle order services/ functions

The minimum entry threshold population of middle order functions/service is found at the population size of settlement about 833(police outpost). On the other hand, the maximum entry threshold population is observed at 3865(higher secondary school) size of settlement. The coefficient of variation is 0.61. The calculated average entry threshold population of middle order functions/services is found to be 1706. Thus, the prescribe threshold population for middle order functions/services has been estimated to be 1500.

iii) High order service/function

The minimum entry threshold population of high order functions/services is found at the size of settlement of 3865 (Police Station). The maximum entry threshold population is observed at the population size of settlement about 228280 (Aizawl NT). The average entry threshold population is calculated to be 165176. The coefficient of variation is calculated at 0.65 (table 5.9). Thus, prescribing high order functions/services to the population size of settlement about 165176 is not appropriate. Therefore, keeping in view previous suggestions and bringing high order functions/services accessible to other settlement, the prescribe threshold population for high order functions/services has been estimated to be 50000 in Aizawl district.

The prescribe travel distance (equity) and threshold population (efficiency) with their associated functions/services proposed for Aizawl district are as follows –

Table -5.10 Proposed equity (travel distance) and efficiency (threshold population)for Aizawl District.

Hierarchical order	Threshold population	Maximum travel distance *	Group of functions/services
Low order service center	400	5km	Primary school, middle school, high school, sub health center, branch post office, rural animal health center, public library, public playground
Middle order service center	1500	10 km	Higher secondary school, primary health center/urban health center, community health center, sub post office, veterinary dispensary, bank, police outpost
High order service center	50000	15 km	College, university, hospital, post & telegraph office, veterinary hospital, cinema hall, police station

*Distance = straight line map distance

5.3 Identification and organization of Spatio- Functional Gap

It is observed that many complementary regions are too large that farthest settlement is located far away from the facility center. It is also apparent to mention that the population in the complementary region may be appears to be too large to be served by existing number of function or the existing service centers are not having adequate function/service. In this regards, it is necessary to identify new service center where settlements are located far away from the existing service centers. Moreover, it is also necessary to provide more function/service where the existing function/service is inadequate to serve the complementary region. Therefore, an attempt has been made to examine spatial-gap and functional-gap in the study area based on the prescribe travel distance and threshold population.

5.3.1 Spatial gap

The spatial or areal gap occurs when a function or service is serving an area beyond its range of goods i.e., prescribe travel distance. It is pertinent to mention that various services/functions have different travel distances depending upon consumer choice. An attempt has been made in the present study to identify the spatial or areal gap in terms of existing service centers and not in terms of functions/services, because all functions/services is to be provided only at the service centers. Thus, in order to determine the spatial gap of service centers the present study follow manual or graphical technique of space covering and space partitioning (Fisher et. al. 1978:434-441).

i) Low order service centers

There are twenty six (26) low order service centers viz. Suangpuilawn, Phullen, Khawlian, Thingsulthliah, Mualpheng, Tlungvel, Saitual NT, Sesawng, Falkawn, Aibawk, S.Maubuang, Samlukhai, Lamchhip, Sialsuk, Sumsuih, Zohmun, L.Sakawrdai, N.Vervek, E.Phaileng, Vaitin, N.Tinghmun, Khanpui, Khawruhlian, Darlawn NT, Sihphir and Aizawl NT. Circles have been draw with the radii of 5 km at each low order service centers according to the scale of the map. It is observed that a number of settlements are located outside the circle indicating un-served areas or beyond travel distance (figure-5.1). These un-served areas are the spatial-gaps where proper attention is needed. Therefore, in order to bridge up these spatial-gaps or provide function/service within the reach of the people, four (4) optimum locations (settlement) have been selected for low order service centers. The proposed low order service centers are – Vanbawng (1271 population), Lungleng –I (640 population) and Tuirial (470 population), N.Lungpher (684 population).

Figure 5.1

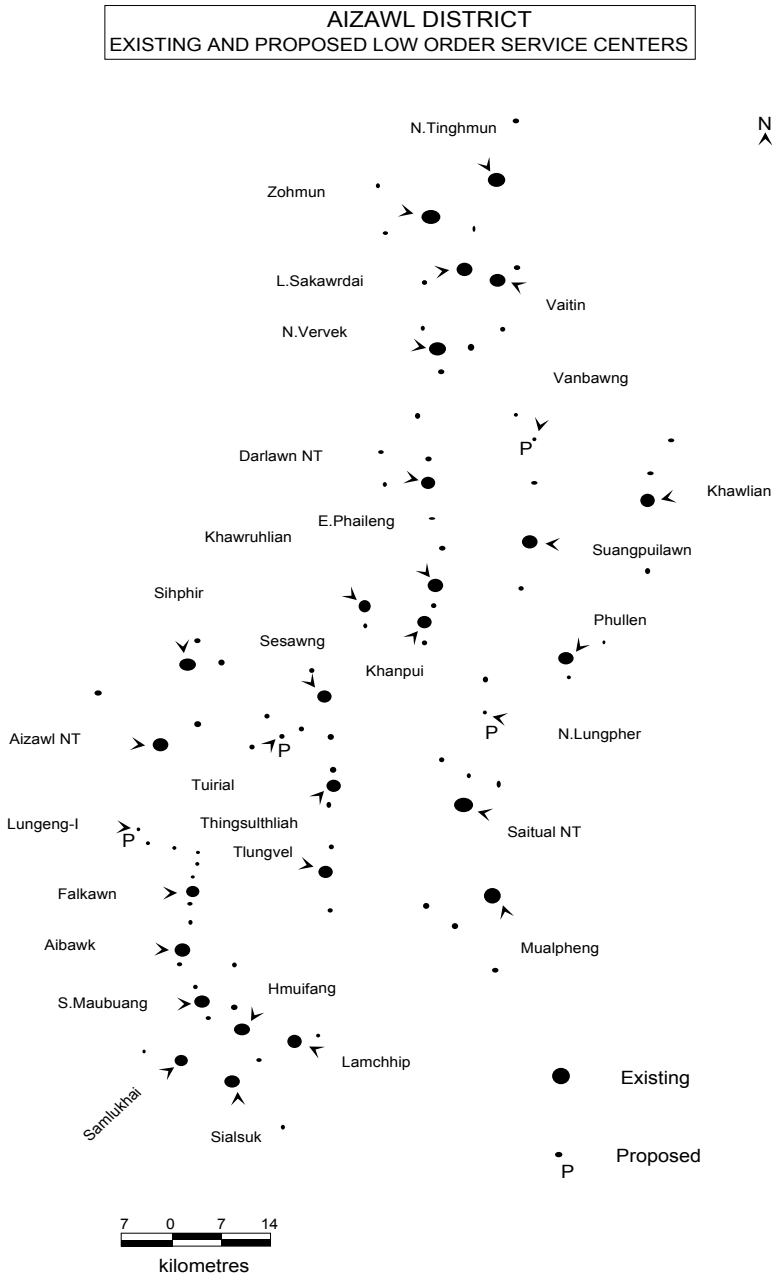

AIZAWL DISTRICT
EXISTING AND PROPOSED LOW ORDER SERVICE CENTERS
N
N.Tinghmun
Zohmun
L.Sakawrdai
Vaitin
N.Vervek
Vanbawng
P
Darlawn NT
Khawlian
E.Phaileng
Khawruhlian
Suangpuilawn
Sihphir
Phullen
Sesawng
Khanpui
P
N.Lungpher
Aizawl NT
P
Tuirial
Lungeng-I
P
Thingsulthliah
Saitual NT
Tlungvel
Falkawn
Aibawk
Mualpheng
S.Maubuang
Hmuifang
Lamchhip
Samlukhai
Sialsuk
Existing
P
Proposed
7 0 7 14
kilometres

Figure 5.2

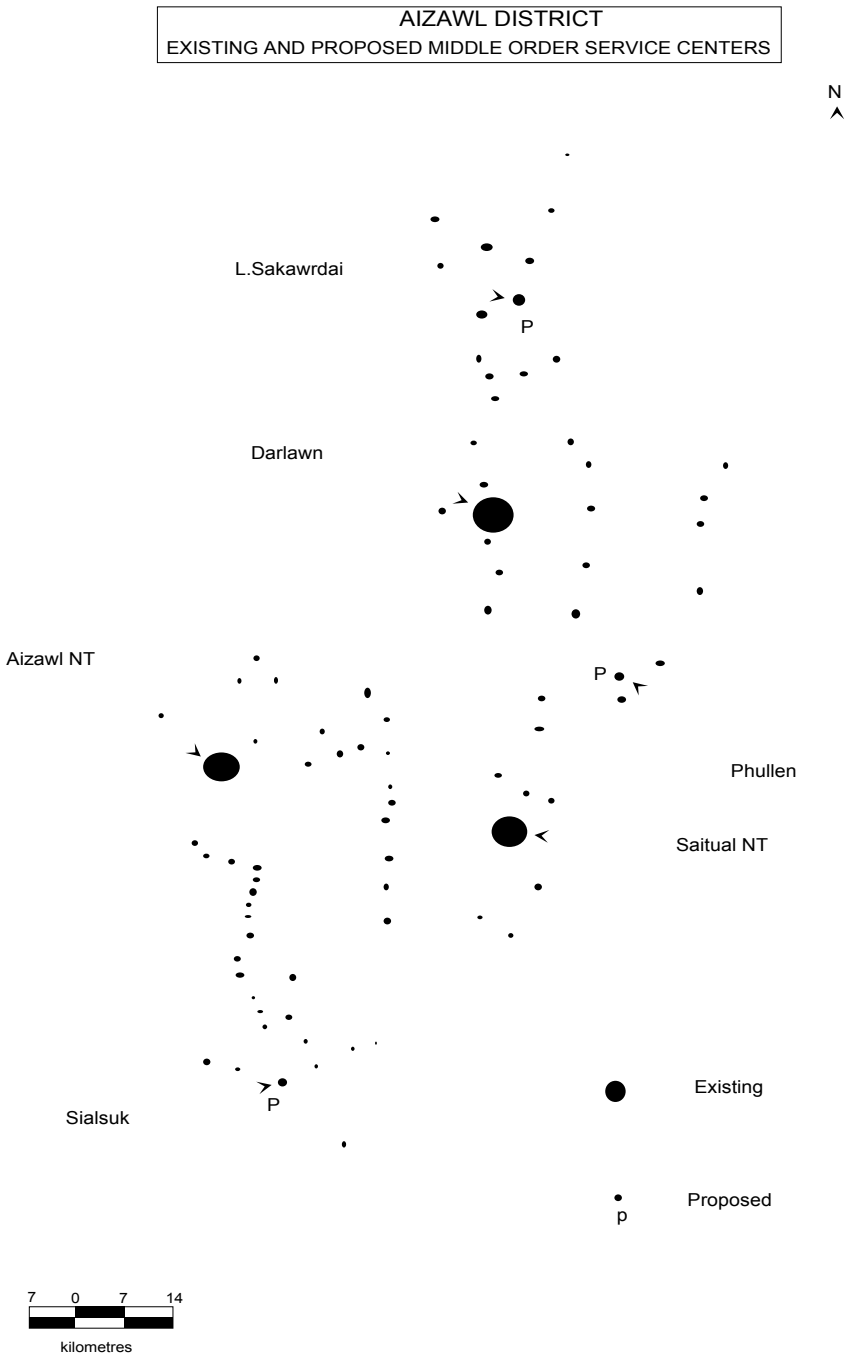
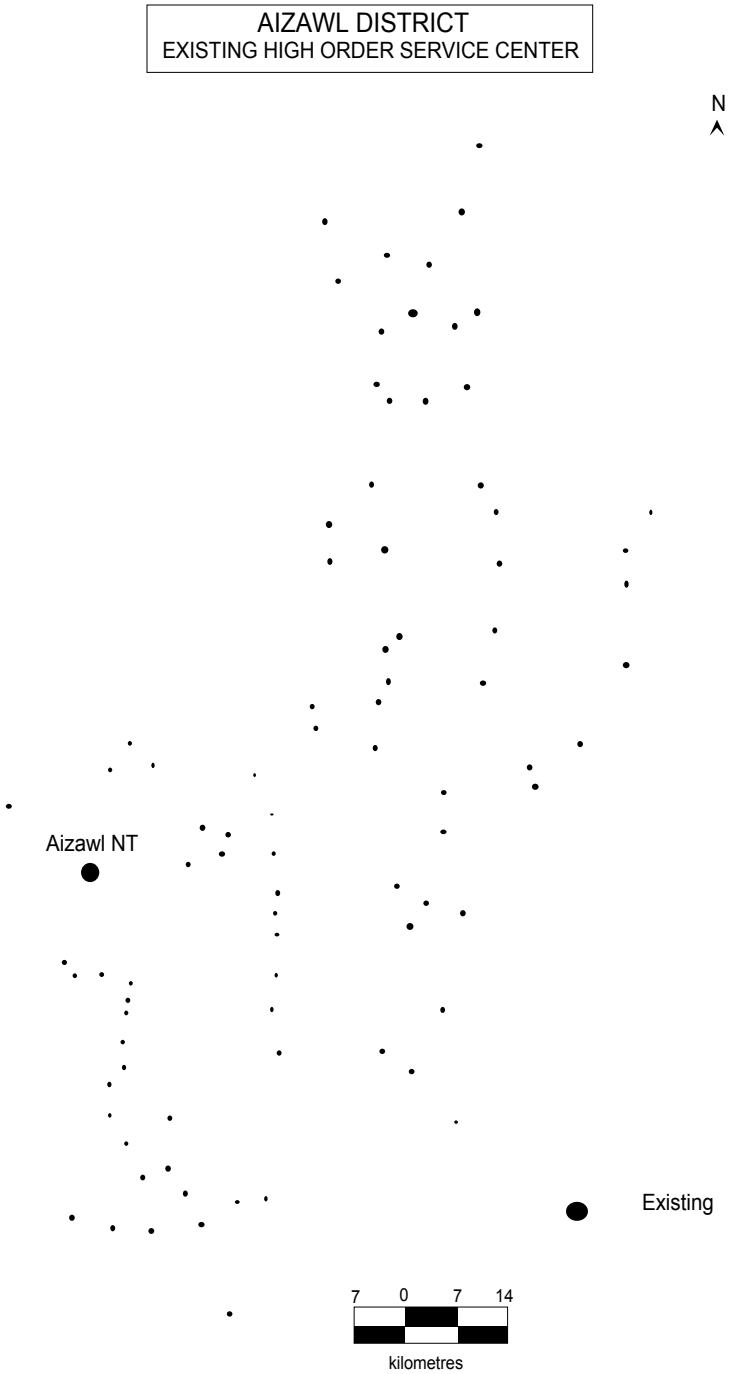

AIZAWL DISTRICT
EXISTING AND PROPOSED MIDDLE ORDER SERVICE CENTERS
N
L.Sakawrdai
P
Darlawn
Aizawl NT
P
Phullen
Saitual NT
Sialsuk
P
Existing
Proposed
p
7 0 7 14
kilometres

Figure 5.3


AIZAWL DISTRICT
EXISTING HIGH ORDER SERVICE CENTER
N
Aizawl NT
Existing
7 0 7 14
kilometres

ii) Middle order service centers

At the existing middle order service centers viz. Aizawl N.T, Darlawn N.T and Saitual N.T, circles have been draw around them with radii of 15 km according to the scale of the map. The circles drawn at each middle order service centers show that the study area is not well served by middle order service centers as it is observed that number of settlements are located outside the circles or beyond travel distance (figure-5.2). These are the spatial gaps where proper attention must be given. In order to reduce these spatial-gaps, three potential and promising low order service centers have been recommended to be middle order service center. The proposed middle order service centers are- Sialsuk (2095 population), Phullen (1695 population) and Lower Sakawrdai (1998 population).

iii) High order service center

There is only one high order service center i.e., Aizawl N.T. A circle has been draw with a radius of 30 km according to the scale of the map (figure-5.3). It is found that there are number of settlements outside the circle, indicating un-served areas or beyond travel distance. It is also found that most of the settlements are located too far away from the existing high order service center. It is pertinent to mention that no potential and promising settlement has been identified taking into account the threshold population (50,000) of high order service center. Thus, there is no proposed center of high order in Aizawl district.

5.3.2 Functional- gap

The functional-gap has been identified in the study area when all the functions identified at a particular hierarchical order are expected to exist in all the service centers of the respective order. In case this is not available, there is a functional gap (Singh &

Singh, 2001:161); (Sekhar, 2004). Thus, the functional-gap in respect of existing and proposed low, middle and high order service centers are as follow-

Table-5.11 Functional-gap of low, middle and high order service centers

Low order service centers

Service center	Existing function	Functional –gap
1. Aizawl NT	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground	Nil
2. Saitual NT	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	Nil
3. Darlawn NT	Primary school, Middle school, high School, Sub center, Public Library, Public playground,	Branch post office, Rural animal health center
4. Lower Sakawrdai	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
5. Thingsulthliah	Primary school, Middle school, high School, Sub center, Public Library, Public playground.	Branch post office, Rural animal health center
6. Sialsuk	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground,	Branch post office
7. Falkawn	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground.	Branch post office
8. Sihphir	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
9. Khawruhlian	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground	Rural animal health center

Service center	Existing function	Functional –gap
10. Suangpuilawn	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground,	Branch post office
11. Phullen	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground	Branch post office
12. Aibawk	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground	Branch post office
13. Tlungvel	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground	Branch post office
14. Khawlian	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	Nil
15. Zohmun	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
16. N.Vervek	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
17. Khanpui	Primary school, Middle school, high School, Sub center, Public Library, Public playground	Rural animal health center
18. Samlukhai	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	Nil

Service center	Existing function	Functional –gap
19. E.Phaileng	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	Nil
20. Lamchhip	Primary school, Middle school, high School, Sub center, Public Library, Public playground	Rural animal health center
21. Mualpheng	Primary school, Middle school, high School, Sub center, Branch post office, Public Library, Public playground	Rural animal health center
22. S.Maubuang	Primary school, Middle school, Sub center, Branch post office, Public Library, Public playground	High School, Rural animal health center
23. Sesawng	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	Nil
24.N.Tinghmun	Primary school, Middle school, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center, High School
25. Vaitin	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
26. Sumsuih	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
27. Vanbawng (P)	Primary school, Middle school, Sub center, Rural animal health center, Public Library, Public playground,	High school, Branch post office
28. N.Lungpher (P	Primary school, Middle school, high School, Branch post office , Public Library, Public playground	Sub center, Rural animal health center,
29. Tuirial (P)	Primary school, Middle school, Public Library,	High School, Branch post office, Sub center, Rural animal health center, Public playground,
30.Lungleng-I (P)	Primary school, Middle school, high School, Branch post office, Public Library, Public playground,	Rural animal health center, Sub center.

(P) = proposed center

Middle order service centers

Service center	Existing function	Functional-gap
1. Aizawl NT	Urban health center, Sub post office, Bank, Higher secondary school, Veterinary dispensary, Police outpost.	Community health center
2.Saitual NT	Community health center, Sub post office, Bank, Higher secondary school, Veterinary dispensary. Police outpost.	Primary health center
3. Darlawn NT	Primary health center, Sub post office, Bank, Higher secondary school, Veterinary dispensary, Police outpost	Community health center
4. Sialsuk (P)	Primary health center, Sub post office, Bank, Police outpost	Higher secondary school, Community health center, Veterinary dispensary
5..L.Sakawrdai (P)	Higher secondary school, Community health center, Police outpost	Sub post office, Bank, Veterinary dispensary, Primary health center
6. Phullen (P)	Primary health center, Sub post office.	Higher secondary school, Community health center, Veterinary dispensary, Bank, Police outpost

(P) = proposed center

High order service center

Service center	Existing function	Functional-gap
1. Aizawl NT	College, University, Hospital, Veterinary hospital, cinema hall, Post & Telegraph office, Police Station.	Nil

The functional-gap in respect of low and middle order service centers indicates that many centers are not having adequate function/service. Therefore, it is necessary to provide function/service at the optimum and appropriate service centers to reduce functional-gap observed in the study area. Among the existing and proposed thirty (30) low order service centers, it is necessary to provide ten branch post offices, seventeen rural animal health centers, four high schools, three sub health centers and one public

playground in the study area. Similarly, two primary health centers, four community health centers, two higher secondary schools, three veterinary dispensaries, one sub post office, two banks and one police outpost are found necessary to provide in the existing and propose six (6) middle order service centers.

On the other hand, it is imperative to mention that the functions/services to be provided at the service centers are likely to perform the same function where the existing functions have been performing. For example. service center having primary health center is to be provided with community health center. It is observed that both the services are performing the same function, an attempt has been made in this regards to compromise the provision of such services as follow-

(i) Two services performing the same function, where the low order service is to be provided at a particular center but the higher order service already exists. In such case the proposed low order service is not provided. Example – In Darlawn NT there is one sub post office, but the service/function proposed for this settlement is branch post office. In this case priority is given to the service already exist. Since the sub post office can perform the task of branch post office is supposed to perform, thus the branch post office is not provided in Darlawn NT.

(ii) Moreover, services more or less performing the same function, where the low order service is already exist and the higher order service is to be provided at the particular center. In this case instead of putting two services, the low order service may be upgrade to the status of the next order service for that center. Example- Sialsuk is having one primary health center and the service to be provided is one community health center. Thus, the existing primary health center may be upgrade to community health center instead of having two health center facilities.

Therefore, the proposed functions/services and their location have been identify as follow–

Table- 5.12 Proposed functions/services and their location

Service/Function	Location
(a) Education	nil
1. Primary School	nil
2. Middle School	nil
3. High School	1.Vanbawng 2.Tuirial 3.S.Maubuang 4.N.Tinghmun
4. Higher Secondary School	1.Phullen 2.Sialsuk
5. College	nil
6. University	nil
(b) Health	
1. Sub-center	1.Lungpher 2.Tuirial 3.Lungleng-I
2.Primary health center/ Urban health center	nil
3. Community Health Center	1.Phullen 2.Darlawn NT 3. Sialsuk
4. Hospital	nil
(c) Communication	
1. Branch Post Office	1.Falkawn 2.Tlungvel 3.Vanbawng 4.Tuirial
2. Sub Post Office	1.L.Sakawrdai
3. Post & Telegraph Office	nil
(d) Veterinary	
1. Rural Animal Health Center	1.Lungpher 2.Tuirial 3.Lungleng-I 4.Mualpheng 5.S.Maubuang 6.Lamchhip 7.Sumsuih 8.Vaitin 9.Khanpui 10.Khawruhlian 11.Zohmun 12.N.Vervek 13.N.Tinghmun
2. Veterinary Dispensary	1.L.Sakawrdai 2.Phullen 3.Sialsuk
3. Veterinary Hospital	nil
(e) Recreation	
1. Public Library	nil
2. Public Play Ground	1. Tuirial
3. Cinema Hall	nil
(f) Banking & Police	
1. Bank	1.L.Sakawrdai 2.Phullen
1. Police Outpost	1. Phullen
2. Police Station	nil

Table-5.13 Identified and proposed low order service centers-corresponding to 5 km travel distance and 400 population.

Name of the block	Name of the centre	Population of the centre	Total population served	Number of dependent settlements
1.Darlawn	Zohmun	1303	3147	3
	L.Sakawrdai	1998	2518	3
	N.Vervek	833	1425	2
	E.Phaileng	1095	2453	2
	Khanpui	1315	1594	1
	Khawruhlian	2066	2396	1
	Darlawn N.T	3865	5267	3
	N.Tinghmun	711	838	1
	Vaitin	909	1310	1
2.Phullen	Suangpuilawn	1740	2198	1
	Phullen	1695	3261	3
	Khawlian	1681	2733	2
	Vanbawng (P)	1272	1962	1
3.Aibawk	Falkawn	859	2534	2
	Aibawk	1318	4050	3
	S.Maubuang	447	1266	2
	Samlukhai	1254	1487	1
	Lamchhip	683	1136	1
	Sialsuk	2095	3066	2
	Sumsuih	766	966	1
4.Tlangnuam	Sihphir	5457	5927	2
	Aizawl N.T	228280	231280	6
	Tuirial (P)	470	975	2
	Lungleng-I (P)	640	1850	2
5.Thingsulthliah	Mualpheng	647	2017	3
	Tlungvel	2450	3237	2
	Saitual N.T	10966	12877	3
	N.Lungpher (P)	684	1268	1
	Sesawng	2793	2875	1
	Thingsulthliah	3528	4984	2

P=Proposed center

Table-5.14 Identified and proposed middle order service centers-corresponding to 15 km travel distance and 1500 population.

Name of the block	Name of the centre	Population of the centre	Total population served	Number of dependent settlements
1.Darlawn	Darlawn N.T	3865	19704	16
	L.Sakawrdai (P)	1998	6589	13
2.Phullen	Phullen (P)	1695	8177	7
3.Aibawk	Sialsuk (P)	2095	7376	8
4.Tlangnuam	Aizawl N.T	228280	246868	17
5.Thingsulthliah	Saitual N.T	10966	15175	8

(P) = Proposed center

Table-5.15 Identified and proposed high order service center- corresponding to 30 km travel distance and 50000 population.

Name of the Block	Name of the centre	Population of the centre	Total population served	Number of dependent settlements
1.Tlangnuam	Aizawl N.T	228280	325325	91

5.4 Spatial development framework

Spatial development framework refers to focusing of investment on socio-economic infrastructure at appropriate places, which has to be chosen in terms of maximum access to the beneficiaries at the minimum cost. In other words, spatial development is concerned with the process of decision making about location and allocation of resources aiming at functionally coherent spatial system. It aims at locating services and people at points where they can be used or function most efficiently to attain the objective of balanced development of an area (Singh and Singh, 2001:149).

It is also pertinent to mention that economic growth and development is not accomplished merely by providing function/service. It is also necessary to ensure that function/service should be made at right places in right manner according to the need and capabilities to sustain and served the concerned areas. It is also observed that there are few favoured points around which services / functions are found to cluster. Thus, when new activities (socio-economic facilities) are to be provided in a region, the consideration for the location of such functions/services in the favoured points i.e. service centers are important. Therefore, spatial development framework involving optimum location of functions/services at the appropriate service centers is necessary to facilitate balanced regional development.

In the present study the proposed hierarchical order of service centers is thirty low order service centers, six middle order service centers and one high order service center. It is believed that the proposed hierarchical order of service centers along with their prescribe functions/services are able to reduce imbalance found among intra as well as inter block in the level of socio-economic development in Aizawl district. Therefore, the proposed spatial development framework in Aizawl district are thirty (30) low order service centers, six (6) middle order service centers and one (1) high order service center. The proposed hierarchical order of service centers and proposed functions/services in addition to existing functions/services of Aizawl district are as follow-

Table- 5.16 Aizawl District- Proposed spatial development framework.

Low order service centers

Name of Service center	Existing Function	Proposed Function
1. Aizawl NT	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground.	nil
2. Saitual NT	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground.	nil
3. Darlawn NT	Primary school, Middle school, high School, Sub center, Public Library, Public playground,	nil
4. Lower Sakawrdai	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	nil
5. Thingsulthliah	Primary school, Middle school, high School, Sub center, Public Library, Public playground.	nil
6. Sialsuk	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground,	nil
7. Falkawn	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground.	Branch post office
8. Sihphir	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	nil

Name of Service center	Existing Function	Proposed Function
9. Khawruhlian	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground	Rural animal health center
10. Suangpuilawn	Primary school, Middle school, high School, Sub center, Rural animal health center, Public Library, Public playground,	nil
11. Phullen	Primary school, Middle school, high School, Sub cente Rural animal health center, Public Library, Public playground	nil
12. Aibawk	Primary school, Middle school, high School, Sub center Rural animal health center, Public Library, Public playground	nil
13. Tlungvel	Primary school, Middle school, high School, Sub center Rural animal health center, Public Library, Public playground	Branch post office
14. Khawlian	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	nil
15. Zohmun	Primary school, Middle school, high School, Branch post office Sub center, Public Library, Public playground,	Rural animal health center
16. N.Vervek	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center

Name of Service center	Existing Function	Proposed Function
17. Khanpui	Primary school, Middle school, high School, Sub center, Public Library, Public playground	Rural animal health center
18. Samlukhai	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	nil
19. E.Phaileng	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	nil
20. Lamchhip	Primary school, Middle school, high School, Sub center, Public Library, Public playground	Rural animal health center
21. Mualpheng	Primary school, Middle school, high School, Sub center, Branch post office, Public Library, Public playground	Rural animal health center
22. S.Maubuang	Primary school, Middle school, Sub center, Branch post office, Public Library, Public playground	High School, Rural animal health center
23. Sesawng	Primary school, Middle school, high School, Branch post office, Sub center, Rural animal health center, Public Library, Public playground,	nil
24.N.Tinghmun	Primary school, Middle school, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center, High School

Name of Service center	Existing Function	Proposed Function
25. Vaitin	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground,	Rural animal health center
26. Sumsuih	Primary school, Middle school, high School, Branch post office, Sub center, Public Library, Public playground	Rural animal health center
27. Vanbawng	Primary school, Middle school, Sub center, Rural animal health center, Public Library, Public playground,	High school, Branch post office
28. N.Lungpher	Primary school, Middle school, high School, Branch post office , Public Library, Public playground	Sub center, Rural animal health center
29. Tuirial	Primary school, Middle school, Public Library	High School, Branch post office, Sub center, Rural animal health center, Public playground
30.Lungleng-I	Primary school, Middle school, high School, Branch post office, Public Library, Public playground	Rural animal health center, Sub center

Middle order service center

Name of Service center	Existing Function	Proposed Function
1. Aizawl NT	Urban health center, Sub post office, Bank, Higher secondary school, Veterinary dispensary, Police outpost.	nil
2.Saitual NT	Community health center Sub post office, Bank, Higher secondary school, Veterinary dispensary. Police outpost.	nil
3. Darlawn NT	Primary health center, Sub post office, Bank, Higher secondary school, Veterinary dispensary, Police outpost	Existing Primary health center to be upgrade to Community health center
4. Sialsuk	Primary health center, Sub post office, Bank, Police outpost	Higher secondary school, existing Primary health center to be upgrade to Community health center, Veterinary dispensary
5.Lower Sakawrdai	Higher secondary school, Community health center, Police outpost	Sub post office, Bank, Veterinary dispensary
6. Phullen	Primary health center, Sub post office.	Higher secondary school, existing Primary health center to be upgrade to Community health center, Veterinary dispensary, Bank, Police outpost.

High order service center

Name of Service center	Existing	Proposed function
1. Aizawl NT	College, University, Hospital, Veterinary hospital, cinema hall, Post & Telegraph office, Police Station.	nil

Figure 5.4

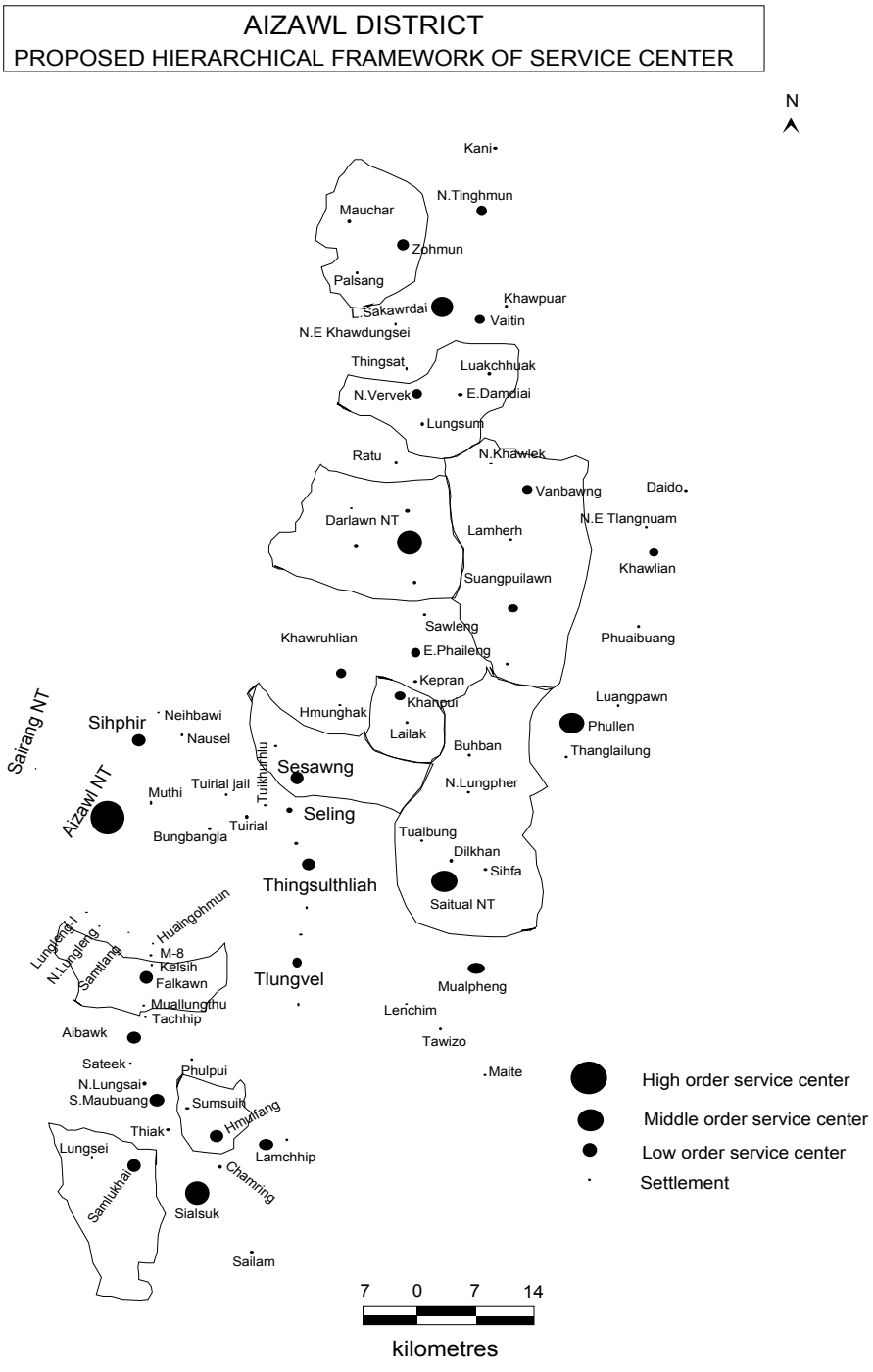
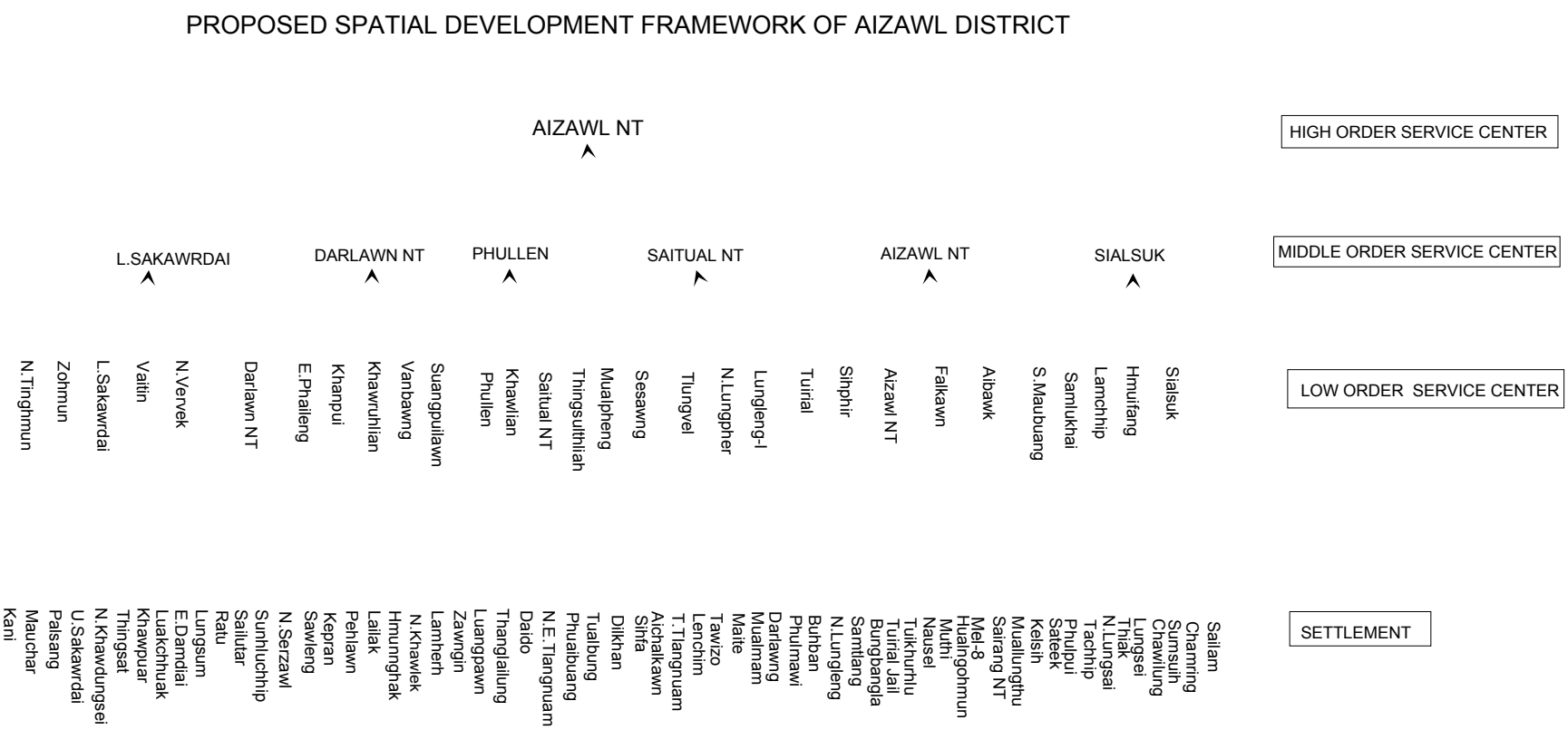

AIZAWL DISTRICT
PROPOSED HIERARCHICAL FRAMEWORK OF SERVICE CENTER
N
Kani
N.Tinghmun
Mauchar
Zohmun
Palsang
Khawpuar
L.Sakawrdai
Vaitin
N.E Khawdungsei
Thingsat
Luakchhuak
N.Vervek
E.Damdiai
Lungsum
Ratu
N.Khawlek
Vanbawng
Daido
Darlawn NT
N.E Tlangnuam
Lamherh
Khawlian
Suangpuilawn
Sawleng
Khawruhlian
Phuaibuang
E.Phaileng
Kepran
Khampui
Luangpawn
Sairang NT
Sihphir
Neihbawi
Hmunghak
Phullen
Nausel
Lailak
Buhban
Thanglailung
Tuikhurhlu
Sesawng
Aizawl NT
Muthi
Tuirial jail
N.Lungpher
Seling
Tuirial
Bungbangla
Tualbung
Dilkhan
Sihfa
Thingsulthliah
Saitual NT
Hualngohmun
Lungleng I
N.Lungleng
Samtlang
M-8
Kelsih
Falkawn
Tlungvel
Mualpheng
Muallungthu
Tachhip
Lenchim
Aibawk
Tawizo
Sateek
Phulpui
Maite
N.Lungsai
S.Maubuang
Sumsuih
Hmulfang
Thiak
Lungsei
Lamchhip
Chamring
Samlukhai
Sialsuk
Sailam
High order service center
Middle order service center
Low order service center
Settlement
7 0 7 14
kilometres

Figure-5.5


PROPOSED SPATIAL DEVELOPMENT FRAMEWORK OF AIZAWL DISTRICT
AIZAWL NT
HIGH ORDER SERVICE CENTER
L.SAKAWRDAI
DARLAWN NT
PHULLEN
SAITUAL NT
AIZAWL NT
SIALSUK
MIDDLE ORDER SERVICE CENTER
N.Vervek
Vaitin
L.Sakawrdai
Zohmun
N.Tinghmun
Darlawn NT
Suangpuilawn
Vanbawng
Khawruhlian
Khanpui
E.Phaileng
Saitual NT
Khawlian
Phullen
Thingsulthliah
Mualpheng
Sesawng
Tlungvel
N.Lungpher
Lungleng-I
Tuirial
Sihphir
Aizawl NT
Falkawn
Aibawk
S.Maubuang
Samlukhai
Lamchhip
Hmuifang
Sialsuk
LOW ORDER SERVICE CENTER
Saitual NT
Daido
Thanglaiiung
Luangpawn
Zawngin
Lamherh
N.Khawlek
Hmunnghak
Lailak
Pehlawn
Kepran
Sawleng
N.Serzawl
Sunhluchhip
Sailutar
Ratu
Lungsum
E.Damdiai
Luakchhuak
Khawpuar
Thingsat
N.Khawdungsei
U.Sakawrdai
Palsang
Mauchar
Kani
N.E.Tlangnuam
Phuaibuang
Tualbung
T.Tlangnuam
Aichalkawn
Sihfa
Dilkhan
Tawizo
Lenchim
Maite
Mualmam
Darlawng
Phulmawi
Buhban
N.Lungleng
Samtlang
Bungbangla
Tuirial Jail
Tuikhurhlu
Nausel
Muthi
Hualngohmun
Mel-8
Sairang NT
Muallungthu
Kelsih
Sateek
Phulpui
Tachhip
N.Lungsai
Thiak
Lungsei
Chawlung
Sumsuih
Chamring
Sailam
SETTLEMENT

5.5 Conclusion

The present study of spatial planning for balanced development of Aizawl district may be summarized as follow-

Firstly, as the distribution pattern of function/service and service center is not uniform throughout the study area, it is observed that the functions/services are found to have different travel distance and entry threshold population. Thus, instead of selecting individual function/service for the provision of travel distance and population threshold, service center of various orders and their associated functions/services have been selected for the provision of travel distance and threshold population.

Secondly, travel distance (equity) and threshold population (efficiency) of group of functions/services have been identify on the basis of the observed maximum travel distance computed at the block level and average entry threshold population at the hierarchical order of functions/services. Therefore, the proposed maximum travel distance of low order functions/services has been estimated to be 5 km, middle order function/service about 15 km and 30 km for high order function/service. The population threshold for low order function/service has been estimated to be 400, middle order function/service about 1500 and 50,000 for high order functions/services.

Lastly, the spatial-gap of low, middle and high order service centers revealed that large numbers of settlements are located too far away from the facility center. Hence, in order to reduce their travel distances several optimum locations have been identified to bridge the spatial-gaps. In this regards, four settlements and three low order service centers are proposed to low order service center and middle order service center. The functional-gap is also observed that many service centers are not having adequate functions/services.

Thus, four high schools, two higher secondary schools, three sub health centers, three community health centers, four branch post offices, one sub post office, thirteen rural animal health centers, three veterinary dispensaries, one play ground, two banks and one police outpost are found necessary to provide at the eighteen (18) low order service centers and four (4) middle order service centers. Therefore, the proposed spatial development framework of the study area is thirty (30) low order service centers, six (6) middle order service centers and one (1) high order service center.

REFERENCES

1. Berry, B.J.L., and. Garrison, W.L., (1958): "The Functional bases of the central place hierarchy", *Economic geography*, Vol.34.
2. Boudeville, J.R., (1966): *Problems of Regional Economic Planning,* University Press, Edinburgh
3. Christaller, Walter.,(1933): *Die Zentralen Orle in Suddeutschland,* Fischer, Jena; translated by C.W. Baskin as:*Central places in Southern Germany,* Prentice Hall, New Jersey, 1966.
4. Fisher, et. al., (1978): "Method of Service center Planning in Rural India", *Regional Planning and National Development*, R.P Mishra, D.V. Urs and V.K Natraj, (eds.), pp.434-441.
5. Friedman, J.P., (1966): *Regional Development Policy*: *A Case study of Venezuela*, Cambridge, M.I.T Press.
6. Friedman, J.P., (1973): "A Theory of polarized development", *Urbanization, planning and national development,* J. Friedman, (ed.), Beverly Hills, Sage.
7. Hirschman, A., (1958): *The Strategy of Economic Development*, Yale University Press, New Haven
8. Losch, A., (1939): *The Economics of Location*, Trans. By W.H Woglam and W.F Stolper, Ya;e University Press, New Haven, 1954 (Originally published in German by Fisher, Jene,1939).
9. Misra, S.K., and Puri, V.K., (2006): *Indian economy –Its Development Experience,* Himalaya Publishing House, p.924.
10. Misra, S.K., and Puri, V.K., (2006): op.cit, p.926.
11. Misra, et. al., (1994): "Integrated Development Planning and Spatio-Functional Integration, A case study of Tahsil Tulsipur District Gonda (U.P)", *Geographical Review of India*, Vol-56, March, No.1, p.56.
12. Misra, R.P., (1990): *District Planning, A Handbook,* Concept Publishing Company, New Delhi.
13. Myrdal, G., (1957): *Economic Theory and Underdeveloped Regions*, Gerald Duckworth & Co, London.
14. Perroux, F., (1950): "Economic Space: Theory and application", *Quarterly Journal of Economics*, Vol.64.
15. Richardson, H.W., (1980): "Polarization reversal in developing countries", *Papers of the Regional Science Association*, Vol.45.
16. Roy, P., and Patil, E.R., (1977): *A Manual for Block Level Planning*, Macmilan Company of India Ltd. New Delhi, p.51.
17. Sekhar, S., (2004): *Regional Planning in India,* Vol-two, Institute for Sustainable Development, Lucknow and Anmol Publication Pvt. Ltd. New Delhi, p.337.

18. Singh, O.P. and Pandey, D.C., (1986): *Development Planning: Theory and Practice*, Gyanodaya Prakasharan, Nainital, pp.7-36.

19. Singh, O.P and Singh, Raj L., (2001): "A Framework of spatial planning with an example", *Essays in Indian Geography, continuity of Traditions,* R. Gopalakrishnan and Ali Ahmed, (eds.), pp.147-165.

20. Tiwari, P.C., (1988): *Regional development and planning in India,* Criteria publications, New Delhi, p.13.

21. Tiwari, P.C., (1988): op. cit., p.209.

22. Willis, Katie. (2005): *Theories and Practices of Development*, Routledge, p.43.

CHAPTER – VI

FINDINGS AND CONCLUSION

The present study on identification of service center and spatial planning is an attempt to deal with the spatial development framework for balanced socio-economic development of Aizawl district. It is a comprehensive study on the existing pattern of settlement and hierarchical orders of service centers for the optimum and appropriate location of the socio-economic facilities. The disparity in the level of socio-economic development in the study area has been manifested in the inappropriate distribution of socio-economic facility as well as inefficient hierarchical order of service centers. Service centers and their spatial organization play the most important role in the regional development of a region since they function as regional centers or regional capitals of surrounding areas and also act as major points for spatial interaction and linkages operating in their surrounding region. Therefore, it is selected Aizawl district, with the state capital located in it may act as a service centre and a catalyst to integrate various service centers within the district for efficient spatial development framework as the planning commission has also recommended that district should be considered as the viable unit for micro level planning because it has a well organized administrative structure.

The main objectives of the present study are - to assess the inter-block level of socio-economic development, to identify services centers of different orders and delineate their complementary region through the study of spatial interaction and, to identify the spatio-functional gap and formulate efficient spatial development framework through spatial planning. Much of the data required for this research has been obtained from intensive field survey and secondary data has also been tapped from successive census enumeration.

Major findings and observations are as follows -

1. The population distribution is uneven in Aizawl district. It is observed that settlements with large population are found either along the highway or at the confluence of several highways. On the other hand, settlements with low population are found either in remote area or in area of poor transportation. Therefore, transportation has tremendous influence on the distribution of population in Aizawl district.

2. The population growth rate is found to be decrease in Aizawl district. The population growth rate of 1981 to 1991is 51.24 %. It decline to 38.72 % during 1991 to 2001. Among the block Tlangnuam block is found to have highest growth rate about 76.95% (1981 - 1991) and 46.32% (1991-2001) respectively. This may be attributed to continuous rural-urban migration and it is more pronounce during 1981 – 1991.

3. The density of population of the district has been increasing and it reaches 91.06 persons per sq. km in 2001. Tlangnuam block has the highest density of population about 455.79 persons per sq. km. This may be attributed to the present of the state capital i.e., Aizawl city containing about 25.7% of the state population and about 70.09% of the district population.

4. The calculated density of settlement of Aizawl district is 2.73 per 100 sq. km. The highest density is found in Aibawk block (3.56) and the lowest density is observed in Tlangnuam block (2.25). The spacing of settlement or inter village distance of Aizawl district is calculated to be 6.45 km. The highest spacing of settlement 7.15 is found in Tlangnuam block and the lowest spacing 5.69 is observed in Aibawk block. It is pertinent to mention that there is a correlation between density of settlement and spacing of

settlement as it is observed that block with high density of settlement is found to have low spacing of settlement. On the other hand, high spacing of settlement is found to be associated with low density of settlement.

5. The study of the inter- block level of socio-economic development of Aizawl district (demographic sector, social sector and economic sector) reveals that the disparity is found to be exist in demographic development, social development and economic development. The composite index shows that the highest score of 27.25 is observed in Tlangnuam block. The lowest score is found in Phullen block about -12.97. Therefore, three level of socio-economic development of Aizawl district has been identified in Aizawl district. Tlangnuam block has been designated as high development block. Aibawk block, Thingsulthliah block, Darlawn block and Phullen block have been designated as low development block. It is imperative to mention that there is no medium development block in Aizawl district. Therefore, it is pertinent to mention that necessary and appropriate measure be taken to bring low development blocks (Aibawk, Thingsulthliah, Darlawn and Phullen) at the level of district average (0.786) in order to reduce the disparity found in the level of socio-economic development in Aizawl district.

6. The study of distributional pattern of selected twenty two (22) functions/services shows that more rudimentary functions are occur in large number and more complex functions are found in lesser number. Moreover, rudimentary functions/services are found in lesser size of population. On the other hand, more population has been fetching not only rudimentary functions/services but also complex functions.

7. The calculated coefficient of variation of services/functions of Aizawl district implies that there is uneven distribution of function/service. It is observed that rudimentary services/functions are found to have high coefficient of variation than complex services/functions. This may be attributed to the cluster/concentration of rudimentary functions/services at some settlement. On the other hand, complex services/functions are localized and hardly a settlement is having more than one of such particular service, thus the coefficient of variation is low.

8. The observed maximum travel distance of selected functions/services indicates that functions/services are having different maximum travel distances. The maximum travel distance of middle school, high school and higher secondary school is 10 km, 29 km, and 87 km respectively. College and University have maximum travel distances of 184 km. The maximum travel distances of sub health center, primary health center, Community health center and hospital are 27km, 43km, 69km and 184km respectively. The maximum travel distance of branch post office is found to be 29 km. About 58 km and 184 km are the maximum travel distances of sub post office and post and telegraph office. The maximum travel distance in respect of rural animal health center is is about 29 km. Veterinary dispensary and Veterinary hospital is having 87 km and 184 km respectively. Public library, Public playground and Cinema hall are found to have maximum travel distances about 24 km, 27 km and 184 km respectively. Maximum travel distance of Bank, Police outpost and Police station is 87 km.

9. There are also variations in the entry threshold population of functions/services. The observed entry threshold population of primary school, middle school, high school, higher secondary school, College and University are 82,116,151,3865,10966 and 228280

respectively. In respect of health facilities, the entry threshold population of sub health center, Primary health center/Urban health center, Community health center and Hospital are 233, 1695, 1998 and 228280 respectively. The entry threshold population of branch post office, Sub post office and Post and Telegraph office are 200, 893 and 228280 respectively. The entry threshold population of rural animal health center, Veterinary dispensary and veterinary hospital are 200, 1340, 228280 respectively. Public Library, Play ground and Cinema hall are having entry threshold population of 213, 127 and 228280 respectively. The entry threshold population of bank, police outpost and police station are 1318,833 and 3865 respectively.

10. The selected functions/services are grouped into three orders. The low order consists of primary school, middle school, high school, sub health center, branch post office, rural animal health center, public library and public playground. Middle order comprises higher secondary school, primary health center/urban health center, community health center, sub post office, veterinary dispensary, bank and police outpost. High order includes college, university, hospital, post and telegraph office, veterinary hospital, cinema hall and Police station.

11. There are twenty six (26) low order service centers, three (3) middle order service centers and one (1) high order service center in Aizawl district. Besides, service centers of various orders, other settlements are also categorized into self sufficient and dependent settlement. There are fourty one (41) self sufficient settlements and twenty five (25) dependent settlements of low order service centers. There is no self sufficient settlement in respect of middle and high order service center. There are eighty nine (89) dependent

settlements of middle order service centers and ninety one (91) dependent settlements of high order service center.

12. According to Christaller, the number of settlements is found to increase from high order to low order based on some principle viz. market principle (K-3), transport principle (K-4) and administrative principle (K-7) respectively. In the present study, although Christaller norm (K-3, K-4, and K-7) is not tallying with the hierarchical order of settlements, but the increasing trend of settlements from high to low hierarchical order is found in the study area.

13. There are twenty six (26) complementary regions of low order service centers, five (5) complementary regions of middle order service centers and one (1) complementary region high order service center based on people's choice of center in availing various order of functions/services. It is imperative to mention that in spite of having necessary functions/services, two settlements appeared to be people's choice of center for middle order function/service. Therefore, these two low order service centers namely, Sialsuk and Lower Sakawrdai are necessary to upgrade to the status of middle order service center by providing more functions/services.

14. It is imperative to mention that the distributional pattern of service centers is found to have an impact in the level of socio-economic development. Tlangnuam block having all the three orders of service centers (one high order service center, one middle order service center and two low order service centers) belongs to high development block. On the other hand, Phullen block (only three low order service centers), Darlawn block (one middle order service center and nine low order service center), Thingsulthliah block (one middle

order service center and five low order service centers), Aibawk block (seven low order service centers) are designated as low development block. Therefore, it is pertinent to mention that the presence of service centers is found to have an impact in the level of socio-economic development in Aizawl district.

15. The prescribed travel distance (equity) and population threshold (efficiency) have been estimated for a hierarchical order of functions/services after finding out the average travel distance at the block level and average entry threshold population of hierarchical order of functions/services. The calculated average travel distance for low order functions/services of Aizawl district is 9.51 km. Middle order functions/services and high order functions/services have average travel distance of about 28.15 km and 88.21km respectively. Therefore, the prescribe travel distances for low order functions/services, middle order functions/services and high order functions/services are 5 km, 15 km and 30 km respectively.

The calculated average entry threshold population of low order services/functions is 165. The middle order services/functions has average entry threshold population of 1706. The high order services/functions has average threshold population of about 132687. Therefore, the prescribe population threshold population for low, middle and high order functions/services are 400, 1500 and 50000 respectively.

16. The spatial-gap of low, middle and high order service centers revealed that large numbers of settlements are located far away from the service center. Thus, in order to reduce their travel distances several optimum locations have been identified to bridge the

spatial-gaps. In this regards, four settlements and three low order service centers have been proposed to low order service center and middle order service center.

17. The functional-gap is also observed that many service centers are not having adequate functions/services. Thus, four high schools, two higher secondary schools, three sub health centers, three community health centers, four branch post offices, one sub post office, thirteen rural animal health centers, three veterinary dispensaries, one play ground, two banks and one police outpost are found necessary to be provided at the eighteen (18) low order service centers and four (4) middle order service centers. Thus, the proposed spatial development framework of the study area is thirty (30) low order service centers, six (6) middle order service centers and one (1) high order service center.

BIBLIOGRAPHY

Abiodun, Josephine.Olu., (1967): "Urban hierarchy in a Developing Country", *Economic Geography*, Vol.43, No.4, pp.347-367, Clark University.

Agarwala, A.K and Hazarika, P., (2004): *Developmental Disparities-A Quantitative Insight*, Akansha Publishing House, New Delhi.

Ahluwalia, Montek.S., (2002): "State Level Performance under Economic Reforms in India', *Economic Policy Reforms and the Indian Economy"*, Anne, O. Krueger, (ed.), Oxford University Press, New Delhi.

Alonso, W., (1969): "Urban and Regional Imbalances in Economic Development", *Economic Development and Cultural Change*, No.17.

Balassa, Bella., (1971): "Trade policies in developing countries", *American Economic Review*, Vol. 61 (May).

Balassa, Bella., (1981): *The Newly Industrializing Countries in the World Economy*,

Oxford, Pergamon.

Barton, Bonnie., (1978): "The Creation of Centrality", *Annals of the Association of American Geographers*, Vol.68, No. 1, March, Taylor and Francis Ltd.

Barthakur, M., (1979): "Growth and development of service centres in the Brahmaputra Valley and their influence on the rural development", *The North Eastern Geographer*, Vol. II, No.1 & 2.

Benerjee, Anuradha and Ahluwalia, Deepa., (2003): "Regional disparities in demography, economic and social development in India: A study based on selected Indicators", *Economic Liberalization and Regional Disparities in India-special focus on the North Eastern Region,* A.C Mohapatra and C.R Pathak, (eds.), Star Publishing House, Shillong.

Berry, Brian.J.L., (1969): "Relationship Between Regional Economic development and the Urban System: The Case of Chile", *Rijdscrift Voor Economische en Sociale Geografic,* No. 60.

Berry, Brian.J.L and Garrison, W.L., (1958): "The Functional Bases of the Central Place Hierarchy", *Economic Geography*, Clark University, Vol.34, 1958.

Bhagwati, J., (2004): *In Defence of Globalization*, Oxford University Press, Oxford

Bhattacharya, B.B., and Shakthivel, S., (2004): "Regional Growth and Disparity in India - Comparison of Pre-and Post-Reform Decades", *Economic and Political Weekly*, Vol.39, No.10, March.

Bhat, L.S., Kundu, A., Das, B.N., Sharma, A.N., Bhat, D.R., Sastry, C.S., and Mahapatra, R.C., (2003): *Micro level Planning, A case study of Karnal Area, Haryana-India*, Rajesh Publications, New Delhi.

Bhattacharya, N.N., (1979): "Central places of the Darrang District, Assam', *North Eastern Geography"*. Vol.II, No.1&2.

Bhattacharya, Bimalendu., (1972): "Factor determining the central functions and urban hierarchy in North Bengal", *Geographical Review of India*, Vol. XXXIV, March.

Boudeville, J.R., (1966): *Problems of Regional Economic Planning,* University Press, Edinburgh.

Brush, John.E., (1953): "The hierarchy of central place in south western Wisconsin", *Geographical Review*, Vol.43, No.3 July, American Geographical Society.

Carrothers, G.A.P., (1956): "An Historical Review of the Gravity and Potential concepts of Human Interaction", *Journal of the American Institute of Planner*, Vol.22.

Carey, H.C., (1958): *Principle of Social Science*, Lippincott, Philadelphia.

Carol, H., (1969): "Development Regions in Southern Ontario based on city centered region", *Ontario Geography*, No.4.

Chakravorty, Sanjoy., (2005): "The history and geography of regional development theory: A futile search for a paradigm", *Development, Displacement and Disparity*, Nirmala Banerjee and Sugata Manjit, (eds.),Orient Longman.

Chandna, R.C., (2004): *Regional Planning and Development*, Kalyani Publishers.

Chand, Mahesh and Puri, Vinay. Kumar., (2005): *Regiona*l *Planning in India*, Allied Publishers.

Christaller, Walter., (1933): *Die Zentralen Orle in Suddeutschland,* Fischer, Jena; translated by C.W. Baskin as:*Central places in Southern Germany,* Prentice Hall, New Jersey, 1966.

Clark, W.A.V., (1968): "Consumer Travel Patterns and the Concept of Range", *Annals of the Association of American Geographers*, Vol. 58, June.

Clark, L. Gordon., (1980): "Capitalism and Regional Inequality", *Annals of the Association of American Geographers*, Vol.70, No.2, June.

Coe.Neil, M., Hess Martin., Young Henry Wai-chung., Dicken, Peter.,and Henderson, Jeffrey., (2004): "Globalizing regional development: a global production

networks perspective", *Transaction of the Institute of British Geographers,* New Series, Vol.29, No.4, December.

Converse, P.D., (1949): "New Laws of Retail Gravitation", *Journal of Marketing*, Vol.1.

Crush, J., (1995): *The Power of Development*, London and New York, Routledge.

Dacey, Michael. F., (1965): "The Geometry of Central Place Theory", *Geografiska Annaler*, Series B, Human Geography, Vol.47, No.2.

Dasgupta, S., (1985): *Towards a Post Development Era*, London, Mittal.

Davies, Wayne. K.D., (1966): "The ranking of service centers: A critical review", *Transactions of the Institute of British Geographers*, No.40, Dec., Blackwell Publishing.

Davies, Wayne. K.D., (1967): "Centrality and the Central place hierarchy", *Urban Studies,* Vol.4, No.1.

Dickinson, R.E., (1929): "The Regional Functions and zones of Influence of Leeds and Bradford", *Geography*, Vol.15.

Dickinson, R.E., (1932): "The distribution and functions of the smaller urban settlements of east Africa", *Geography*-VII.

Dickinson, R.E., (1934): "The Metropolitan regions of the United States", *Geographical Review*, Vol.24.

Dutta, P.C. and Choudhury, H., (1995): "Per capita household consumption inequalities in the North East Region of India", *IJRS*, Vol. 27 (1&2).

Dutta, P.C. and Choudhury, H., (1996): "A note on Inter-state variation in per capita non-food household items of consumption in the North east India", *IJRS*, Vol. 28(2).

Emmanuel, A., (1972): "Unequal Exchange", *New Left Book*.

Escobar, Arturo., (1995): *Encountering Development: The Making and Unmaking of the Third World*, Princeton, Princeton University Press.

Fisher et. al., (1978): "Method of Service center Planning in Rural India", *Regional Planning and National Development*, R.P Mishra, D.V. Urs and V.K Natraj, (eds.).

Forbes, J.D., (1972): "Central place Theory-An Analytical Framework for Retail Structure", *Land Economics*, Vol. 48, No.1, University of Wisconsin Press.

Friedman, J.P., (1966): *Regional Development Policy*: *A Case study of Venezuela*, Cambridge, M.I.T Press.

Friedman, J.P., (1973): "A theory of polarized development", *Urbanization, Planning and National Development*, J.Friedman, (ed.), Sage.

Fuguitt, G.V. and N.A Deeley., (1966: "Retail Service Patterns and Small Town Population change", *Rural Sociology*.

Ganguli, B.N. and Gupta, Debendra. B., (1976: *Levels of Living in India – An Inter State Profile*, S.Chand and Co. Ltd, New Delhi.

Gereffi, Garry and Fonda, Stephanie., (1992): "Regional paths of development", *Annual Review of sociology,* Vol.18.

Ghosh, Sumita., (1998): *Introduction to Settlement Geography,* Orient Longman.

Godlund, S., (1956): "Bus service in Sweeden", *Lund studies in Geography*, Series.13.

Gonzalez, Casanova, P., (1969): "Inter Colonialism and National Development", *Latin American Radicalism*, Horowitz, I.L, Decastro, J.I and Gerassi, J., (eds.), New York.

Green, F.H.W., (1949): "Motor-Bus centers in south west England considered in relation to population and shopping facilities", *Institute of British Geographers Publication*, No. 14.

Griffin, K., (1969): *Underdevelopment in Spanish America*, London.

Hadjimichalis, Costis., (1987): *Uneven Development and Regionalism State. Territory and Class in Southern Europe*, Croom Helm.

Hagerstrand, T., (1967): *Innovation diffusion and Spatial Processes*, University of Chicago Press, Chicago.

Hangaragi, S.S., (2005): "The Centrality based hierarchy of urban centers in old Bijapur District, Karnataka", A*nnals of the Association of Geographers, INDIA*, Vol. XXV, No.2, December.

Hangaragi, S.S., (2010): "Identification of backward areas for balanced regional development in India: A district level analysis", *Indian Journal of Regional Science*, Vol. XXXXII, No.4.

Hagget, P., (1966): *Locational Analysis in Human Geography,* Edward Arnold, London, (*as quoted in Regional development and Planning in India,* P.C Tiwari, 1988).

Hassinger, E., (1957): "The Relationship of Retail Service Patterns to Trade Center Population Change", *Rural Sociology*.

Hirschman, Albert. O., (1958): *The Strategy of Economic Development*, Yale University Press, New Haven.

Hodgson, M. John., (2002): "Interaction-based Location-allocation Models for Indian Regional Planning: Background and Potential", Regional *Planning-concepts, techniques, policies and case studies,* R.P Misra, (ed.), Concept publishing company, New Delhi.

Holt-Jensen, A. (1988): *Geography*: *history and concepts*, London, Paul Chapman Publishing, trans. B.Fullerton.

Isard, Walter., (1960): *Methods of Regional Analysis: An Introduction to Regional Science*, John Wiley and Sons Inc., New York.

Jafferson, M., (1931): "The Distribution of Worlds City's Folk", *Geographical Review,* Vol.XXI.

Keynes, J.M., (1936): *The General Theory of Employment, Interest and Money*,

London, Macmillan.

Khullar, D.R., (2003): *India- A comprehensive Geography*, Kalyani Publishers.

Kosso, Peter., and Kosso, Cynthia., (1995): "Central Place Theory and the Reciprocity between theory and evidence", *Philosophy of Science*, Vol. 62, No. 4. December, University of Chicago Press.

Krugman, P., (1998a): "What's new about the new economic geography", *Oxford Review of Economic Policy*, Vol.14, No.2.

Krugman, P., (1998b): "Space: The final frontier", *Journal of Economic Perspectives*, Vol.12, No.2.

Kumar, A. & Sharma, N., (1997): "Rural Centres of Services- A case study of Sindega", *Geographical Review of India.* Vol.39, March, No.1-4.

Kuznets, S., (1957): "'Quantitative aspect of economic growth of nation-II", *Economic Development and Cultural Change*, Vol.V, July.

Kuznets, S., (1963): "Quantitative aspect of economic growth of nation: Distribution by size", *Economic Development and Cultural change*, Vol.II.

Kuznets, S., (1973): "Modern Economic Growth: Findings and Reflections", *American Economic Review*, Vol.63.

Lal, Deepak., (1983): *The Poverty of Development Economics*, London; Institute of Economic Affairs.

Lalrinmawia (1999): *Levels of Regional Development in Mizoram*, M.Phil Dissertation, Unpublished, Dept. of Geography, North Eastern Hill University.

Lavrov, S.B. and Sdasyuk, Galina, V., (1988): "The Growth Pole concept and the Regional Planning Experiences of Developing Countries", *Contribution to Indian geography…X*, *Regional Development*, Moonis Raza, (ed.), Heritage Publishers.

Lekhi, .R.K., (2005): *The Economics of Development and Planning*, Kalyani Publisher.

Lianzela (1991): *Economic Development of Mizoram*, Spectrum Publications, Guwahati.

Lipton, Michael., (1977): *Why Poor People Stay Poor Urban Bias in World Development*, Harvard University Press, Cambridge, Massachusetts.

Losch, August., (1939): *The Economics of Location*, Trans. By W.H Wonglom and W.F. Stolper, Yale University Press, New Haven, 1954 (Originally published in Germany by Fisher, Jena, 1939).

Lukermann,F. and Porter, P.W., (1960): "'Gravity and Potential models in Economic Geography", *Annals of Association of American Geographers*, Vol.50.

MacLeod, Gordon., (2001): "New regionalism reconsidered: Globalization and the remaking of Political economic space", *International Journal of Urban and Regional research*, Vol.25.4,December.

Mandal, R.B., (2001): *Urban Geography, A Text Book*, Concept Publishing Company, New Delhi.

Maithani, B.P., (1986): *Spatial Analysis in Micro Level Planning*, Omsons Publication, New Delhi.

Marshall, J.U., (1964). 'Models and Realities in Central Place Studies', *The Professional Geographers,* Vol.16, pp.5-8.

Martin, Ron and Sunley, Peter., (1996): "Paul Krugman's Geographical Economics and its implication for Regional Development: A critical assessment", *Economic Geography,* Vol.72, No.3, July, Clark University.

Martinussen, J., (1997*)*: *Society, State and Market: A Guide to Competing Theories of Development*, London, Zed Books.

Mahajan, O.P., (1982): *Economic Planning and Regional Development in India,* Ess Publication, New Delhi.

Mather, E.C., (1944): "A Linear distance map of farm population in the United States", *Annals of the Association of American Geographers*, Vol.34.

Mathur, A., (1983): "Regional development and income disparities in India", *Economic Development and Cultural Change*, Vol.31.

Mitra, Ashok., (1965): *Levels of Regional Development in India*, Government of India.

Minocha, A.C., (1983): "Regional Disparities in India: Some Basic Issues", *Social Scientist*, Vol.5, No.5, May.

Mishra, R.N. and Sharma, Pawan. Kumar., (2007): "Functional Classification of Town", *Transaction*, Journal of the Institute of Indian Geographer, Vol. 29, No.2, Dept. of Geography, University of Pune.

Mishra, R.N & Sharma, Pawan. Kumar., (2003): "Study of rural growth centres in Jaisalmer District", *Annals of National Association of Geographers' India*, Vol-XXIII, No-1, June.

Mishra, B.N & Dubey, V.N., (1996): "Settlement system analyses for spatial planning. A case study of Jaunpur District U.P", *Annals of National Association of Geographers' India,* Vol-XVI, No.1, June.

Misra, R.P., and Achyutha, R.N., (1998): *Micro Level Planning, Principles, Methods and Case Studies*, Concept Publishing Company.

Misra, R.P., (1983): "Growth poles and growth centres in the context of India's urban and regional development problems", *Contribution to Indian Geography, Concepts and Approaches,* R.P Misra, (ed.), Heritage Publishers, New Delhi, India.

Misra, R.P., (1970): "Growth Pole policy for Regional development in India", *Balanced Regional Development, Concepts, Strategy and Case study*, T.B Lahiri, (ed.), Proceedings and Papers of two-day All India Conference, organized by Institute of Economic Geography India on March 7,8 1970 at Calcutta.

Misra, O.P., Sadhana Burg, K.M and Tripathi, D.N., (1994): "Integrated Development Planning and Spatio-Functional Integration. A case study of Tashil Tulsipur District, Gonda (UP)", *Geographical Review of India,* Vol.56, No.1, March.

Misra, R.P., (1990): *District Planning, A Handbook*, Concept Publishing Company, New Delhi.

Misra, R.P.,. Sundaram, K.V., and Rao, Prakasa.V.L., (1974): *Regional Development Planning in India*, Vikas Publishing House, New Delhi.

Misra, S.K and Puri V.K., (2006): *Indian economy –Its Development Experience,* Himalaya Publishing House.

Myrdal, G., (1957): *Economic Theory and Underdeveloped Regions*, Gerald Duckworth & Co, London.

Nabudere, Dani.W., (1997): "Beyond modernization and Development, or why the Poor reject development", *Geografiska Annaler*, Series B,Human Geography, Vol.79, No.4, Current Development Thinking.

Nagaraj, R., Aristomene Varaudakis and Marie A.V., (1998): "Long- run Growth Trends and Convergence Across Indian states", OECD technical Papers, No.131, January.

Nagaraj, H. and Murthy, Krishna., (2007): "Geographical Analysis of Regional Disparities-A Case Study of Chitradurga District, Karnataka", *Transactions*,Vol.29,No.1,Institute of Indian Geographers, Dept. of Geography, University of Pune.

Nair K.R.G., (1983): *Regional Experience in a Developing Country*, Wiley Eastern Limited, New Delhi.

Narman, Anders., (1997): "Development thinking-bridging the gap between theory and practice", *Geografiska Annaler,* Series B. Human geography, Vol. 79, No.4,Current Development Thinking, Blackwell Publishing.

Nasee, Yasmeen., (2004): "Levels of Development: A case study of western plain of Uttar Pradesh", *Geographical Review of India*, Vol.66, No.4, Dec.

Nath, V., (1970): "Regional Development in Indian Planning", *Economic and Political Weekly*, January.

Nayyar, Deepak., (2003): "Globalization and Development Strategies", *Trade and Development*, J.Toye, (ed.), Edward Elgar, Cheltenham.

Nayyar, Deepak., (2006): *Development through globalization?* Research Paper No.2006/29,March, United Nation University, World Institute for Development Economics Research.

Nayak, L.T and Narayankar, D.S., (2009): "Identification of Regional Disparities in Levels of Development in Bellary District-Karnataka", *Indian Journal of Regional Science*', Vol.XXXXI, No.1, Regional Science Association, India.

Ojha and Bhat., (1964): "Pattern of income distribution in an under developed economy: A case study of India", *American Economic Review*,Vol.54.

Olayawola, A.M. and Aguda A.S., (2009): "Hierarchy of service centers in Ijesaland, Nigeria", *Journal of Geography and Regional Planning*, Vol. 2(5), pp.131-143, May.

Olsson, G., (1965): *Distacne and Human Interaction: A Review and Bibliography*, Bibliography series No.2, Regional Science Research Institute, Philadelphia.

Pachuau, Rintluanga., (1994): *Geography of Mizoram*, R.T Enterprise .

Parr, B. John., (1970): "Theoretical Problem in central Places Analysis", *Economic Geography*, Vol., 46, No.4, Oct., Clark University.

Parr, B. John., (1987): "The development of spatial structure and regional growth", *Land Economics*, Vol., 63, No.2, May.

Patel, Nitin. R., (1979): "Locating Rural social Service Center in India", *Management Science*, Vol. 25, No.1, January.

Patnaik, S.C., (1981): *Economics of Regional Development and Planning in Third World Countries,* Associated Publishing House, New Delhi.

Pathak, C.R., (1994): "Regional Disparities and Development in the third World Countries-Some Reflections", *Poverty, Inequality and Development*, D.N Singh and T.D Singh, (ed.), Environment and Development Study Center, Varanasi.

Pal, A.K., Singh, D.N., and Pandey, M., (1994): "Disparities in Levels of Regional Development: A Case Study", *Poverty, Inequality and Development*, D.N Singh and T.D Singh, (ed.), Environment and Development Study Center, Varanasi.

Papola, T.S., (1998): "Regional Planning for Integrated Development, The case of Mountain Areas", *Annals of NAGI*, Vol. XVIII, No-1 & 2 Dec.

Patra, A.K., (2010): "Inter-regional Disparities in Infrastructure Services: A study in Orissa", *Indian Journal of Regional science',* Vol. XXXXII, No.1.

Perroux, F., (1950): "Economic Space: Theory and application", *Quarterly Journal of Economics*, Vol.64.

Perroux, F.,(1955): Note sur la notion de pole de Croissance, Economic Appliqué 8 (1-2), Jan.- june, Also, idem (1955), "Economic Space Theory and Application", *Quarterly Journal of Economic*.

Phanse, Vijaya and Dubey, Archana., (1993): "Dynamics of Regional Disparities in Levels of Socio-Economic Development in Malwa Region (M.P)", *Regional Disparities and Development in India*, R.S Tripathy and R.P Tiwari, (eds.), Ashish Publishing House, New Delhi.

Pieterse, Jan. Naverdeen., (1996): "The Development of development theory: towards critical globalism", *Review of International Political Economy*, Vol.3, No.4.

Poteer, Rob., (2001): "Observations Geography and Development: Core and Peryphery", *Area*, Vol.33.4, December, Blackwell Publishing.

Preston, E. Richard., (1971): "The Structure of central place system", *Economic Geography,* Vol. 47, No. 2, April.

Purohit, K.C., (1993): "Spatial Disparities in the levels of Development in Chamoli District (Garhwal Himalaya)", *Regional Disparities and Development in India*, R.S. Tripathy and R.P. Tiwari, (eds.), Ashish Publishing House.

Rahnema, M. and Bawtree, V., (1997): *The Post-Development Reader*, London and New Jersey, Zed Books.

Rao, Nagabhushana. Eadubelli., (1986): *Strategy for Integrated Rural Development*, (*A case study of a region in Coastal Andhra)*, B.R Publishing Corporation.

Rao, Hemlata., (1972): "Identification of backward regions and the study of trends in regional disparities in India" (Paper presented at a Seminar on regional imbalances,IIPA)

Rao, Hemanta., (1977): "Identification of backward regions and the trends in regional disparities in India", A*rhta Viganana*, Vol.19, No.2.

Rao, Koteswara. T., (1990): *Regional Planning Resources and Rural Development in India*, Chugh Publication, Allahabad.

Rao, M. Govinda., Shan, R.T., and Kalirajan, K.P., (1999): "Convergence of incomes across Indian states- A divergent view", *Economic and Political Weekly*, March 27.

Rao, Prakasa. V.L.S., (1988): "Central Place Theory in retrospect and Prospect", *Contribution to Indian Geography…X, Regional Development*, Moonis Raza, (ed.), Heritage Publishers.

Rao, Prakasa. V.L.S. and Ramachandran, R., (1983): "Mobility and Choices of Central Places", *Contribution to Indian Geography, Concepts and Approaches*, R.P. Misra, (ed.), Heritage Publishers, New Delhi, India.

Rao, S.K., (1973): "A note on measuring economic distances between regions in India", *Economic and Political Weekly*,Vol.17.

Rao, T.N.A., (1993): *Balanced Regional Development-Levels of Development of Karnataka*, Academy of Regional Science and Humanities (ACARSH), Belgaum.

Raza, Moonis., (1988): "Regional Development as Eco-development- An Introductory Statement", *Contribution to Indian Geography…X, Regional Development*, Moonis Raza, (ed.), Heritage Publishers.

Reilly, W.J., (1931): *The Law of Retail Gravitation,* New York.

Richardson, H.W., (1980): "Polarization reversal in developing countries", *Papers of the Regional Science Association*, Vol.45.

Rigg, Jonathan., Bebbington, Anthony., Gough, Katherine., V, Bryceson., Deborah, F., Agergaard, Jytte., Fold, Niels., and Tacoli, Cecelia., (2009): "The World Development Report-2009, Reshapes Economic Geography: Geographical Reflection", *Transaction of the Institute of British Geographers*, New Series, Vol.34, No.2, April.

Rodwin, L., (1970): *Nation and Cities*, Haughton Mifflin, New York.

Rostow, W.W., (1960): *The Stages of Economic Growth: A non-Communist Manifesto*, Cambridge, Cambridge University Press.

Roy,P. and Patil E.R., (1977: *A Manual for Block Level Planning*, Macmilan Company of India Ltd. New Delhi.

Rukshanna (2009): "Regional Imbalances in the Dimensions of Rural Development", *Indian Journal of Regional Science*, Vol. XXXXI, No.2.

Ryngynga, K., (2003): "Levels of development in the hills of North-East India", *Economic Liberalization and Regional Disparities in India-special focus on the North Eastern Region,* A.C Mohapatra and C.R Pathak, (eds.), Star Publishing House, Shillong.

Sachs, W., (1992): *The Development Dictionary: A Guide to Knowledge as*

Power, London, Zed Books.

Sachs, J., and A.Warner., (1995): "Economic Reforms and the Process of Global Intergration", *Brookings Papers on Economic Activity*,Vol.1.

Saitluanga, B., (2008): *Urbanization and Regional Development in the Patkai Hills*, M.Phil Dissertation, Unpublished, Jawaharlal Nehru University, Center for the Study of Regional Development, School of social Sciences, New Delhi.

Sampath, R.K., (1977): "Inter-state inequalities in income in India", *Indian Journal of Regional Science*, Vol.9.

Sarma, P.V., and Kumar, Mohan. K.V., (1989): "Identification of Basic Planning Units for Integrated area Development-A case Study of Godavari delta region of Andhra Pradesh", *Planning, regional development and Disparities in India (A.C Minocha Fecilitation volume)*, H.S Yadav, (ed.), Criterion Publications.

Sarker, P.C., (1994): "Regional Imbalances in Indian Economy over Plan Periods", *Economic and Political Weekly*, Vol.29, No.11, March.

Seabrook, J., (1994): *Victims of Development, Resistance and Alternatives*, London, Verso.

Sen, L.K., et al., (1971): *Planning Rural Growth Centers for Integrated Area Development, a Study in Miryalguda Taluka,* National Institute of Community Development, Hyderabad, India.

Sekhar, Sushanshu., (2004): *Regional Planning in India,* Vol-two, Institute for Sustainable Development, Lucknow and Anmol Publication Pvt. Ltd. New Delhi.

Shaban, Abdul and Bhole, L.M., (2000): "Regional Disparities in Rural Development in India", *Journal of Rural Development*, Vol.19, Jan.-March, NIRD, Hyderabad.

Shand, Ric., and Bhide. S., (2000): "Sources of Economic Growth- Regional Dimensions of Reforms", *Economic and Political Weekly*, October 14.

Sharma, Babli. R., (2003): "Hierarchical Pattern of Service Centres in the urban field of Kasganj (based on Census data and filed survey)", *Geographical Review of India*, Vol.65, December, No.3, Dept. of Geography, University of Kolkota.

Sharma, S.K., (1994): "Anatomy of Spatial Inequality in Development in Madhya Pradesh", *Poverty, Inequality and Development*.

Sharma, R.C., and Kumar, Naresh., (1993): "Regional Disparities in the levels of socio-economic development in India", *Regional Disparities and Development in India*, R.S Tripathi and R.P Tiwari, (eds.), Ashish Publishing House, New Delhi.

Sharma, Poonam., (1995): "Regional Inequalities in the process of socio-economic development", *Annals of the association of Geographers, India*, Vol. XV, No.1, June.

Sharma, Ravi Kiran., (2005): "Study of Central Place in Integrated Area Development of Ranchi Plateau", *Urban and Regional Development in India*, Volume Two, B.Thakur, VNP Sinha, M.Prasad, N.Sharma, RanaPratep, R.B Mandal and RBP Singh, (eds.), Concept Publishing Company, New Delhi.

Sharma, P.K., (1983): *Market Centres in Central Assam: A geographical Analysis,* Unpublished Ph.D Dissertation. Utkal University, Bhubhaneswar.

Sharma, P., and Sharma, H.N., (1985): " Identification, Ranking and Grouping of Service Centers-A Case Study of Nowgong District", *The North Eastern Geographers*. Vol-17, No 1& 2.

Sharma, S.C., and Sharma, Ranjan., (1993): "Spatial Planning for Socio-Economic Development at micro level", *Geographical Review of India*, Vol.55, March, No.1, Geographical Society of India, Kolkota.

Sharp, Joanne., and Briggs, John., (2006): "Post colonialism and Development: new dialogues?" *The Geographical Journal*, Vol.172, No.1, March.

Shearmur, Richard., (2008): "Urban hierarchy or Local Buzz? High order business service location and (or) knowledge intensive business location in Canada, 1991-2001", *The Professional Geographer*, Vol.60, Aug., No.3.

Shivalingaih, M., (1972): "Integrated area development-concept and emperical results", *Urban System and Rural Development: A Seminar (II)*, M.S Masoodal et. al., (eds.), University of Mysore.

Simon, David., (1997): "Development reconsidered; new direction in development thinking", *Geografiska Annaler*, Series B Human Geography, Blackwell Publisher, Vol.,79,No.4.

Singh, A. Lalit., (1997): "Service Area Analysis of the market Centers in Manipur", *Hill Geographer*, Vol.XIII, No. 1&2.

Singh, M.B., and Singh, Virendra., (1994): "Regional Disparities in U.P", *Poverty, Inequality and Development*, D.N Singh and T.D Singh, (eds.), Environment and Development Study Center, Varanasi.

Singh, O.P., and Pandey, D.C., (1986). *Development Planning: theory and Practice*, Gyanodaya Prakasharan, Nainital, pp.7-36.

Singh, O.P., and Singh, Raj L., (2001): "A Framework of spatial planning with an example", *Essays in Indian Geography, continuity of Traditions,* R. Gopalakrishnan and Ali Ahmed, (eds.).

Singh, J.P., and Mangat. H.S., (1994): "Regional Disparities in Industrial Development in Punjab", *Poverty, Inequality and Development*, D.N Singh & T.D Singh, (eds.), Environment and Development Study Center, Varanasi.

Stiglitz, J.E., (2002): *Globalization and its Discontents,* Allen Lane, London.

Singh, H.L., (1992 & 1993): "Identification of the hierarchy of service centres, A case study in Koilwar Block of Bhojpur District, Bihar", *North Eastern Geographer*. Vol.24 No.1 &2.

Singh, R.P., and Sanjenbam, Vedaja., (1991): "Rural Development and Micro-Level planning: A case study of Jiribam Block, Manipur", *North Eastern Geographer*, Journal of the North-Eastern India, Geographical Society. Vol-23, No-1 &2.

Singh, R.Y., (1998): *Geography of Settlement*s, Rawat Publications, New Delhi.

Slater, David., (1993): "The geopolitical imagination and the enframing of development theory", *Transaction of the Institute of British Geographers,* Vol.18, No.4, 1993, Blackwell Publishers.

Smailes, A.E., (1994): "The Urban Hierarchy in England and Wales", *Geography,* Vol.XXIX.

Smith, Adam., (1950): *An Inquiry into the Nature and Causes of the Wealth of Nations*, Edwin Cannon (ed.), Methuen, London), (as quoted in *Theories and Practices of Development*, Katie Willis, Routledge, 2005).

Sur, Suchit., (1992): "Spatial Planning and Integrated Rural Development", *Geography and Rural Development,* RNP Sinha, (ed.), Concept Publishing Company.

Swamy, S., (1967): "Structural change and distribution of income by size", *Review of Income and Wealth*.

Tiwari, P.C., (1988): *Regional development and planning in India,* Criteria publications, New Delhi.

Thaha, A.L., and M. Thaha., (1979): *A Manual for Integrated rural Development for Village, Block and district Level Planning*, Quilon.

Thaker, H.Hrima., and Shiyani, R.T., (2009): "Socio-Economic Development in Gujarat: Rosy picture with concerns", *Journal of Rural Development*, Vol.28, No.4, NIRD, Hyderabad.

Thakur, R.N., (1985): *Micro-Regional Central Place System in India (A Case Study of the Siwan Region*, Inter-India Publication.

Trewartha, G.T, (1953): "A Case of Population Geography", *Annals of the Association of American Geographers*.

Tripathi, R.S., and Tiwari, R.P., (1993): "Spatial disparities in the levels of development in Chamoli District (Garhwal Himalaya)", *Regional Disparities and Development in India*, (R.S. Tripathi and R.P. Tiwari, (eds.), Asish Publishing House.

Tornqvist, Gunnar., (1977): "The capacity of economic activities: some critical viewpoints on theory and application", *Economic Geography*, Vol.53, No.2, April, Clark University.

Ullman, E.L., (1956): "The Role of Transportation and the Bases for Interaction", *Man's role in Changing the face of the Earth,* W.L Thomas, (ed.), University of Chicago Press, Chicago.

Vanlalthlana, B., (2001): *Population Redistribution and Urbanization in Mizoram*, Unpublished Ph.D Thesis, Dept. of Geography, North Eastern Hill University, Shillong.

Valenzuala, J.S., and Valenzula, A., (1978): *Modernization and dependency: alternatice Perspective in the Study of Latin American Underdevelopment*, comp. Polit., Vol.10.

Wanmali, S., (1972): "Central places and their tributary populations: some observation", *Behavioural Science, Community Development,* Vol.6, March.

Wanmali, Sudhir and Islam, Yassir., (1995): "Rural Services, Rural Infrastructure and regional development in India", *The Geographical Journal*, Vol.161, No.2, July, Blackwell Publishing.

Wanmali, Sudhir., (1992): *Rural Infrastructure, The settlement system, and development of the regional economy in Southern India,* Research Report, International Food Policy Research Institute.

Wanmali, Sudhir., and Khan, Waheedudin., (1988): "Role of Location in Regional Planning with Particular Reference to the Provision of Social Facilities", *Contributions to Indian Geography…X, Regional Development*, Moonis Raza, (ed.), Heritage Publishers.

Williamson, J.G., (1965): "Regional Inequality and the Process of National Development: A Description of the Pattern", *Economic Development and Cultural Change,* Vol. 13, No.4, Part II, July.

Willis, Katie., (2005): *Theories and Practices of Development*, Routledge.

Wolf, M., (2004): *Why Globalization Works*, Yale University, New Haven and London.

World Bank., (1993): *The East Asian Miracle*, Oxford, OUP.

Yavagal, F.V., (1992): "Location and Allocation of Central Places. A study in an Integrated Area Development of Bijapur District, Karnataka", Geography *and Rural Development.* R.N.P Sinha, (ed.) Concept Publishing Company.

Young, C.E., (1971): "Rural-Urban Terms of Trade", *African Social Research*, No.12, December.

APPENDICES

- Village level Questionnaire
- Monthly Mean Maximum & Minimum Temperature of Aizawl District (1986-2005)
- Aizawl District (1961-2001) Village level Population
- Distribution Pattern of Functions/ Services- Aizawl District
- Peoples' Choice of Center for Low order Functions/Services
- Peoples' Choice of Center for Middle order Functions/Services
- Peoples' Choice of Center for High order Functions/Services

APENDIX-1

VILLAGE LEVEL QUESTIONAIRE

1. Name of Block :
2. Name of Village :
3. (a) Service /Function

Service /Function	If it is in the Village, mention quantity.
1. EDUCATION a) Primary School b) Middle School c) High school d) Higher Sec. School e) College f) University 2. HEALTH a) Sub centre b) Primary health center c) Community health center d) Hospital 3. COMMUNICATION a) Branch Post Office b) Sub Post office b) Post & telegraph office 4. VETERINARY a) Rural animal health center b) Veterinary dispensary c) Veterinary hospital 5. RECREATION a) Public library b) Playground c) Cinema hall 6. BANKING & POLICE a) Bank b) Police outpost c) Police station	

(b) Space Preference (Consumer behaviour pattern)

Service/function	Local	Outside name of place	Mode of transport	Dist. in km	Frequency	Time taken	Remarks
a) EDUCATION i) Primary school ii) Middle School iii) High School iv) H.S.S v) College vi) University							
b) HEALTH i) Sub center ii) PHC iii) CHC							
c) COMMUNICA-TION i) Branch post office ii) Sub post office							
d) VETERINARY i)Rural animal health center ii)Veterinary hospital iii)Veterinary hospital							
e) RECREATION i) Public library ii) Playground							
f) BANKING & POLICE i) Bank							

ii) Police outpost iii) Police station							

APPENDIX-2 Monthly Mean, Maximum and Minimum Temperature of Aizawl District. (1986-2005)

Year	Jan		Feb		Mar		Apr		May		Jun	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1986	25	9.1	27.7	10.2	33.2	12.4	31.8	12.4	31.4	13.6	32.9	17
1987	26.6	7.8	28.1	9.4	30.7	10	32.4	11.7	33	15.2	31.5	18.9
1988	24	10.4	27.2	11.2	30.6	13.4	34.6	14.2	29.6	15.8	32	18.2
1989	23	5.8	27.2	8.2	32.2	14.8	34.4	14.6	33.2	16.6	31.6	18.8
1990	25.8	9.4	25.4	10	28.6	11.2	27.4	12.4	30.2	15.6	28.8	17.8
1991	26.4	8.2	28	11	31.8	13.4	33.8	12.4	30.2	14	29.8	17.6
1992	23	7.4	23.4	9.4	32.6	10.2	33	13	33.8	13.4	33.6	17.4
1993	24.6	6.8	27.6	8.4	30.6	12.4	32.6	11.6	32	13.8	29	15
1994	29.8	8.4	29.6	8.4	31.4	11.6	34	12.7	34	17.2	31.7	17.2
1995	27.8	11.7	28.7	14.7	34.4	17.2	34.7	16.5	32,7	19.7	32.1	19.7
1996	24.3	8.3	27.5	12.2	31.3	17.8	33.9	18.2	32.3	19.7	30.9	20.9
1997	25.1	7	26.3	8.4	30.9	12.7	30.9	13.2	33.3	16.1	30.7	16.8
1998	24.1	8.4	27.5	9.3	30.3	11	31.2	14.1	32.6	17.2	32.3	18.8
1999	27	9.4	32.9	11.3	33.1	13.4	36.7	16	35.3	15.4	30.9	16.5
2000	26.1	7	27.1	10.5	31.5	11.5	32.1	12.9	33.1	13.9	31.9	17.5
2001	26.5	6.5	30.5	10	33.8	12,4	35.1	13.3	32.8	12.9	32.3	16.9
2002	28.2	10	31.2	10	32.6	13	31.5	11.2	31.8	14	29.7	18.2
2003	26.2	8.6	27.8	11.4	30.4	10.6	32.4	14.4	33.3	14.9	31.6	19.4
2004	26	9	28	7.8	32.2	11.8	29.6	13.2	32.6	16	30	18
2005	28.2	7.7	29.4	10.2	29.7	12.7	32	13.6	30	13.2	31	15.7
Average	25.9	8.2	28.3	10.1	31.7	12.7	32.9	13.6	32.5	15.4	31.3	17.8
Mean	17.1		19.1		22.1		23.2		23.9		24.5	
Max	29.8		32.9		34.4		367		35.3		33.6	
Min	5.8		7.8		10		11.2		12.9		15	

Year	Jul		Aug		Sept		Oct		Nov		Dec	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1986	32.4	16.7	31.9	17.4	29.2	16.4	29.9	14.5	27.5	12.6	26.9	9.4
1987	30.5	18.9	30.4	19.2	29.8	18.4	32.4	16.4	29.9	12.4	23.4	10.9
1988	29.4	18	30.6	16.6	31.6	15.8	30.4	17.8	28.6	16.2	25.6	11.8
1989	31.8	18.6	30	19	30.3	19.2	30.3	17.2	26	13.8	23.4	4.9
1990	27.4	19	NA	NA	30.3	18.6	31.3	15.4	27.3	13.6	25.2	11
1991	31	19.2	32	19	29	18	31	16.2	26.4	12	24.6	5.4
1992	31.2	18.2	31.4	18	32.2	17.8	30	15.4	31	12	24.4	9.6
1993	30.2	17.6	28.9	18	31.8	17.4	30	15.2	27.2	13.8	NA	NA
1994	31.2	19.2	30.2	18.8	30.9	18.7	31.3	17.5	30.7	15.2	26	13.7
1995	29.7	18.4	31.5	20.2	31.1	21.2	30.9	20.2	29.7	13	25.9	11.3
1996	30.5	21.9	30.5	22.8	33.9	23.8	32.5	21.2	29.7	16.3	NA	NA
1997	30.1	19.5	NA	NA	30	17.9	30	17	29.9	13.8	24.5	9
1998	30	19.3	29.3	18.8	31.2	19.1	30.1	15.2	30.1	16.2	26.7	12.3
1999	29.7	18.6	30.9	18.7	29.1	18.7	30	17.7	28.4	13.7	25.6	10.4
2000	30.5	18	30.7	16.9	29.7	17.1	31.1	15.8	29.6	10	23.4	9.7
2001	31.2	17.2	31.4	20.4	30.6	19.4	30.4	17.9	28	13.2	35.6	12
2002	28.5	19.4	30.2	19.2	30.6	19	31	16.4	30.2	12.8	26.2	9
2003	31	20.6	30.8	19	30.2	19	29	18	28	14.2	25.4	9
2004	39.2	17.2	31.2	19.2	29.7	18.2	30.5	16.7	28.8	13.8	28.2	9.2
2005	30	18.2	29.5	18.2	33.1	17.2	31.2	16.2	29	12.5	28.7	10.2
Average	30.4	18.7	30.7	18.9	30.9	18.5	30.8	16.9	28.9	13.6	25.7	10.2
Mean	24.5		24.7		24.6		23.8		21.1		17.8	
Max	32.4		32		33.9		32.5		31		28.7	
Min	16.7		16,6		15.8		14.5		10		5.1	

Source: Pushpak,Zemabawk,Aizawl

Average monthly rainfall of Aizawl District

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1986	5.7	21.3	58.3	360.3	247.3	343.3	490.7	399.7	320	204.3	188.7	62.7
1987	15	40.7	64.3	148.3	162.3	480.3	438.7	481.7	477	134	134	102.7
1988	0	53.7	80.7	185	488	380.3	439.3	429.7	320..	279.7	58.7	4.3
1989	0	32.3	34.3	148.3	138.3	498.3	499.3	479.3	459.7	396.7	3.3	5.7
1990	1.3	55.3	290.7	339.3	297	393	353.3	456	337.3	193	138.3	79.7
1991	26.7	55	46	375	523/7	441	292.7	368.3	279	333.7	36.7	25
1992	2	49.7	40	124	253.7	375.7	393.3	456	479.3	363.3	31	12.7
1993	10.7	98.7	90	135.3	427.3	534.7	502.3	419.7	315.7	192.7	12.7	0
1994	14.3	14	191	220	140.7	371	434.3	482	248.7	137.7	24.7	0
1995	0	42	131.3	88.3	427	597.7	399	654	319.3	230	297.3	0
1996	10.7	26	267,7	131.7	291	377.7	475	426.7	569	155.7	37.3	0
1997	8.7	24.7	226.3	117.3	320	334.3	797.3	362	555.3	69.7	45.3	82.7
1998	63	33.3	147	169	456	306.3	575.3	496.7	303.3	125.7	55	0
1999	0	0	33.5	30.5	578.3	488.2	532	493.8	540.8	259.8	23.7	14.3
2000	22.2	28.5	152.7	303.2	517.2	336.3	258.7	657.7	330.7	268.3	28.3	0
2001	0	57.3	67,7	103.7	398.7	525.7	390.7	410.7	407.7	328	120	0
2002	24.7	0.5	68	179.8	587	363	505.7	519	273.2	188.8	78.3	0.5
2003	2.8	15	130.6	166.3	333.2	833.6	374.6	469.2	399	186.6	0	59.8
2004	0	0	18	379.3	262	535.8	865.5	450	395.3	195.8	6.5	0
2005	9.8	11.3	179.1	86.6	405.5	178.7	545.4	337.4	386.9	241.8	43	10.9
Average	0	33	120.9	189.6	362.7	434.7	478.2	462.5	385.9	224.3	68.1	26.8
Max	63	98.7	367.7	379.3	587	833.6	865.5	657.7	569	396.7	297.3	102.7
Min	0	0	18	30.5	138.3	178.7	258.7	337.4	248.7	69.7	0	0

Source: Department of Agriculture, Govt. of Mizoram.

APPENDIX-3 Aizawl District (1961-2001) - Village Level Population

Sl.no	DARLAWN BLOCK	1961	1971	1981	Growth rate in %	1991	Growth rate in %	2001
1	NORTH TINGHMUN	628		838	-7.63	774	-8.13	711
2	ZOHMUN	169	1669	761	-25.88	958	42.27	1363
3	PALSANG	470		592	-30.57	411	-8.75	375
4	UPPER SAKAWRDAI	617		84	-1.78	69	97.1	136
5	LOWER SAKAWRDAI			573	87.95	1077	85.51	1998
6	N. KHAWDUNGSEI	187		280	-32.85	188	-19.68	151
7	VAITIN	574		601	21.29	729	24.69	909
8	MAUCHAR	616		595	-10.08	535	41.68	758
9	KANI	154		159	-63.52	58	118.9	127
10	KHAWPUAR			420	-2.38	410	-2.19	401
11	EAST DAMDIAI					43	395.34	213
12	THINGSAT	248		354	0.28	355	-34.36	233
13	NORTH VERVEK	527	1344	234	214.1	735	13.33	833
14	LUNGSUM	283		375	-17.86	308	23.05	379
15	RATU	853	1474	2030	15.36	2342	-3.33	2264
16	SUNHLUCHHIP	307		24		U.I		417
17	SAILUTAR					438	6.16	465
18	NORTH SERZAWL	602		513	-4.67	489	6.33	520
19	SAWLENG	1124		986	21.19	1195	18.82	1420
20	KEPRAN	486	1934	936	-20.19	747	0.66	752
21	EAST PHAILENG	352		696	44.39	1005	8.95	1095
22	PEHLAWN	452		381	34.12	511	18.59	606
23	KHANPUI					980	34.18	1315
24	KHAWRUHLIAN	1058	1981	2179	-16.1	1828	13.01	2066
25	HMUNNGHAK	67				223	47.98	330
26	LAILAK	566		192	-8.33	176	58.52	279
27	DARLAWN N.T	1173	3349	2804	28.7	3609	7.09	3865

Sl.no	TLANGNUAM BLOCK	1961	1971	1981	Growth rate in %	1991	Growth rate in %	2001
1	NEIHBAWI	357				233	30.04	303
2	SIHPHIR	1194	2805	3247	55.83	5060	7.84	5457
3	NAUSEL	181		56	-1.78	55	203.6	167
4	MUTHI	598		278	48.92	414	60.62	665
5	TUIRIAL JAIL			207	-5.79	195	109.2	408
6	TUIRIAL			116	68.1	195	141.02	470
7	BUNGBANGLA			3	400	15	906.66	151
8	LUNGLENG-I	359	190	451	7.76	486	31.68	640
9	NORTH LUNGLENG	264	208	440	14.77	505	7.72	544
10	SAMTLANG			562	34.16	754	-11.67	666
11	SAIRANG N.T	751	2218	2574	36.9	3527	50.38	5304
12	AIZAWL N.T	18416	35202	82754	87.59	155240	47.04	228280

Sl.no	PHULLEN BLOCK	1961	1971	1981	Growth rate in %	1991	Growth rate in %	2001
1	NORTH KHAWLEK	663		716	-0.97	709	-2.67	690
2	VANBAWNG	800	1536	1485	-6.86	1383	-8.02	1272
3	LAMHERH	169		191	52.87	292	56.84	458
4	SUANGPUILAWN	801	1530	1938	-14.44	1658	4.94	1740
5	ZAWNGIN	473		366	24.04	454	15.63	525
6	PHULLEN	1215	1620	1939	-17.79	1594	6.33	1695
7	THANGLAILUNG					317	107.25	657
8	LUANGPAWN	445		237	15.18	273	40.65	384
9	PHUAIBUANG	1210	1657	1910	-3.14	1850	18	2183
10	N.E TLANGNUAM	279		284	30.98	372	50.8	561
11	DAIDO	407		395	13.67	449	9.35	491
12	KHAWLIAN	812	1730	1609	-6.46	1505	11.69	1681

Sl.no	AIBAWK BLOCK	1961	1971	1981	Growth rate in %	1991	Growth rate in %	2001
1	HUALNGOHMUN	210	325	467	24.19	580	5	609
2	THINGDAWL	224	401	569	42.53	811	3.32	838
3	KELSIH	417	377	526	3.42	544	24.81	679
4	FALKAWN					626	37.22	859
5	MUALLUNGTHU	773	595	979	-6.94	911	9.33	996
6	TACHHIP	776	503	607	17.62	714	25.07	893
7	AIBAWK			364	242.3	1246	5.77	1318
8	SATEEK		906	891	-16.94	740	15.54	855
9	PHULPUI	768	888	827	10.64	915	7.54	984
10	NORTH LUNGSAI			98	26.53	124	-20.96	98
11	SOUTH MAUBUANG	473	638	561	-24.24	425	5.17	447
12	THIAK	356	468	519	19.46	620	16.29	721
13	SUMSUIH	788	754	720	9.72	790	-3.03	766
14	HMUIFANG	137	187	188	5.31	198	1.01	200
15	LUNGSEI	76		153	15.68	177	31.63	233
16	SAMLUKHAI	615	912	1013	17.86	1194	5.02	1254
17	CHAMRING	162	161	165	7.87	178	27.52	227
18	LAMCHHIP	572		474	25.1	593	15.17	683
19	CHAWILUNG	142				225	101.33	453
20	SIALSUK	1434	1447	1576	36.61	2153	-2.69	2095
21	SAILAM	995		503	23.45	621	19.8	744

Sl.no	THINGSULTHLIAH BLOCK	1961	1971	1981	Growth rate in %	1991	Growth rate in %	2001
1	BUHBAN	549		488	-2.66	475	22.94	584
2	MUALMAM			67	-53.73	31	164.5	82
3	SESAWNG	612		710	0.49	1062	162.99	2793
4	TUALBUNG	792		599	16.36	697	6.16	740
5	DILKHAN							184
6	NORTH LUNGPHER	444		590	-6.44	552	23.91	684
7	SIHFA	1144		875	7.65	942	4.77	987
8	SELING	583		649	116.17	1403	107.69	2914
9	TUIKHURHLU					25	292	98
10	THINGSULTLANGNUAM	236		691	68.59	1165	15.02	1340
11	THINGSULTHLIAH	838	5009	2871	28.59	3692	-4.44	3528
12	AICHALKAWN			46	354.34	209	-44.49	116
13	MUALPHENG	618		536	4.66	561	15.32	647
14	LENCHIM	393		270	-31.85	184	65.21	304
15	DARLAWNG	264		225	27.55	287	83.97	528
16	TLUNGVEL	662	2997	2187	12.34	2457	-0.28	2450
17	PHULMAWI	410		162	38.27	224	15.62	259
18	TAWIZO	304		343	-33.52	228	24.56	284
19	MAITE	818		704	-5.68	664	17.77	782
20	SAITUAL N.T	2669	5353	5543	51.57	8402	30.51	10966

Sources: Census of India- 1961, 1971, 1981 & 200

APPENDIX-4 DISTRIBUTION PATTERN OF FUNCTIONS / SERVICES -AIZAWL DISTRICT

Sl.no	DARLAWN BLOCK / SETTLEMENT	EDUCATION						HEALTH				COMMUNICATION			VETERINARY			RECREATION			BANKING &POLICE		
		PS	MS	HS	HSS	COL	UNIV	SC	PHC	CHC	HOSP	BPO	SPO	PTO	RAHC	VDP	VHP	PL	PG	CH	BANK	PO	PS
1	NORTH TINGHMUN	1	1					1										1	1				
2	ZOHMUN	3	2	1				1				1						1	1			1	
3	PALSANG	1	1					1				1						1	1				
4	UPPER SAKAWRDAI	1																	1				
5	LOWER SAKAWRDAI	6	5	1	1			1		1		1						1	1			1	1
6	NORTH KHAWDUNGSEI	1																					
7	VAITIN	2	2	1				1				1						1	1				
8	MAUCHAR	1	1					1				1						1	1				
9	KANI	1	1																1				
10	KHAWPUAR	1	1									1						1	1				
11	EAST DAMDIAI	1	1															1	1				
12	THINGSAT	1	1					1				1							1				
13	NORTH VERVEK	2	1	1				1				1						2	1			1	
14	LUNGSUM	1	1									1						1	1				
15	RATU	6	3	2				1				1				1		1	1		1		
16	SUNHLUCHHIP	1																1	1				
17	SAILUTAR	1	1					1				1						1	1				
18	NORTH SERZAWL	1	1					1				1						1	1				
19	SAWLENG	3	2	1				1				1						1	1				
20	C.C KHAWPUI	1	1															1	1				
21	KEPRAN	2	1	1				1				1						2	1				
22	EAST PHAILENG	3	2	1				1				1			1			1	1				
23	PEHLAWN	2	1															2	1				
24	KHANPUI	4	3	1				1				1						1	1				
25	KHAWRUHLIAN	5	4	3				1	1			1						2	1		1		
26	HMUNNGHAK	1										1						1	1				
27	LAILAK	1	1																				
28	DARLAWN N.T	6	5	4	1			1	1				1			1		4	1		1	1	1
	Coeficient of variation	0.8	0.72	0.67	0				0							0		0.54	0		0	0	0

PS=Primary School, MS= Middle School, HS=High School, COL=College, UNIV=University, SC=Sub center, PHC=Primary health center, CHC=Community health center, HOSP=Hospital, BPO=Branch post office, SPO=Sub post office, RAHC=Rural animal health center, VDP=Veterinary dispensary, VHP=Veterinary hospital, PL=Public library, PG=Public playground, CH=Cinema hall, PO=Police outpost, PS=Police station.

	PHULLEN BLOCK	EDUCATION							HEALTH			COMMUNICATION			VETERINARY			RECREATION			BANKIN & POLICE		
Sl.no	SETTLEMENT	PS	MS	HS	HSS	COL	UNIV	SC	PHC	CHC	HOSP	BPO	SPO	PTO	RAHC	V.DISP	VHP	PL	PG	CH	BANK	PO	PS
1	NORTH KHAWLEK	1	1					1										2	1				
2	VANBAWNG	2	1					1							1			2	1				1
3	LAMHERH	1	1															2	1				
4	SUANGPUILAWN	3	2	1				1	1				1		1			2	1				1
5	ZAWNGIN	1	1					1										1	1				
6	PHULLEN	4	2	1				1	1				1		1			2	1				
7	THANGLAILUNG	1	1					1										1					
8	LUANGPAWN	1	1					1										1	1				
9	PHUAIBUANG	4	2	1				1	1			1						1	1				
10	N.E TLANGNUAM	2	1															1	1				
11	DAIDO	2	1					1										1	1				
12	KHAWLIAN	4	2	1				1				1			1			1	1				1
	Coefficient of Variation	0.58	0.37	0				0	0			0	0		0			0.3	0				0

	TLANGNUAM BLOCK	EDUCATION							HEALTH				COMMUNICATION			VETERINARY			RECREATION			BANKING & POLICE		
Sl.no	SETTLEMENT	PS	MS	HS	HSS	COL	UNIV	SC	PHC	CHC	HOSP	BPO	SPO	PTO	RAHC	VDP	VHP	PL	PG	CH	BANK	PO	PS
1	NEIHBAWI	1	1															1					
2	SIHPHIR	9	5	3				1				1				1		1	1		1		
3	NAUSEL	1	1															1					
4	MUTHI	1	1	1								1						1					
5	TUIRIAL JAIL	2	2																				
6	TUIRIAL	1	1															1					
7	BUNGBANGLA	2	2	1																			
8	LUNGLENG-I	1	1	1								1						1	1				
9	NORTH LUNGLENG	1	1	1				1				1						1	1				
10	SAMTLANG	1	1					1															
11	SAIRANG N.T	8	3	2				1	1				1		1			1	1		1		1
12	AIZAWL N.T	198	176	100	41	13	1	39	4		13	23	9	1	15	1	1	71	60	2	10	1	4
	Coefficient of Variation	3	3.09	2.39				1.9	0.85			1.8	1.13		1.2	0		2.6	2.06		1.3		0.85

	THINGSULTHLIAH BLOCK	EDUCATION						HEALTH				COMMUNICATION			VETERINARY			RECREATION			BANKING & POLICE		
Sl.no	SETTLEMENT	PS	MS	HS	HSS	COL	UNIV	SC	PHC	CHC	HOSP	BPO	SPO	PTO	RAHC	VDP	VHP	PL	PG	CH	BANK	PO	PS
1	BUHBAN	1	1					1				1						1	1				
2	MUALMAM	1																					
3	SESAWNG	4	2	1				1				1			1			1	1				
4	TUALBUNG	1	1	1				1				1						1	1				
5	DILKHAN	1	1																1				
6	NORTH LUNGPHER	1	1	1								1						1	1				
7	SIHFA	2	1	1				1				1						1					
8	SELING	4	2	1				1				1						1	1		1		
9	TUIKHURHLU	1																					
10	THINGSULTLANGNUAM	1	1	1												1		1	1				
11	THINGSULTHLIAH	5	4	1				1		1			1					1	1		1		
12	AICHALKAWN	1	1																				
13	SAISIH VETY FARM																						
14	MUALPHENG	2	1	1				1				1						1	1				
15	LENCHIM	1	1					1										1	1				
16	DARLAWNG	1	1															1					
17	TLUNGVEL	5	2	1				1							1			4	1		1		
18	PHULMAWI	1	1															1	1				
19	TAWIZO	1	1															1	1				
20	MAITE	1	1	1				1										1	1				
21	SAITUAL N.T	19	8	7	3	1		3		1		2	1		1	1		8	7		2	1	1
	Coefficient of Variation (C.V)	1.52	1.47	1.1				0.5		0		0.31	0		0	0		1.14	1.11		0.4		

	AIBAWK BLOCK	EDUCATION						HEALTH				COMMUNICATION			VETERINARY			RECREATION			BANKING & POLICE		
Sl.no	SETTLEMENT	PS	MS	HS	HSS	COL	UNIV	SC	PHC	CHC	HOSP	BPO	SPO	PTO	RAHC	VDP	VHP	PL	PG	CH	BANK	PO	PS
1	HUALNGOHMUN	1	1					1				1						1	1				
2	THINGDAWL	2	2	1				1				1			1			1	1				
3	KELSIH	1	1									1						1	1				
4	FALKAWN	2	1	1				1			1				1			1	1				
5	MUALLUNGTHU	3	2															1	1				
6	TACHHIP	2	1	1				1					1					1	1				
7	AIBAWK	3	2	1				1					1		1			1	1		1		
8	SATEEK	1	1	1				1				1						1	1				
9	PHULPUI	1	1	1				1				1						1	1				
10	NORTH LUNGSAI	1																					
11	SOUTH MAUBUANG	1	1					1				1						1	1				
12	THIAK	2	1	1				1										1	1				
13	SUMSUIH	2	1	1				1				1						1	1				
14	HMUIFANG	2	2	1								1			1			1					
15	LUNGSEI	1	1															1	1				
16	SAMLUKHAI	2	1	1				1				1			1			1	1				
17	CHAMRING	1	1									1						1	1				
18	LAMCHHIP	1	1	1				1				1						1	1				
19	CHAWILUNG	1	1									1						1	1				
20	SIALSUK	4	2	1				1					1		1			1	1		1	1	
21	SAILAM	1	1	1								1			1			1	1				

APPENDIX-5 PEOPLE'S CHOICE OF CENTER FOR LOW ORDER FUNCTIONS/SERVICES

DARLAWN BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/Service	Travel Distance (in km)
1	NORTH TINGHMUN	Zohmun	HS	15
2	ZOHMUN			
3	PALSANG	Zohmun	HS	5
4	UPPER SAKAWRDAI	L.Sakordai	MS.HS.SC,BPO,PL	8
5	LOWER SAKAWRDAI			
6	NORTH KHAWDUNGSEI	L.Sakordai	MS.HS.SC,BPO,PL,PG	9
7	VAITIN			
8	MAUCHAR	Zohmun	HS	12
9	KANI	Zohmun	HS	*20
		N.Tinghmun	SC.BPO,PL	10
10	KHAWPUAR	Vaitin	HS,SC	4
11	EAST DAMDIAI	N.Vervek	HS,SC,BPO	2
12	THINGSAT	L.Sakordai	HS,PL	5
13	NORTH VERVEK			
14	LUNGSUM	N.Vervek	HS,SC	2
15	RATU			
16	SUNHLUCHHIP	Darlawn	MS,HS,SC	8
17	SAILUTAR	Darlawn	HS	12
18	NORTH SERZAWL	Darlawn	HS	6
19	SAWLENG			
20	KEPRAN	E.Phaileng	RAHC	6
21	EAST PHAILENG			
22	PEHLAWN	E.Phaileng	HS,SC,BPO,RAHC	3
23	KHANPUI			
24	KHAWRUHLIAN			
25	HMUNNGHAK	Khawruhlian	MS,HS,SC	4
26	LAILAK	Khanpui	SC,BPO,PL,PG	7
		Khawruhlian	HS	*7
27	DARLAWN NT			
	Average			6.94
	Coefficient of Variation			0.54

(* not counted for the calculation of average travel distance & Coefficient of variation)

PHULLEN BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	NORTH KHAWLEK	Suangpuilawn	HS,BPO	21
2	VANBAWNG	Suangpuilawn	HS	13
3	LAMHERH	Suangpuilawn	HS,SC	7
4	SUANGPUILAWN			
5	ZAWNGIN	Phullen	HS,RAHC	5
6	PHULLEN			
7	THANGLAILUNG	Phullen	HS,RAHC	2
8	LUANGPAWN	Phullen	HS,RAHC	5
9	PHUAIBUANG			
10	N.E TLANGNUAM	Khawlian	HS,SC,BPO,RAHC	3
11	DAIDO	Khawlian	HS,SC,BPO,RAHC	8
12	KHAWLIAN			
	Average			8
	Coefficient of Variation			0.78

TLANGNUAM BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel distance (in km)
1	NEIHBAWI	Sihphir	HS,SC,BPO,RAHC,PG	1
2	SIHPHIR			
3	NAUSEL	Sihphir	HS,SC,BPO,RAHC,PL	3
4	MUTHI	Aizawl NT	SC,RAHC,PG	5
5	TUIRIAL JAIL	Aizawl NT	HS,SC,BPO,RAHC,PL ,PG	24
6	TUIRIAL	Aizawl NT	HS,SC,BPO,RAHC, PG	27
7	BUNGBANGLA	Aizawl NT	SC,BPO,RAHC,PL,PG	15
8	LUNGLENG-I	Aizawl NT	BPO,RAHC	23
		Samtlang	SC	*9
9	NORTH LUNGLENG			
10	SAMTLANG	Aizawl NT	HS,BPO,RAHC	16
11	SAIRANG N.T			
12	AIZAWL NT			
	Average			14.27
	Coefficient of Variation			0.71

AIBAWK BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	HUALNGOHMUN	Aizawl	RAHC	10
2	THINGDAWL			
3	KELSIH	Falkawn	RAHC, SHC	4
4	FALKAWN			
5	MUALLUNGTHU	Falkawn	H.S, SHC, RAHC	1
6	TACHHIP	Aibawk	RAHC	11
7	AIBAWK			
8	SATEEK	Aibawk	RAHC	3
9	PHULPUI	Aibawk	RAHC	5
11	NORTH LUNGSAI	S.Maubuang	MS,SHC,BPO,PL, PG	3
12	SOUTH MAUBUANG	Aibawk	HS	*10
13	THIAK	S.Maubuang	BPO	3
14	SUMSUIH	Hmuifang	RAHC	2
15	HMUIFANG			
16	LUNGSEI	Samlukhai	HS,SHC,BPO	11
17	SAMLUKHAI			
18	CHAMRING	Sialsuk	HS	3
19	LAMCHHIP			
20	CHAWILUNG	Lamchhip	HS,SHC	5
21	SIALSUK			
22	SAILAM	Sialsuk	SHC	12
	Average			5.62
	Coefficient of Variation			0.7

(* not counted for the calculation of average travel distance & Coefficient of variation)

THINGSULTHLIAH BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	BUHBAN	Saitual NT	HS,RAHC	23
2	MUALMAM	Sesawng	MS,HC,BPO,RAHC, SHC,PL,PG	10
3	SESAWNG			
4	TUALBUNG	Saitual NT	RAHC	9
5	DILKHAN	Tualbung	HS	*3
		Saitual NT	SHC,BPO,PL,RAHC	6
6	NORTH LUNGPHER	Saitual NT	SHC,RAHC	19
7	SIHFA	Saitual NT	RAHC,PG	5
8	SELING			
9	TUIKHURHLU	Tuirial	MS	*2
		Aizawl NT	SHC,HS,BPO,RAHC ,PL,PG	29
10	T. TLANGNUAM	Thingsulthliah	SHC	2
11	THINGSULTHLIAH			
12	AICHALKAWN	Thingsulthliah	HS,SHC,PL,PG	2
		Tlungvel	RAHC	*7
13	MUALPHENG			
14	LENCHIM	Mualpheng	HS,BPO	29
15	DARLAWNG	Tlungvel	HS,SHC,RAHC	3
16	TLUNGVEL			
17	PHULMAWI	Khumtung	HS	*2
		Tlungvel	SHC,RAHC	5
18	TAWIZO	Mualpheng	HS,BPO	14
19	MAITE	Mualpheng	BPO	22
20	SAITUAL NT			

(* not counted for the calculation of average travel distance & Coefficient of variation)

APPENDIX-6 PEOPLE'S CHOICE OF CENTER FOR MIDDLE ORDER FUNCTIONS/SERVICES

DARLAWN BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	NORTH TINGHMUN	Sakordai	HSS,CHC,PO	16
		Darlawn NT	SPO,VDS	*58
		Ratu	Bank	*44
2	ZOHMUN	Sakordai	HSS,CHC	12
		Darlawn NT	SPO,VDS	*54
		Ratu	Bank	*40
3	PALSANG	Sakordai	HSS,CHC	22
		Darlawn NT	SPO,VDS	*64
		Ratu	Bank	*50
		Zohmun	PO	*10
4	U. SAKAWRDAI	Sakordai	HSS,CHC,PO	10
		Darlawn NT	SPO,VDS	*52
		Ratu	Bank	*38
5	L. SAKAWRDAI	Darlawn NT	SPO,VDS	42
6	N.KHAWDUNGSEI	Sakordai	HSS,CHC,PO	9
		Darlawn NT	SPO,VDS	*51
		Ratu	Bank	*37
7	VAITIN	Sakordai	HSS,CHC,PO	2
		Darlawn NT	SPO,VDS	*47
		Ratu	Bank	*30
8	MAUCHAR	Sakordai	HSS,CHC	25
		Darlawn NT	SPO,VDS	*67
		Ratu	Bank	*53
		Zohmun	PO	*13
9	KANI	Sakordai	HSS,CHC	25
		Darlawn NT	SPO,VDS	*68
		Ratu	Bank	*54
		Zohmun	PO	*18
10	KHAWPUAR	Sakordai	HSS,CHC PO	8
		Darlawn NT	SPO,VDS	*50
		Ratu	Bank	*36
11	EAST DAMDIAI	Sakordai	HSS,CHC, PO	10
		Darlawn NT	SPO,VDS	*43
		Ratu	Bank	*29
12	THINGSAT	Sakordai	HSS,CHC, PO	5
		Darlawn NT	SPO,VDS	*37
		Ratu	Bank	*23

13	NORTH VERVEK	Sakordai	HSS,CHC, PO	15
		Darlawn NT	SPO,VDS	*35
		Ratu	Bank	*18
14	LUNGSUM	Sakordai	HSS,CHC	*15
		Darlawn NT	SPO,VDS	30
		Ratu	Bank	*13
		N.Vervek	PO	*5
15	RATU	Darlawn NT	HSS,PHC,SPO,PO	17
16	SUNHLUCHHIP	Darlawn NT	HSS,PHC,SPO,PO,PS, VDS,	7
17	SAILUTAR	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	10
18	NORTH SERZAWL	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	7
19	SAWLENG	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	7
20	KEPRAN	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	14
21	EAST PHAILENG	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	23
22	PEHLAWN	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	23
23	KHANPUI	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	33
24	KHAWRUHLIAN	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	36
25	HMUNNGHAK	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	38
26	LAILAK	Darlawn NT	HSS,PHC,SPO,PO,VDS,Bank	35
27	DARLAWN NT			
	Average			18.5
	Coefficient of Variation			0.63

(* not counted for the calculation of average travel distance & Coefficient of variation)

TLANGNUAM BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	NEIHBAWI	Aizawl NT Sihphir	HSS,PHC,SPO,PO Bank.VDS	16 *1
2	SIHPHIR	Aizawl NT	HSS,PHC,SPO,PO	14
3	NAUSEL	Aizawl NT Sihphir	HSS,PHC,SPO,PO Bank,VDS	16 *3
4	MUTHI	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	5
5	TUIRIAL JAIL	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	24
6	TUIRIAL	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	27
7	BUNGBANGLA	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	15
8	LUNGLENG-I	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	23
9	NORTH LUNGLENG	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	24
10	SAMTLANG	Aizawl NT	HSS,PHC,SPO,PO,Bank,VDS	16
11	SAIRANG N.T	Aizawl NT	HSS,PO,Bank,VDS	26
12	AIZAWL NT			
	Average			18.73
	Coefficient of Variation			0.36

PHULLEN BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	NORTH KHAWLEK	Darlawn NT	HSS,VDS,PO,Bank	87
		Suangpuilawn	PHC,SPO	*21
		Vanbawng	PO	*8
2	VANBAWNG	Darlawn NT	HSS,VDS,PO,Bank	79
		Suangpuilawn	PHC,SPO	*13
3	LAMHERH	Darlawn NT	HSS,VDSBank	73
		Suangpuilawn	PHC,SPO,PO	*7
4	SUANGPUILAWN	Darlawn NT	HSS,VDS,Bank	66
5	ZAWNGIN	Darlawn NT	HSS,VDS,Bank	53
		Suangpuilawn	PHC,SPO,PO	*10
6	PHULLEN	Saitual NT	HSS,VDS,Bank,CHC, SPO,PO	40
7	THANGLAILUNG	Saitual NT	HSS,VDS,Bank,CHC, PO	38
		Phullen	PHC,SPO	*2
8	LUANGPAWN	Saitual NT	HSS,VDS,Bank,CHC, PO	45
		Phullen	PHC,SPO	*5
9	PHUAIBUANG	Saitual NT	HSS,VDS,Bank,CHC, PO	51
		Phullen	SPO	*11
10	N.E TLANGNUAM	Saitual NT	HSS,VDS,Bank,CHC	64
		Phullen	SPO	*24
		Phuaibuang	PHC	*13
		Khawlian	PO	*3
11	DAIDO	Saitual NT	HSS,VDS,Bank,CHC	69
		Phullen	SPO	*29
		Phuaibuang	PHC	*18
		Khawlian	PO	*8
12	KHAWLIAN	Saitual NT	HSS,VDS,Bank,CHC	61
		Phullen	SPO	*21
		Phuaibuang	PHC	**10
	Average			60.5
	Coefficient of Variation			0.26

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	HUALNGOHMUN	Aizawl NT	HSS,PHC,SPO,VDS, Bank,PO	10
2	THINGDAWL	Aizawl NT	HSS,PHC,SPO,VDS, Bank,PO	13
3	KELSIH	Aizawl NT	HSS,PHC,SPO,VDS, Bank,PO	14
4	FALKAWN	Aizawl NT	HSS,PHC,SPO,VDS, Bank,PO	18
5	MUALLUNGTHU	Aizawl NT	HSS,PHC,SPO,VDS, Bank,PO	19
6	TACHHIP	Aizawl NT	HSS,PHC,VDS,PO	24
		Aibawk	Bank, SPO	*11
7	AIBAWK	Aizawl NT	HSS,PHC, VDS,BANK,PO	30
8	SATEEK	Aizawl NT	HSS,PHC,VDS, PO	33
		Aibawk	Bank, SPO	*3
9	PHULPUI	Aizawl NT	HSS,PHC,VDS, PO	38
		Aibawk	Bank, SPO	*5
10	NORTH LUNGSAI	Aizawl NT	HSS,PHC,VDS, PO	37
		Aibawk	Bank, SPO	*10
11	SOUTH MAUBUANG	Aizawl NT	HSS,PHC,VDS, PO	40
		Aibawk	Bank, SPO	*13
12	THIAK	Aizawl NT	HSS,PHC,VDS	43
		Aibawk	Bank, SPO	*16
13	SUMSUIH	Aizawl NT	HSS,VDS	*48
		Sialsuk	PO,PHC,SPO,Bank	21
14	HMUIFANG	Aizawl NT	HSS,VDS	*50
		Sialsuk	PO,PHC,SPO,Bank	19
15	LUNGSEI	Aizawl NT	HSS,VDS	*55
		Sialsuk	PO,PHC,SPO,Bank	14
16	SAMLUKHAI	Aizawl NT	HSS,VDS	*66
		Sialsuk	PO,PHC,SPO,Bank	3
17	CHAMRING	Aizawl NT	HSS,VDS	*71
		Sialsuk	PO,PHC,SPO,Bank	2
18	LAMCHHIP	Aizawl NT	HSS,VDS	*60
		Sialsuk	PO,PHC,SPO,Bank	9
19	CHAWILUNG	Aizawl NT	HSS,VDS	*65
		Sialsuk	PO,PHC,SPO,Bank	14
20	SIALSUK			
21	SAILAM	Aizawl NT	HSS,VDS	*81
		Sialsuk	PO,PHC,SPO,Bank	12
	Average			20.65
	Coefficient of Variation			0.6

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in
1	BUHBAN	Saitual NT	HSS,VDS,Bank,CHC,SPO,PO	23
2	MUALMAM	Aizawl NT	HSS,VDS,Bank,PHC,SPO,PO,HPT	58
3	SESAWNG	Aizawl NT	HSS,VDS,Bank,HPT,SPO,HPT	48
4	TUALBUNG	Saitual NT	HSS,VDS,Bank,SPO,CHC,PO	9
5	DILKHAN	Saitual NT	HSS,VDS,Bank,SPO,CHC,PO	6
6	N. LUNGPHER	Saitual NT	HSS,VDS,Bank,SPO,CHC,PO	19
7	SIHFA	Saitual NT	HSS,VDS,Bank,SPO,CHC,PO	5
8	SELING	Aizawl NT	HSS,PO	45
		T.Tlangnuam	VDS	*3
		Thingsulthliah	CHC,SPO	*5
9	TUIKHURHLU	Aizawl NT	HSS,VDS,Bank,PHC,SPO,PO	29
10	T. TLANGNUAM	Aizawl NT	HSS,PO	*48
		Thingsulthliah	CHC,SPO,Bank	2
11	THINGSULTHLIAH	Aizawl NT	HSS,PO	50
		T.Tlangnuam	VDS	*2
12	AICHALKAWN	Aizawl NT	HSS,PO	*52
		T.Tlangnuam	VDS	*4
		Thingsulthliah	CHC,SPO,Bank	2
13	MUALPHENG	Saitual NT	HSS,VDS,Bank,CHC,SPO,PO	10
14	LENCHIM	Saitual NT	HSS,VDS,Bank,CHC,SPO,PO	39
15	DARLAWNG	Aizawl NT	HSS	*57
		Thingsulthliah	CHC,SPO	6
		T.Tlangnuam	VDS	*8
		Tlungvel	Bank	*3
16	TLUNGVEL	Aizawl NT	HSS	*59
		Thingsulthliah	CHC,SPO	9
		T.Tlangnuam	VDS	*10
17	PHULMAWI	Aizawl NT	HSS	*60
		Thingsulthliah	CHC,SPO	9
		T.Tlangnuam	VDS	*11
		Tlungvel	Bank	*6
18	TAWIZO	Saitual NT	HSS,VDS,Bank,CHC,SPO,PO	24
19	MAITE	Saitual NT	HSS,VDS,Bank,CHC,SPO,PO	32
20	SAITUAL NT			
	Average			22.37
	Coefficient of Variation			0.82

* not counted for the calculation of average travel distance & coefficient of variation)

APPENDIX-7 PEOPLE'S CHOICE OF CENTER FOR HIGH ORDER FUNCTIONS/SERVICES

DARLAWN BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	N. TINGHMUN	Sakordai	PS	*16
		Aizawl NT	COL,UNIV,HPT,V.HPT,CH,P&T	184
2	ZOHMUN	Sakordai	PS	*12
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	180
3	PALSANG	Sakordai	PS	*22
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	190
4	U. SAKAWRDAI	Sakordai	PS	*10
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	178
5	L. SAKAWRDAI	Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	168
6	N. KHAWDUNGSEI	Sakordai	PS	*9
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	177
7	VAITIN	Sakordai	PS	*2
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	170
8	MAUCHAR	Sakordai	PS	*25
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	193
9	KANI	Sakordai	PS	*26
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	193
10	KHAWPUAR	Sakordai	PS	*8
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	176
11	EAST DAMDIAI	Sakordai	PS	*10
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	169
12	THINGSAT	Sakordai	PS	*5
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	163
13	NORTH VERVEK	Sakordai	PS	*10
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	153
14	LUNGSUM	Sakordai	PS	*15
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	153
15	RATU	Darlawn NT	PS	*17
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	140
16	SUNHLUCHHIP	Darlawn NT	PS	*7
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	133
17	SAILUTAR	Darlawn NT	PS	*10
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	136
18	NORTH SERZAWL	Darlawn NT	PS	*7
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	133
19	SAWLENG	Darlawn NT	PS	*7
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	116

20	KEPRAN	Darlawn NT	PS	*14
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	109
21	EAST PHAILENG	Darlawn NT	PS	*23
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	103
22	PEHLAWN	Darlawn NT	PS	*23
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	100
23	KHANPUI	Darlawn NT	PS	*33
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	90
24	KHAWRUHLIAN	Darlawn NT	PS	*36
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	87
25	HMUNNGHAK	Darlawn NT	PS	*38
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	88
26	LAILAK	Darlawn NT	PS	*35
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	91
27	DARLAWN NT	Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	126
	Average			168.42
	Coefficient of Variation			0.11

(* not counted for the calculation of average travel distance & coefficient of variation)

TLANGNUAM BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	NEIHBAWI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	16
2	SIHPHIR	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	14
3	NAUSEL	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	16
4	MUTHI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	5
5	TUIRIAL JAIL	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	24
6	TUIRIAL	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	27
7	BUNGBANGLA	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	15
8	LUNGLENG-I	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	23
9	NORTH LUNGLENG	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	24
10	SAMTLANG	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	16
11	SAIRANG N.T	Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	26
12	AIZAWL NT			
	Average			18.73
	Coefficient of Variation			0.36

PHULLEN BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	NORTH KHAWLEK	Darlawn NT	PS	*87
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	161
2	VANBAWNG	Darlawn NT	PS	*79
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	154
3	LAMHERH	Darlawn NT	PS	*73
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	148
4	SUANGPUILAWN	Darlawn NT	PS	*66
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	140
5	ZAWNGIN	Darlawn NT	PS	*53
		Aizawl NT	COL, UNIV, HPT, V.HPT, CH,P&T	148
6	PHULLEN	Saitual NT	COL,PS	*40
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	120
7	THANGLAILUNG	Saitual NT	COL,PS	*38
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	118
8	LUANGPAWN	Saitual NT	COL,PS	*45
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	117
9	PHUAIBUANG	Saitual NT	COL,PS	*51
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	131
10	N.E TLANGNUAM	Saitual NT	COL,PS	*64
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	144
11	DAIDO	Saitual NT	COL,PS	*69
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	149
12	KHAWLIAN	Saitual NT	COL,PS	*61
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	141
	Average			139.25
	Coefficient of Variation			0.1

(* not counted for the calculation of average travel distance & coefficient of variation)

AIBAWK BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in km)
1	HUALNGOHMUN	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	10
2	THINGDAWL	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	13
3	KELSIH	Aizawl NT	PS,COL, UNIV, V.HPT, CH,P&T	14
		Falkawn	HPT	*4
4	FALKAWN	Aizawl NT	PS,COL, UNIV, V.HPT, CH,P&T	18
5	MUALLUNGTHU	Aizawl NT	PS,COL, UNIV, V.HPT, CH,P&T	19
		Falkawn	HPT	*1
6	TACHHIP	Aizawl NT	PS,COL, UNIV, V.HPT, CH,P&T	24
		Falkawn	HPT	*6
7	AIBAWK	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	30
8	SATEEK	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	33
9	PHULPUI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	38
10	NORTH LUNGSAI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	37
11	SOUTH MAUBUANG	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	40
12	THIAK	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	43
13	SUMSUIH	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	48
14	HMUIFANG	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	50
15	LUNGSEI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	55
16	SAMLUKHAI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	66
17	CHAMRING	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	71
18	LAMCHHIP	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	60
19	CHAWILUNG	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	65
20	SIALSUK	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	69
21	SAILAM	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	81
	Average			42.1
	Coefficient of Variation			0.51

(* not counted for the calculation of average travel distance & coefficient of variation)

THINGSULTHLIAH BLOCK

Sl.no	Name of Settlement	Choice of Center	Function/service	Travel Distance (in
1	BUHBAN	Saitual NT	PS.COL	*23
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	103
2	MUALMAM	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	58
3	SESAWNG	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	48
4	TUALBUNG	Saitual NT	PS.COL	*9
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	89
5	DILKHAN	Saitual NT	PS.COL	*6
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	85
6	N. LUNGPHER	Saitual NT	PS.COL	*19
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	99
7	SIHFA	Saitual NT	PS.COL	*5
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	92
8	SELING	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	45
9	TUIKHURHLU	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	29
10	T. TLANGNUAM	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	48
11	THINGSULTHLIAH	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	50
12	AICHALKAWN	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	52
13	MUALPHENG	Saitual NT	PS.COL	*10
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	83
14	LENCHIM	Saitual NT	PS.COL	*39
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	112
15	DARLAWNG	Aizawl NT	HSS,PS,HPT	57
16	TLUNGVEL	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	59
17	PHULMAWI	Aizawl NT	PS,COL, UNIV, HPT, V.HPT, CH,P&T	60
18	TAWIZO	Saitual NT	PS.COL	*24
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	97
19	MAITE	Saitual NT	PS.COL	*32
		Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	105
20	SAITUAL NT	Aizawl NT	UNIV, HPT, V.HPT, CH,P&T	80
	Average			72.55
	Coefficient of Variation			0.34

(* not counted for the calculation of average travel distance & coefficient of variation)

ABBREVIATION USED IN APENDIX 5, 6 & 7

1.	MS	=Middle School
2.	HS	=High School
3.	HSS	=Higher Secondary School
4.	COL	=College
5.	UNIV	=University
6.	SC	=Sub Center
7.	PHC	=Primary Health Center
8.	CHC	= Community Health Center
9.	UHC	=Urban Health Center
10.	HPT	=Hospital
11.	BPO	=Branch Post Office
12.	SPO	=Sub Post Office
13.	P&T	=Post and Telegraph Office
14.	RAHC	=Rural Animal Health Center
15.	VDS	=Veterinary Dispensary
16.	V.HPT	=Veterinary Hospital
17.	PL	=Public Library
18.	PG	=Public Playground
19.	CH	=Cinema Hall
20.	PO	=Police Outpost
21.	PS	=Police Station

BIO DATA

Name	: Saithangpuia
Father's Name	: S.Lianchhuma
Mother's Name	: Hmingkhumi
Date of Birth	: 22.10.1979
Educational Qualification	: Msc (Geography)
Designation	: Assistant Professor
Nationality	: Indian
Office Address	: Govt. Saitual College, Saitual Mizoram.
Present Address	: House No. V-II 5, I.T.I Veng, Aizawl, Mizoram.
Study Area	: Aizawl District, Mizoram.
Name of the Research Topic	: Identification of Service Center and Spatial Planning for Balanced Development: A Case Study of Aizawl District, Mizoram.

Publication of Research Paper:

1. "Level of Development in Aizawl District: A Case Study", *Geographic*, Vol.3, July 2008, A Journal of Geography Association of Mizoram, Aizawl, pp.40-46.

2. 'Identification of Service Center and Hierarchy of Settlements: A Case Study of Aibawk Rural Development Block, Aizawl District', *Geographic*, Vol.3, July 2008, A Journal of Geography Association of Mizoram, Aizawl, pp. 47-57.

3. "Identification of Basic Planning Units for Integrated Area Development- A case Study of Aizawl District, Mizoram" *Geographic,* Vol.6, July 2011, , A Journal of Geography Association of Mizoram, Aizawl, pp. 36-47.

Presentation in National/State/Regional Level Seminar

1. Presented paper "Human Rights and Environmental Degradation" on University Grants Commission (UGC) sponsored State-Level Seminar on *Human Rights and Human Development in Northeast India* held on 2nd and 3rd June, 2011 at Govt. Saitual College, Saitual.

Research Project

1. University Grants Commission Sponsored Minor Research Project on "Identification of Service Center and Spatial Planning for balanced Development of Aizawl District, Mizoram".