CHAPTER- V: POLICY MEASURES, SUMMARY AND CONCLUSION.

5.1. Summary of Major Findings:

The study and analysis of spatio-economic dimensions, the hierarchy of functions and settlements in general and the identification of a frictionless area in particular acquired priority and renewed interest in research. The efficacy of micro-level planning in hilly terrains is incomplete unless the spatio-economic dimensions are cognised. More specifically, a hilly space containing numerous frictions of different shapes and sizes poses great challenges to spatial mobility persons in travelling to their workplaces, markets, schools, health centres etc and in transporting goods and materials. A literature review relating to space economy and location theories evolved by geographers, regional economists, regional scientists and planners in furtherance of their findings of the local optimum locations for allocation of functions, firms, industrial units in various settlements and areas stimulated us to include space in the present study. Objective examination of the existing conditions prevailing in various settlements under the study area is considered essential to evolve the desired operational plan by cognizing the topography, resources, institutional determinants, available functions and the whole community of the Nongtrai area. The emergence and development of theories relating to space economy by Waltar Isard has heightened the need for contributive research in identifying the existence of service centres, central settlements and peripheral settlements of the study area. Using the standard methods viz., Guttman Scale, Weighting and CFI methods it is found that out of 140 settlements, only three settlements qualified as service centres, seventeen settlements as central settlements and the remaining settlements as peripheral or tributary settlements. The analysis of the hierarchy of functions and settlements clearly indicates the lack of infrastructures and investment in Nongtrai area. This snobbish state of development will perpetuate if appropriate allocation of functions (both policy and non-policy) is not carried out in a timely manner. The whole array of settlements constitutes the spatial organisational of the society with man-made environments and how they are affected by space. Therefore, all such
studies cognised the element of space, the available functions, the infrastructural gaps, institutional factors and other factors that are involved in pushing the economy to the ‘take-off stage’. The present study is a modest attempt that examined the postulates of the space and location theory in the context of the centre-periphery relation to facilitate allocation of functions for basic access by consumers of all settlements. Subject to modifications, the traditional settlement system and pattern of spatial organization observed in Nongtrai area can be taken as a facsimile for the whole State of Meghalaya for areas having similar topography.

The profile of study area displays variations of physical and institutional factors within its boundaries arising out of the differences of physiography, geological formations and the climatic conditions. There are also variations of socio-economic conditions, demographic characteristics and histories of settlements in the study area. The study area also reveals a remarkable variability in the distributional pattern of settlements especially their sittings, sizes, spacing and dispersal over a surface. Interestingly, we found that old settlements nucleated towards their centres because of man’s gregarious instinct in the good olden days and are located near the perennial stream or rivulet. This corroborates the fact that occupancy intensity of hill settlements is a function of perennial water sources viz., springs, streams, rivulets, rivers, etc. As water is a vital need, the sittings of settlements within the vicinity of water sources are primarily for basic access to it. It is also observed that there exists a positive correlation between the sizes and densities of peripheral settlements and the spacing of central settlements within the frictionless distance. As spacing or distance from the central settlements increase, the density of peripheral settlements decreases.

One of the major findings of the study is that within the frictionless area, farmers are willing to travel to their farmlands and come back home daily and do not care of the intensity of gradient, steepness, ruggedness of terrains and the type of route they travel as long as varying slopes of the route are below 30°. They commute on a path or a trail connecting the settlements and their farms regularly to carry out their agricultural activities. The trip productions of farmers are always residential. But, as distance
from settlement increases beyond the frictionless area, the numbers of farms decrease due to the operation of the varying magnitudes of frictions and distance etc and as such more amount of energy, money and time is required to overcome the frictions. The existence of few farms beyond the distance of 5.00 Kms from settlements corroborates this fact. In such cases, some farmers used to stay at their farmlands during the cultivation and harvesting periods to overcome the frictions. From Table 4.5.4 of Annexure-V, a spatio-temporal or distance-time graph can be plotted with time along the X-axis and distance along the Y-axis. The finding stimulates a research scholar to carry out further enquiry with regard to the nature of spatio-economic dimensions and space preferences exhibited by rural populace. Finding of a frictionless area indicates the spatial mobility preference to farmlands by farmers and may be used as criteria for provision of certain functions within that area. Since most of the farm sizes in hill areas are small and as such provision of policy functions for each farm separately may not be cost-effective. For instance, provision of a non-gravity type of irrigation to every farm is not cost-effective in terms of maintenance costs. Therefore a local optimum location containing a perennial source of water supply may be located and an electric pump may be installed to fulfil the irrigation needs of a group of farming households. This is a convergence approach of providing functions to people.

It is seen that in subsistence agriculture transport cost is minimum and as such it is embodied with human labour. Obviously because factor inputs like seeds, yokes, spades, pesticides etc. are not heavy in weight and thus a farming household does not require employing a separate labourer for 8 hours for such services. On the other hand, the above factor inputs do not involve transport costs but the same used to be carried to farms by the labourers who are engaged in tilling, weeding, planting etc. For subsistence agriculture, human labour, irrigation, capital and seeds are the ubiquitous factors of production. Animal labour, pesticides, manures and fertilizers are found in some areas only and therefore they are local in nature. Thus, we infer that human labour, capital, irrigation and seed are the indispensable factors of production in irrigated farming. Though the intensity or the degree of influence of other prophylactic factors such as
water, relative humidity, light and sunshine could not be investigated due to
the non-availability of the scientific instruments like hydrometer, hygrometer,
etc; however, the study opens up the eyes of a researcher to delve deeper.

During harvest, spatial element plays its significant role because
farm owners used to employ labourers to transport the output (paddy) from
farmlands to their homes and remunerate them either in cash or in kind. If it
is in cash, they pay varying rates of wages for males and females. In some
settlements, farming households still follow their traditional system and
remunerate the labourers they employ for porterage of output in kind i.e
they remunerate paddy for carriage charges. Therefore in Nongtai area
both the barter system and the modern currency system still exist.

To know the returns-to-scale parameters, using the OLS method a
regression the popular Cobb-Douglas production function is estimated and
estimates are obtained. The method of cultivation portrays a labour
intensive technique since the labour scale is higher than the capital scale.
This conforms to our a priori expectations that capital content in
subsistence agriculture is low. Lack of farm mechanization and application
of modern technologies is a practical reality. For farms with increasing
returns, the returns to scale are greater than 1 whereas for farms with
decreasing returns, the returns to scale are less than 1. Thus for
subsistence agriculture also, the economic laws of returns to scale operate
significantly. Some farmers are reluctant to adopt farm mechanization
partly due to the interplay of institutional factors like belief in the destruction
of soil fertility by oozing diesel, inability of power tiller to scratch the surface
of the soil deeper and partly due to the lack of technical education, training,
poverty etc. Evidently, institutional determinants play their significant role in
agricultural production.

With regard to ranking of settlement, it is found that applying the
Guttman Scalogram technique helps us only to identify the presence or
absence of a function in a particular settlement. Composite Functional
Index (CFI) method is superior to the Guttman Scale as weights are also
accounted. To overcome the weaknesses of the above two methods in
effective allocation of functions, the present study recommends that ranking
of settlement should be determined by the numbers, operativeness,
capacity, frequency of use, quality, periodicity of occurrence etc. of functions a settlement has in relation to the consumers. The scalograms indicate that a number of zeros exist in all 140 settlements. The existence of many zeros especially the higher order functions reflects the lack of infrastructures called ‘infrastructural gap’ or ‘functional gap’ in the area.

In our heuristic quest, we found that there exists a correlation between population size and the CFI value as seen in the scattergram. This covariation is non-linear but positive i.e as population size increases; the numbers of functions also increase though not at the same rate. This confirms our a priori expectation that the demand of functions directly varies with the numbers of users. The estimates reveal that population sizes vary directly with CFI values. Using the CFI method, it is also found that corresponding to the population size of each settlement in the descending order; the ten selected functions reveal the case of discontinuous distributions. Except for institutional administration the data and information clearly indicate that no function exhibits a continuous distribution. This also confirms our a priori expectation that investment in the study area is done in a haphazard manner without any proper planning. There exists a demand for the ten selected functions in all the settlements. Only if such primary functions are available in all settlements, then the CFI value will exhibit a continuous distribution. If institutional administration is included, it means that CFI value would have exhibited a case of continuous distribution since this function is present in all settlements.

The hypothetical example of a hill route or a road connecting the two points say a settlement and a market with a total distance (D) that a biocarrier or a mechanical carrier travels is a regular phenomenon of the rural populace. In hilly terrains, the total distance that exists on a geographic space comprises two components viz. the horizontal distance \(D_h\) and the sloping distance \(D_s\). In (4.9.22) we have derived the equation showing the total transport cost of spatial mobility between the two points as given below.

\[
T_c = \{W + (\sum D_{hn} + \sum D_{sn}/\cos \theta_n) + F_f + O_c\} \quad \text{[Since } k = 1\}
\]

(5.1.1)

As the weight or load of capital, goods or an object is always accounted, the demand of energy increases and fuel consumption also increases. Thus, total transport cost is a function of weight of a material or object,
summation of varying magnitudes of frictions, the distance and the overhead cost. This is mathematically expressed as

\[ T_c = f(W, F, D, O_c) \]  

(5.1.2)

Where \( F = F_1 + \cos \theta \). Obviously, as the value of \( \theta \) increases it gives rise to various magnitudes of gradients in case of a road and slopes in case of a trail. We hope that transport economists and transport planners can apply this model in estimating the transport cost of travel in any geographic space.

In hilly regions, transport cost as a linearity concept plays a vital role in creating the utility of places i.e settlements, market centres, farms, heritage sites, etc. But, due to the presence of frictions, linearity turns to non-linearity. Such spatial dimension strongly influences and determines the degree of backwardness or forwardness of a particular area or region since the degree of accessibility and physical movement of goods, persons etc is functionally related to transport cost and transport cost exhibits a positive correlation with friction. Thus friction exerts a potent influence on transport and transport in turn, on development.

The journeys that persons perform from one place to another are caused by a number of factors. Many people travel to their respective workplaces to perform their works. Peoples travel across any area or region to carry out their business and other economic activities. Thus they constitute the workfolks. Persons travel regularly to markets to exchange money with goods in order to sustain their livelihood. Few persons travel for hunting, fishing and collection of forest produce. Children travel to schools, colleges, institutions and other places of learning to carry out their studies. Some travel across the globe for sports like football, cricket etc while others travel as tourists and joy riders. The elementary economic theory tells us that since transport possesses a want-satisfying power, thus it constitutes one of the goods. Travelling for some kilometers without paying a price for it constitutes a non-economic good while traveling to some destinations by paying a price for it constitutes an economic good. Once transport turns out to be an economic good, its demand is a function of its price and the prices of other goods and income. In all the above forms of transport, once goods and physical things are carried by either a biocarrier
or a mechanical carrier, axiomatically costs are involved since more quantity of energy is expended. Therefore, the demand for transport reveals a regular fluctuation between the origin (O) and the destination (D) over time. Transportation planners conduct O-D surveys for the formulation of a transportation plan of a given city, area or region to have an inventory of the existing travel pattern, existing transport facilities, existing land use and economic activities. In doing so, they identify the study area, external cordon and zones. By external cordon they refer to the imaginary line that represents the boundary of a particular study area. Since transport planning does not directly form part of the present study its details are not discussed. Anyhow, empirical evidences suggest that transport exhibits a demand and its demand directly varies with the price that a consumer pays for it. However, the demand for transport in urban areas may be different from the rural areas. For instance, Button (2003) writes “In urban areas the demand for road space and public transport services is markedly higher in the early morning and late afternoon than during the rest of the day; in the inter-urban context the demand for passenger transport fluctuates regularly over a year with high seasonal peaks, while with international freight transport (especially shipping) there are long-term cycles in demand.” The identification of a frictionless area as discussed in chapter 4.5 points out the fact that the demand for transport is not merely a function of its price, the prices of other goods and income since transport price is greatly influenced by slope, gradient and other frictional forces. Transport economists consider that transport demand is a function of its price, prices of other goods and the income level. This is mathematically expressed as:

\[ D_t = f(P_t, P_1, P_2, \ldots P_n, Y) \]  

(5.1.1)

Where \( D_t \) is the demand for a transport commodity, \( P_t \) is its price, \( P_1, P_2, P_3 \ldots P_n \) are the prices of various economic goods ranging from 1 to \( n \) and \( Y \) is the income level. To elucidate this fact, price of a transport commodity in hill road space over a certain distance is strongly influenced by frictions and time dimension besides the above factors. This is discussed in chapter 4.9. Even if technological advancement in road construction is achieved, the transport price in a hill road space is predominantly a function of gradient and unlike in a plain road. A comparative spatio-economic analysis of
investments in hill roads and plain roads may yield good findings on their effects of development.

Finally, we briefly discuss now on the core issue of the influence of transport on economic development. We stated before that transport creates utility of places. Transport economists advocate that transport exerts a positive influence on economic development as physical movement of goods, materials, labour and other resources takes place on a space. This means improved transport system increases production, improves the condition of working classes, induces progress in trade and commerce etc. According to this school of thought, even industrial revolution was successful because of prior revolution in transport technology. Transport economists postulate a casual linkage between low-cost transport and economic growth. Studies and empirical evidences are available to support this theory. From the above discussions, we have seen that transport is a necessary though not a sufficient condition for development. On the other hand, another school of thought argues that an excessive amount of scarce resources sometimes tend to be devoted to transport improvements. This line of thinking argues that economic forces tend to lead to an excess of transport provision, especially high cost infrastructures at the expense of more efficient and productive projects. They specifically point out that the lumpiness of the transport capital together with its longevity and associated externalities make them difficult to estimate future costs and benefits. Consequently, decisions to allocate more resources for the development of transport sector are not easily reversible or rectifiable. This sector attracts resources quite simply because if mistakes of economic nature are committed, the same are difficult to be proved as soon as major projects are completed. Development strategists concern mainly with allocation of public investment funds and it is thus natural that they claim transport, communications, energy, drainage, etc. as being of paramount importance. Transport economists belonging to this school of thought infer that though transport is an explicit sine qua non for modern economic development, yet the opportunity cost involved to improve transport further can not be easily justified and hence it becomes a debatable issue.
In spite of the arguments put forward by the second school of thought, it is an undeniable fact that transport plays an inevitable role to induce development especially in less developed countries. Button (2003) discusses the four functions that transport aids in bringing about economic development in any area, region or country. Firstly, transport constitutes as a major factor input for production of outputs as it permits goods and labourers to be transferred between the production centres and the consumption centres. Secondly, transport improvements can shift production possibility functions by altering factor costs through the reduction of the levels of inventory that is tied up in the production process. Thirdly, mobility is increased permitting factors of production, especially, labour to the places where they may be employed most productively. Fourthly, transport increases the welfare of individuals by extending the range of social facilities and by providing superior public goods such as national defense, national relief operations, greater social cohesion, etc. Transport economists also discuss the application of transport economics at the micro-level in terms of the development and use of techniques such as Social Cost Benefit Analysis, Internal Rate of Returns etc relating to project appraisal. Though these techniques are mostly employed in developed countries, however now-a-days, the third world countries are also using them with modifications so as to suit the local situations. At the macro-level, economists stress upon the need to have an appropriate transport planning so as to bring about an overall economic development. They argue that provision of transport should be expanded to ensure balanced growth and development. Though this argument is not pragmatic, yet in view of the variations in resource endowment, topography, terrains, institutions, capacity building etc. one can not deny the fact that transport strongly influence the development process as it ensures regular flow of technology, labour, materials, capital, social cohesion, etc. Transport further carries in it the urban force and transforms rural settlements into the fields of influence. Transport, therefore, induces into a society with the latest state-of-the-art and civilization. Obviously, transport economics is an extension of the linear concept of a space whereas regional economics which deals with the two-
dimensional aspects of space such as frictionless area, friction area, peripheral area, virgin area is an extension of space economics. The study of demand for transport facilities falls within the scope of transport economics and hence details such as direct costs, external costs, pricing of transport services, inelasticity of transport demand, investment criteria etc are not discussed here.

5.2. Recommendations:

Population sizes of peripheral settlements of the study area are small. They need to be clustered to their respective central settlements so as to meet the threshold population and to make the central functions cost-effective for accessibility by the consumers. The finding of the frictionless distance in farming operations helps us to take it as the base for the provision of certain functions in central settlements or service centres as the case may be for easy reach of consumers dwelling in hill areas. For instance, a U.P School or a Sub-Centre can be provided at any central settlement provided that the distance between that central settlement and its peripheral settlements does not exceed 5.00 Kms and is within the permissible slope of 30°. We hope that the model constructed as shown in the diagram 4.9.1, contributes to the theoretical development of space economics and readers will derive benefits out of it in sharpening their acumen and insight further. The formulated laws of biotic and abiotic motions will act as a blueprint for farm economists, planners, transport engineers and policy makers in formulating projects for the provision of policy and non-policy functions in rural areas. The carriage cost of output can be minimized only through the improvement of transport system and accessibility nodes. Provision of roads is also necessary in all the settlements having irrigated farms or any permanent place of cultivation like ginger cultivation, tapioca cultivation, papaya cultivation etc to ensure easy accessibility of farmers and to transform part of subsistence agriculture to commercial agriculture. This will greatly reduce the varying magnitudes of frictions and temporal distance and will prevent market imperfections. Thus it is recommended that every farm of economically viable sizes should be provided with roads, irrigation facilities, cold storage facilities, canals, etc to
achieve the above objectives. In the course of data collection, it is found that a number of industrial firms such as the M/s Abhijeet North Eastern Projects Ltd, Nagpur, M/s Adhunik Steels Limited, Kolkata, M/s Kaziranga Mines Private Ltd, Shillong etc., are already in search of iron ore and some have paid the surface rent and purchased the iron ore deposits from the local land owners for prospecting the iron ore outcrops for setting up of steel industries in this area. The process of industrialization will soon to take off in this area. For academic benefits, we recommend that the applicability of the Weberian concept of material index be studied and tested empirically. If the principle is found workable, industrialists will be able to determine the optimum locations of their firms as to be either market-oriented i.e near the market centre or source-oriented i.e near the source of raw materials.

To improve agricultural production, policy measures like adoption of agricultural mechanization, multi-cropping system, modern technologies, trainings, HYVs, SRI method of cultivation, etc. should be prescribed. The State Agriculture Department needs to intensify rigorously the farmers’ training programmes. Provision of IT packages such as TVs, computers with internet facilities at every settlement should be prescribed to sensitise awareness among the farmers of the latest developments in agricultural production and marketing. Such facilities and technical guidance are necessary to enable farmers to know the price fluctuations in foodgrains, cereals, horticultural produce, etc and to explore market surveys. Scientific instruments such as a clinometer, hydrometer, hygrometer, thermometer, barometer, etc, should be provided at least for every settlement if not for every household for data augmentation. Unemployed youths should be fully trained to use these instruments and keep records of the readings and data on regular basis. Ways and means for mobilization of funds required for maintenance, repairs and payment of salaries for the employed youths should be jointly devised by the traditional institutions and the State Government. This will ease the data scarcity problem needed for researches, studies and other uses. Institutional economics or cultural economics aids a researcher to study the institutional determinants. We are
hope that such studies will yield new findings and appropriate policy measures for developing this area can be suggested.

The existence of zeros in Table 4.6.2, 4.6.3, 4.6.4 & 4.6.5, implies increasing demand of investment i.e the creation of functions. As the area is underdeveloped, more policy functions are required to be invested or created so as to propel the local economy to the growth path of the country. We are skeptical that if the present pace of investment continues it will take many years for the area to score the points against the fifty demand-driven functions. In view of the resource constraints, functions possessing higher demands need to be identified and investment should be made on priority basis. More public investment for setting up of colleges and institutions (both technical and non-technical), roads, power lines, water development etc is recommended. Investment in non-policy functions like creation of local shops, repair centres, market centres, tourist lodges, viewpoints etc is urgently needed. Proper planning should be carried out for every investment. Popular techniques like programme budgeting, cost-effectiveness analysis, social cost-benefit (SCBA) analysis etc should be applied to ensure that functions proposed to be created are frugiferous to the community.

Economists both classical and neoclassical strongly advocate the need of infrastructures to conduce development in any area or region. Transport & communications, educational institutions, energy, power, stadiums, health facilities, housing, information technology, post offices, financial institutions, markets, hydraulic structures, farm machinery, farm houses, etc constitute a set of infrastructures. In the early stages of development, a substantial amount of investment in infrastructures is absolutely necessary. They constitute the basis for economic development or a pre-condition for take off as economists call them. Creation of infrastructures is a *sine qua non* for production and distribution of output to the demanding consumers. No form of economic development can take place without capital formation. However, the threshold infrastructure necessary to activate the development process depends on the size of the area or region, the development level attained, current economic growth, population, resources etc. Economists and planners agree that the order,
type and volume of functions should be decided only after building up their threshold levels. It is recommended that investment of the demand-driven functions should be continued persistently till the saturation point. This will exhibit a continuous distribution.

The hilly trail or road model clearly indicates that total distance (D) existing in a geographic space comprises two components viz., the horizontal distance (D_h) and the sloping distance (D_s). Thus, it is recommended that the significant role that varying magnitudes of frictions play should always be accounted in transport studies involving spatial mobility of persons, goods and other objects. We state that the magnitude of friction can be reduced only through technological advancement in road construction, automobile industry etc and if the magnitude of friction i.e the gradient is reduced flows of goods, materials and persons will take place more frequently. It is suggested that every settlement shall be connected with road network and market centres or service centres should be created at designated places or settlements to transform subsistence farming into commercial farming. This will push the area into the growth trajectory.

We also suggest that both the State and the Central Government should come out with an appropriate Spatial Transport Policy so as to ensure development at both the micro-level and macro-level perspectives without inducing any backwash effects on the available resources. Such policy shall favour for more investment in the major four sectors of the economy namely (1) Primary, (2) Secondary, (3) Tertiary and (4) Infrastructures. In the primary sector, it encourages farmers to augment agricultural production and marketing. In the secondary sector, it stimulates investors to set up industries. In the tertiary sector, it facilitates the Government to set up vocational, management and technical institutes so as to enhance capacity building such as skills, efficiency and other professional activities that generate self-employment to the people. In the infrastructure sector, it accentuates the Government and private stakeholders to create both policy and non-policy functions proportionately.

5.3. Conclusion: In conclusion, the study and analysis of spatio-economic dimensions acquired priority, enthusiasm and heurism in micro-level
planning. Micro-level planning is one of the ‘thrust areas’ of development because it aims at providing the necessary functions to the consumers living at peripheral settlements, central settlements, service centres, etc. Mere economic planning disregarding the spatial dimensions i.e areal and linear dimensions does not give the blueprint of resources, topography, connectivity levels, settlement patterns, accessibility problems, frictions, intrinsic factors of backwardness etc of a particular area. Spatio-economic studies essentially relate to the classical theories of agricultural land use, market area analysis, industrial location, central places, location and space economy and frictionless area developed by J.H von Thunen, August Losh, Alfred Weber, W. Christaller, Walter Isard and Arthur Getis respectively besides other relevant location theories. Among the above, the theoretical contributions made by Christaller, Isard and Getis deserve special mention for the present work. They aided vigorously in designing and evolving the operationally realistic findings, models and laws of spatial mobility for accessibility of functions by consumers in hilly terrains. The present study is a modest attempt aimed at examining the practical validities of the above tenets in the domain of spatial organization observed in Nongtrai area which is representative of other hilly regions having similar topography. Therefore, it is the spatio-economic planning only that aid planners to know the space preferences revealed by the people while consuming resources. Spatial preferences are always of immense consideration in micro-level planning because they indicate the willingness of consumers to avail the functions and consequently the development levels of a particular area and community. Bearing in mind the concept of utilitarian approach, objective examination of physical setting, settlements, culture, mode of production in subsistence agriculture, existing functions, settlement patterns, economic and spatial linkages sharpened our insights to diagnose the problems faced by the people of the study area and to derive new findings.

The profile of the study area displayed mild variations in physical and cultural factors within its domain arising out of the differences in physiography, geological formations, climatic conditions and acculturations. Settlements exhibited their varied settings and typicality of housing arrangements and nucleation, areal heterogeneities, socio-economic
conditions and cultural histories. A close examination of the geometrical arrangement of both the upland and lowland settlements revealed that the spacing of most of these settlements belong to a type of compact or nucleated settlement due to the operation of the casual factors primarily cultural and historical. For non-motorable settlements, they revealed a radial plan pattern of settlements due to nucleation forces as stated above. In case of motorable settlements, they revealed a strassendorfer pattern of settlement i.e houses exist on both sides of a road forming a cluster of settlements. Attractive forces such as ribbon developments encouraged a linear physical growth that evolved this pattern of settlement. The physical setting of the study area as discussed in Sub-Chapt er 3.2 threw us light about the varying altitudes that the area stands above the mean sea level, the major rivers, hills, geomorphological formations, topography, land suitability etc. An understanding of topography, resources, mode of subsistence, population sizes, consumption pattern and culture of the people was of great help in formulating the research design, objectives and hypotheses, identification of demand-riven functions, use of appropriate methods for analysis, specification of variables and the hierarchy of functions and settlements. Above all, such perception aided us in gaining an insight into the complexity of factors affecting the spatial and economic organization prevailing in the study area.

Upland settlements indicate slight differences in irrigated farming as compared to lowland settlements. Irrigated farming carried out by farming households in upland settlements mainly involves the application of labour, irrigation, seeds, spade, hoe, dao and other traditional agricultural implements only whereas in lowland areas irrigated farming involves the use of labour, animals, irrigation, seeds, yoke or plough, bamboo ladder, hoe, dao, animals and other traditional agricultural implements. Such variation is caused by acculturation. The study reveals that in irrigated farming human labour, irrigation, capital and seeds constitute the ubiquitous factors of production. However, the study reveals that as far as residence-farm spatial mobility is concerned; farmers of upland and lowland areas exhibited no variations i.e their frictionless distance preferences are uniform. The present study has specified distance input or transport input
as one of the factors of agricultural production and it is found that in case of subsistence agriculture, transport cost is embodied with family labour or hired labour as no cost of transporation of inputs is involved. It is also found that the laws of decreasing, constant and increasing returns to scale operate also in subsistence agriculture.

The existence of a frictionless area constitutes one of the major findings of the present micro-level study and is conducive to theoretical developments. This enabled us to examine the practical validity of location theories especially those of Christaller, Isard, Getis where an element of space is highly recognized and the ‘centre-periphery’ relation becomes the guiding principle whenever micro-level studies on spatio-economic dimensions are taken up. Nongtrai area is proverbial for its backwardness due to the lack of basic functions needed to propel the local economy to the growth trajectory of a country. Development of rural areas does not mean merely pumping of money to provide the basic needs of human beings as the welfare state demands. Such development encompasses a wide spectrum of functions and physical linkages to break away all structural disabilities that chain the people to the condition in which they are now. Therefore, provision of the three types of functions viz. (1) point-bound functions such as schools, hospitals, banks etc (2) connective functions such as roads, canals, power lines etc and (3) mobile functions such as mobile hospitals, mobile shops, mobile services, moveable goods etc. is considered by us as a necessary condition to put the economy to the ‘take-off’ stage. Increase of population demands proportionate increase in the provision of functions as population size is positively correlated with the numbers of available functions which is revealed by the present study. A number of economists both classical and neoclassical unanimously agree that creation of functions is an indispensable condition to remove backwardness. Functions are the powerfull and efficacious instruments of growth and development. They are the elixirs that heal economic ills. Investment in human resources, social and economic infrastructures is directly related to growth and development. Though it is not erroneous to say that economic functions viz. power, transport and irrigation should be provided first to enable the development process to take off. These are the
prerequisite functions needed to activate the cycle of development. It shall be the collective endeavour of economists, planners and policy makers to ensure that any area shall have a balanced development to assert that the covariation between population and functions is positive and linear. If this principle does not hold, then an area is either haphazardly provided with functions or there exists an inadequacy of functions. The infrastructural gaps can be minimized if zero scores are eliminated i.e if more functions are provided. We hope that if at least some of the fifty functions selected for the present study are found in all the settlements, the data would have revealed a case of continuous distribution. Identification of functions according to the consumers’ demand is an essential step to alleviate poverty and other economic constraints since planning for infrastructure development is beset with a number of problems mainly the problem of choice between alternatives. Though the present study does not attempt to evaluate the socio-economic impact of the available functions, but it can be asserted that sustainable functions do bring about improvement in human lives economically, materialistically and qualitatively. The role of institutional administration to aid the government and private firms or individuals in monitoring and ensuring that projects are functional should be considered inevitable.

Coming now to the theoretical expositions, we are optimistic that the postulates and model constructions ushered in the present study will benefit the planners and policy makers to translate them into real action while formulating realistic development plans for any depressed area. The proposed new atomic model of land use ingrained with new concepts, the simple linear regression model for spatial mobility and farming operations shown in diagram 4.9.1 and figure 4.9.3 respectively and the laws of spatial mobility in for farming operations in hilly areas will stimulate the research scholars to further their studies and investigations in this direction. As a heuristic principle, using the residence-farm data collected and presented in the Table 4.5.4 of Annexure-V, the multiple regression model viz., \( Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + e \) of (4.9.8) can be tested empirically i.e the estimates of \( \beta_0, \beta_1 \) and \( \beta_2 \) can be obtained. As basic mobility refers to the physical travel of persons, goods, services etc in space, we hope that the spatial norms for
location of functions and the modes of transport prescribed in Table 4.8.4 will be made use of by planners and policy makers in allocating of the demand-driven functions to the consumers. This is one of the postulates emanated from this study.

As long as subsistence agriculture continues to dominate as a major occupation, the element of space as one of the factor inputs plays the insignificant role in agricultural production since this is already embodied with family labour or labour employed in farming operations. There is a possibility of a space element to play a significant role as a factor input in case of large commercial agriculture. However in case of the distribution and transportation of output especially in hilly terrains, it is an undeniable fact that the space element plays a significant role due to the operation of frictional forces. It is the frictions that hinder the spatial mobility of goods, services and facilities which induce a backwash effect on the people.

We confide that if the above recommendations are translated into reality, farmers of this area are in no way less inferior to their progressive counterparts found in other parts of the country. Therefore, the usefulness of micro-level studies involving the space element is always of paramount importance once they when realized in the right perspective and taken in the right direction since macro-level studies do not capture the ground realities. Micro-level studies focusing the hurdles that hold back development can definitely form the basis of realistic plan formulation for the cause and purpose of achieving the objectives and attaining the goals of growth and development in the depressed Nongtrai area. It is expected that provision of sustainable functions will definitely place this area in the growth trajectory.
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