A METHODOLOGY TO DEFINE THE TYPOLOGY OF RURAL URBAN CONTINUUM SETTLEMENTS IN KERALA

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This paper explores to understand the Rural Urban Continuum (RUC) development in Kerala in terms of its reason for the formation, urbanization, characteristic features and issues for governance. The paper argues for the need for having a specific settlement typological classification which can help to reduce issues in Planning and urban governance. An attempt is made to determine the indicators which can be used to determine the typology of settlement pattern. A methodological construct is also explained which can be used to delineate the typology of such Settlements.

INTRODUCTION

Traditionally, settlements are either classified as urban or rural settlements. This definition is predominantly based on the population size and density parameters, though some countries use occupational structure and availability of services like schools, banks hospitals etc. In spite of the existence of diverse criteria’s to define settlements exists for various countries; the urban and rural settlements are generally believed to be distinguishable in their character.

It is observed in certain countries that a particular pattern of these urban and rural pockets give rise to a unique pattern, more popularly known as the “Rural Urban continuum” (RUC) development pattern. This pattern has got the features of both of the urban or rural settlements, but difficult to be classified as either of them. Such patterns are evident in India, some of the south East Asian countries like Indonesia, some parts of china, corridor development patterns of USA and various other countries.

In India, this type of development pattern is mostly seen in the western coast starting from Kanyakumari in Tamil Nadu to Goa, though the settlement is more intense and uniformly distributed in the state of Kerala. Similar trends of development are seen along certain highways connecting two adjacent cities. But such RUC development pattern, seen for a larger region is predominantly seen in Kerala only.

The main objective of this study is to develop a methodological construct by using some indicators derived from literature reviews which can be used to delineate the settlement typology of the RUC Settlement pattern of Kerala.

This paper is structured into five sections. The first section discuss the RUC settlements of Kerala in terms of its characteristic features, reason for its formation and the urbanization and the urban process in such settlements. The second section discusses the issues pertaining to planning management and governance related to Kerala settlements. The third section discuss about the

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need for defining a settlement typology for Kerala settlements so as to overcome some of these issues. The Fourth section discusses some indicators which helps to determine the settlement typology using which the settlements can be classified. The final section suggests a methodological construct which can be followed in delineating the settlement typology.

THE SETTLEMENT STRUCTURE OF KERALA AND THE RUC DEVELOPMENT
The most striking features that differentiate Kerala from rest of the country is the spatial pattern of the settlement system characterized by dispersed but interconnected, linear but densely agglomerated stretch. Practically there is no distinction between an urban area and a rural area, with co-existences of the primary secondary and tertiary sectors in both. Hence, the settlement in Kerala does not have any distinct core, nor do the villages have any marked nodality (Chatopadhyay, 1995). In reality village to village boundary, village to town boundary or town to town boundary appears to be more imaginary than real. Generally, an urban centre can be identified by the presence of some more commercial activities. This pattern makes the settlements unique with dwellings made in individual plots and distributed evenly all over the habitable areas. Such a kind of development is generally called as the Rural Urban Continuum development Pattern (RUC development).

Many planners and sociologists believe that such a settlement pattern has resulted in equitable distribution of infrastructure facilities and has resulted in a better quality of life amongst people living in both rural and urban areas. This settlement pattern thus resulted in minimising migration from rural areas to urban areas, with in the state, contrary to what is seen in other states of India.

The existence of the RUC development in Kerala is not a recent phenomenon. Famous traveller Ibn batuta recorded this type of situation in Kerala in the 14th Century (Chatopadhyay, 1995). Logan (1887) noted that coastal tracts of Malabar (Kerala) were so densely populated that it is difficult to say where one municipal town begins and where one ended.

Similar types of urbanization and patterns of settlement systems are found in some of the South Asian countries. McGhee (1987) states that a similar type of settlement patterns is also seen in some Asian countries like Indonesia and termed this phenomenon as “Desakota” (The initial name used was “Kotadesa”). This Desakota regions need not be confused with periurban development. It refers to closely interlinked rural/urban livelihoods, communication, transport and economic systems (Marcus Moench & Dipak Gyawali, 2008). Quader MA, (2000) argues that Ruralopolis is the ideal term coined to describe these spatially atypical urban and rural regions. He says that Kerala is a ruralopolitan region with elements of a Desakota. Isaac (1986) used the nomenclature “gragara” by combining the gra from gramam (means Rural) and the gara from nagaram (means Urban) to explain the enigma of mixed rural urban settlement pattern and the mix of agricultural and non-agricultural activities in the Kerala’s spatial transformations. Pauchet & Oliveau (2008) argues that the RUC development in Kerala is an extended version of the Desakota concept and is found in a stretch of 30 KM width along the coast in the north south direction.

REASON FOR THE FORMATION OF RUC SETTLEMENT IN KERALA
There might be many factors, which would have influenced and shaped this type of habitable areas. Some of the predominant factors are discussed below.
Historical Factors

Smaller Kingdoms and decentralisation of trade: Before the arrival of British, Kerala was ruled by more than 100 principalities. Each of these kingdoms were independent with their own state capitals with a system of trade and commerce. Some of the bigger kingdoms among the principalities established main ports at the urban centres like Kannur, Talashery, Calicut and Cochin. Apart from these main ports, there were 33 minor ports to handle trade of plantation products, spices, coir and timber. Thus, each of these port settlements started to develop itself as small urban centres which prevented the formation of a large single port settlement.

No Major External attack and Invasion: Throughout the history, there was any major external attack on Kerala. This prevented the establishment of a unified single Kingdom (and thus a single primate city capital). Even during the period of British rule, there were many smaller kingdoms which had established suzerainty to British rule, thus preventing the formation of larger cities.

Physiogeographical factors

Physical factors: The peculiar linear shape of Kerala with width varying from 11 Km to 121 Km (In the East west directions) and a length of 590 Km along the coast (In north south direction) made the settlement to grow in a ribbon fashion. There are three geographical divisions in the state mainly lowlands, Midlands and Highlands with the highlands having approximately 33% as forest cover. Hence, habitable areas are mostly present only in the low and midlands. All these made the settlements to flourish in the low and midlands and thus contributing to the RUC development.

The ample availability of water because of high rainfall, high water table, fertile land with good tropical climate (with no extremes) and the presence of 42 rivers made Kerala a better habitable place except the forest areas in the east. Hence settlements could originate in any habitable areas and people started to live within their compound which prevented the formation of concentrated settlements.

Economic factors

Agro based industrial development

There are very less number of Industrial units in Kerala. Most of these units were established after the independence period and were predominantly small scale agro based industries which dealt mostly with coir and plantation crop products. They were established in the rural areas because of the availability of raw material and labour resources. This prevented the amalgamated growth of a single large scale industrial settlement.

Effect of Migrant labourers to Middle East

Due to the large scale migration of educated and skilled labourers to the oil rich Middle East after the 1970’s, the income level and affordability of the households in Kerala increased drastically. Hence the joint family system gradually started disappearing. This coupled with general preference of people to live in plotted development resulted in low-rise uniform density patterns instead of concentrated high density pockets.

Migration from Urban to Rural Areas

The employment opportunities created by plantation crops along with the starting of large number of hydro electric projects, especially after the independence period attracted migrant labourers from the urban areas to the less developed rural areas of highland and mid land regions.
Availability of land at a cheap rate also attracted people to migrate to these areas for agriculture purposes. Hence, a reverse migration process is experienced which indeed contributed to the development of RUC settlement pattern.

**Land ceiling act of 1963**
The land ceiling Act of 1963 envisaged the distribution of land from landlords to poor people. Kerala is one of the very few states in India which strictly administers the land ceiling act and no individual could own land beyond a limit of 12 standard acres. In Kerala, sub-division and fragmentation of holdings is very common. The average size of operational holding in the year 1976-77 was 0.49 hectares which has declined to 0.23 hectares in the year 2005-06 (Devi & Ajith 2011). This fragmentation of land contributed to the scattered distribution of settlements.

**Political factors**
Administrative policies and Socialist Ideology: After independence, Kerala has been ruled by political parties which had inclination towards socialist ideologies. Hence, resource allocation was done more or less equitably to both urban and rural areas. The deprivation of resources is minimal among various regions in Kerala. These policy decisions resulted in better quality of life and amenities distribution among the rural areas and thus prevented the migration of people from urban areas.

Better connectivity by road and water ways: The settlements in Kerala are well connected by proper network of roads. These road networks has been developed to complement the physiographic features, with two national highways running in North South directions and 6 national highways running more or less in the east west directions. Apart from this, there are many state highways, major district roads and panchayath roads closely knit together to form a loop of road network. Kerala has also got 42 Rivers flowing through it. Hence water ways developed as a major source of transport until the roadways and railways took over. This network of roads and waterways made better accessibility and reduced the travelling distance to service centres and thus contributed to the RUC development.

**URBANISATION IN THE CONTEXT OF RUC DEVELOPMENT.**
The urbanisation process in Kerala is quite distinct from rest of the country. Kerala is dominated by small and medium towns and the towns appear to be small and villages appear to be large, when compared to Indian standards (Chatopadhyay1988; Chatopadhyay1995; Srikumar TT 1993; Firoz 2006 ). With increase in the communication facility and transportation linkages, all the habitable parts in Kerala have become well connected with the non habitable areas. As a result, the final pattern of settlement system becomes more livable. (Firoz 2012)

The main urban centres in the state, Thiruvanathapuram, Kochi and Kozhikode are being located at almost equal distance from each other, providing uniform facilities to the people in the hinterland which in turn reduces the pressure on a single centre. These cities together with some other class I and II towns form a series of urban nodes, mostly along the coast, with in the rural urban continuum. (Figure 1)

The urbanization rate in the year 1991 was 26.44 % which reduced to 25.96% in the year 2001.However, the year 2011 showed a steady increase of urbanization rate to 47.72 % making it
the second highest urbanized state in the India. Such a phenomenon of contrasting urbanization process is not seen in any Indian states.

Between the period, 2001 to 2011, Kerala witnessed the lowest population add on in India, with only 4.6 % increase in its population. There has been no change in the area of the state resulting in very less change in the population density. Hence, the question which needs to addressed in terms of the urbanization is that “How can there be steep increase in the urbanization rate of Kerala from 25.96 % to 47.72 % in a decade? This makes one to conclude that, Kerala’s Urbanization pattern needs to be further analyzed in terms of its reasons. Firoz (2006) argues that in Kerala, according to 2001 census, 94.35 % of the villages satisfy the population criteria and 86.5 % of the villages satisfy the density criteria to define an area urban. However, many of these settlements do not satisfy the occupation criteria to define an area urban and hence they are classified as rural.

Based on a study of the RUC settlements in Kerala, it can be argued that the rural in Kerala is not really “rural” and the urban in Kerala is not really “urban”, it is something in between, having the characteristic features of both urban and rural, intermixed in most of the areas (Firoz, 2006). He also explains that the rural and urban in Kerala is not much distinct in their character and the classification based on population, density and occupation criteria to define a settlement does not hold valid too much in this case.
CHARACTERISTIC FEATURES OF THE RUC DEVELOPMENT

Residential developments in the RUC are generally seen as a ribbon development along the roads, railways and waterways. However, commercial developments are seen along their intersections, with shops in the front and residential development in the rear. Residential developments in larger plots are also seen in Kerala. When the family grows, each of the siblings set up their own houses by subdividing the large plots with internal roads. This contributes to the formation of independent houses within the compound and a series of such development contribute to the formation of a RUC settlement.

In Kerala, the RUC settlements can be visualized as a low-density type development when compared to other urban areas in India. They lack good public infrastructure due to the extra cost in developing the infrastructure on a larger stretch. Normally such developments are Ribbon type and seen mostly along the highways and the major district roads and has a diminished rural character and small-town atmosphere. Such settlements have got high ratio of road surface area.

ISSUES PERTAINING TO THE RUC DEVELOPMENT IN KERALA

Compared to the compacted settlements like the rural or urban settlements, RUC settlements being dispersed and spread out can result in serious issues for the planning, management and governance of the state. It can result in increased per capita cost for infrastructure distribution like street lights, electricity distribution, roads, gas connections, water supply and solid waste disposal etc.

Because of the high pressure on land and due to more and more built spaces being constructed, RUC settlements have resulted in a series of environmental issues like, loss of vegetation and natural habitat, lowering of water table, natural resource exploitation and degradation, high pollution (Air, water and soil) and high surface runoff of stormwater.

There has been constant change in occupational pattern of people from primary to secondary and tertiary employments, and land is more preferably used as a real-estate commodity than for agriculture. This pressure on land has led to an increase in land price even in rural settlements and the same has been unaffordable for the poor section of the society.

Though settlements in Kerala are well connected by road, condition of these roads does not meet the acceptable standards. Even the highways and the major district roads are not so wide enough to accommodate the increasing number of vehicles. All the major highways pass through major cities and most towns lack bypass and ring roads.

Widening of the roads are difficult in the RUC settlement pattern because of high population density, with people residing mostly along the road sides. Such widening involves demolition of houses, and shops with rehabilitation and resettlement of people resulting in high resistance from local population.

Lack of clear cut demarcation for RUC settlements has created a series of governance issues in Kerala. After the introduction of the 73rd and 74th constitutional amendment act, certain functions and responsibilities related to governance have been identified and listed for the urban and rural local bodies based on their status. In the event of the undistinguishable settlement characteristics, these designated lists of the functions could not be properly performed.

In Kerala, the rural settlements being comparable in size and density with that of many of the urban areas, the lack of proper building bylaws for town planning and urban development has
restricted the local bodies in preventing uncontrolled growth. Hence it becomes essential to have a RUC based code for giving guidelines for better town and country planning.

Kerala lacks good policy directions for better governance of the RUC settlements. This has not been possible because, till date there are no clear cut parameters to delineate a RUC settlement from the urban and rural settlements.

**NEED FOR DEFINING A TYPOLOGY FOR RUC DEVELOPMENT**

The RUC development pattern prevails in most of the areas in Kerala, except for areas predominantly in the highlands, areas occupied by forest, areas near to plantation crops estates, as well as those near to marshy land and water bodies. This may be due to the geographical and topographical particulars of these places. Further, regions comprising of cities like Kochi, Kozhikkode and Thiruvananthapuram along with their surrounding Panchayaths exhibit truly an urban tendency.

Thus it becomes essential to delineate the settlements of Kerala as the most urbanized to the least rural settlements and thus grouping them as clusters of settlements having similar characteristics. This clustering should delineate a group of regions for Kerala, which should have homogeneity amongst themselves with in the cluster group and should be heterogeneous when compared between the clusters.

Such a clustering of settlements are essential for various policy formulations for the state, say to mention for the spatial planning process. Currently for all spatial planning process, the unit of assessment is taken as a local body (Municipality, Corporation or a Village panchayath). Hence when preparing master plans, and City development strategies, the boundary of analysis is taken as the boundary of the administrative unit. However, in reality such a boundary does not exist. Hence the urbanization report of Kerala states that for Kerala, the best procedure for spatial planning is to adopt a regional planning approach (long term spatial planning process) for selected regions and then prepare a master plan/Development plan for the local body with in the region based on the broad frame work of the regional plan.

The ﬁrst step towards such clustering is to determine the parameters which contribute for deﬁning, rural urban settlement in Kerala, the authors explored the similar cases of typology delineation by various studies like PLUREL\(^1\), ESPON\(^2\), OECD\(^3\) and explore the parameters used for determining the settlement typology. The authors also explored the methodology being followed in such cases studies to check the applicability of the same in the context of Kerala.

**INDICATORS TO DELINEATE THE TYPOLOGY OF RUC SETTLEMENTS**

To delineate the typology of settlements in Kerala, the authors reviewed the cases of various similar studies through a literature review mainly from the European context. Apart for these literature reviews the authors have added certain other indicators found relevant in this context.

These indicators are expected to distinguish urban and rural settlements. Normally, typological studies are done for larger geographical regions, say for a continent, country, state or geographical regions etc. Hence, the data used in the study for deriving the indicators should be available from secondary sources because collecting primary data is practically impossible.

The study reveals that the indicators based on which the delineation of the settlements can be predominantly classified under Demography, Labour Force Characteristics, Sector wise
Employment, Livestock, Literacy, Civic Infrastructure, Communication and Information facility, Road infrastructure and Housing Infrastructure. The detailed list of Indicators is listed in Table 1 and Table 2. These indicators are further discussed based on their tendency to be more of Urban or Rural.

**Table 1**

List of Indicators with their sources as derived from literature that can be used in determining the settlement typology.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sub Indicators(s)</th>
<th>Authors</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sex Ratio (SR)</td>
<td>Dutt, A. K etal (1986), Bogdanov, N etal (2007)</td>
<td>Higher SR is UT</td>
</tr>
<tr>
<td></td>
<td>Dependency Ratio(DR)</td>
<td>OgduH,G etal (2010), Monasterolo, I etal(2010), Bogdanov, N etal (2007)</td>
<td>Higher DR is RT</td>
</tr>
<tr>
<td></td>
<td>House Hold Density(HHD)</td>
<td>Ballas D etal (2003), Madu, I. A(2009)</td>
<td>Higher HHD is UT</td>
</tr>
<tr>
<td></td>
<td>House Hold Size (HHS)</td>
<td>Authors own research</td>
<td>Higher HHS is RT</td>
</tr>
<tr>
<td>Labour Force Characteristics</td>
<td>Main workers, Marginal workers (Male and Female)(Mw, Mrw)</td>
<td>Dutt, A. K etal (1986), Madsen, M. F etal (2010), Maynooth, N. U. I (2000)</td>
<td>Higher Mw is UT and Mrw is RT</td>
</tr>
<tr>
<td></td>
<td>Non workers(Male and Female) (Nw)</td>
<td>Dutt, A. K etal (1986)</td>
<td>Higher Nw is RT</td>
</tr>
<tr>
<td></td>
<td>Household laborers as % of working pop.(HHL) (Male, Female and Total)</td>
<td>Dutt, A. K etal (1986) &amp; (Monasterolo, I etal(2010), Madu, I. A(2009))</td>
<td>Higher SSE is UT</td>
</tr>
</tbody>
</table>

Note: "UT" is Urban Tendency and "RT" is Rural Tendency. All Indicators are compiled by the authors from literature review.
### Table 2

**List of Indicators as suggested by authors that can be used in determining the settlement typology**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sub Indicators(s)</th>
<th>Authors</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic Infrastructure (CI)</td>
<td>Primary Schools/10000 population.</td>
<td>Authors own research</td>
<td>Higher CI is UT</td>
</tr>
<tr>
<td></td>
<td>Banks/10000 Pop.,</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>PDS Shops /10000 Populations.</td>
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<td></td>
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<tr>
<td></td>
<td>PDS Card Holders (%).</td>
<td></td>
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<tr>
<td></td>
<td>Sports and Arts Clubs/10,000 Pop.</td>
<td></td>
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<tr>
<td></td>
<td>Library, Reading Rooms/10,000 pop.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication and Information facility (CIF)</td>
<td>Telephone Connections/mobile connections/1000 population.</td>
<td>Authors own research</td>
<td>Higher CIF is UT</td>
</tr>
<tr>
<td></td>
<td>No of Post Offices and Private Couriers/10 thousand Population)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road infrastructure (RI)</td>
<td>Black road length per thousand persons</td>
<td>Authors own research</td>
<td>Higher RI is UT</td>
</tr>
<tr>
<td></td>
<td>Ratio of surfaced road length to unsurfaced road length</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Road Density Per thousand Populations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing Infrastructure (HI)</td>
<td>% Pacca Houses</td>
<td>Authors own research</td>
<td>Higher HI is UT</td>
</tr>
<tr>
<td></td>
<td>%Houses Electrified</td>
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</tr>
</tbody>
</table>

Note: "UT" is Urban Tendency and "RT" is Rural Tendency. All Indicators are compiled by the authors from literature review.

**METHODOLOGICAL CONSTRUCT**

In order to derive the final typology of settlements in Kerala, the methodology adopted by Donnelly et al. (1987), Maynooth (2000), Ballas et al. (2003), Sabater et al (2004), Bogdanov et al. (2007), Gülümser (2009), Madu (2009), Ogdul et al.(2010) , Madsen et al.(2010), Monasterolo et al.(2010) etc. shall be followed.

These selected indicators (as listed in table 1) shall be put for a correlation analysis in order to avoid biasness in one or more dimensions in the data set. Multivariate statistical analysis like Principal component analysis (PCA) shall be used for reduction in the dimension of the variables and the most relevant variable which explains a majority of the variance are selected there by reducing the data set.

These variables are analyzed using cluster analysis and settlements are grouped. (Those settlements which exhibits high degrees of homogeneity are grouped into one segment and those which exhibit high degree of heterogeneity are grouped as different clusters.) These settlements shall be subjected to spatial mapping using some of the GIS software's and the settlements typological distribution shall be analyzed and Interpreted. Erik Mooi et al. (2011) has suggested a methodological framework for using PCA and Cluster analysis using SPSS. This procedure shall
be used in the analytical process. The final settlement typology thus derived shall be used to suggest various policy directions in context of Kerala.

CONCLUSION

Deriving a typology for the settlements RUC settlement system, like that of Kerala has got a lot of practical application in urban and regional planning. Since settlements are further classified apart from urban and rural, spatial planning becomes easier and simpler. Such typological classification also helps for better infrastructure and recourse allocation planning, investment planning, land use and environmental planning and for better fund allocation for urban governance.

Notes

1. PLUREL (Peri-urban Land Use Relationships - Strategies and Sustainability Assessment Tools for Urban-Rural Linkages) is a European integrated research project within the European Commission's sixth frame work programme.

2. ESPON (European spatial planning Observation Network) is project of the European union to support policy development in relation to territorial cohesion and a harmonious territorial development, for providing information, analyses and scenarios on territorial structures and dynamics in Europe. This project has developed various data, indicators, typologies, models and maps based on which studies can be undertaken.

3. OECD (Organization for Economic Co-operation and Development) has developed an urban-rural typology. The aim of the study is to enhance regional comparisons and uses indicators based on the percentage of the regional population that lives in rural or urban municipalities, which are pre-classified by population density.

4. Generally in India, high sex ratio is a social indicator which is high in Urban areas. This is primarily because of high aspiration of families to have a male child against a female child. However, in Kerala, due to high literacy and better awareness, female infanticide is very low.

5. Uses the number of working hours as a parameter for farmer population. This is in principle similar to Main, marginal workforce.

6. Uses the same concept of Main, Marginal workers but uses a different terminology of part time and full time workers.

7. Uses related terminologies for primary sector employment in the country of study, but not exactly as cultivators and agricultural labourers.

8. Uses related terminologies for secondary sector employment in the country of study, but not exactly as house hold labourers.

9. Uses related terminologies for tertiary sector employment in the country of study, but not exactly as Tertiary employment.

10. Uses literacy rate at various levels of Primary, Secondary and Higher degree education. But cannot be used at this level in Indian context due to non availability of data.

References


Census of India (2011) - General population tables, Registrar General and Census Commissioner, Government of India.


Firoz, Mohammed (2006) - "Quality of life and Infrastructure delivery in the Rural Urban Continuum-A case study from Kerala" , Journal of Institute of Town Planners India, New Delhi, Vol 3, No 1, January-March

Firoz, Mohammed (2006) - “Spatial planning in the rural urban interface in Kerala” , Journal of Institute of Town Planners India, New Delhi, Vol 3, No 3, July-September.

Firoz, Mohammed (2012) - 'An enquiry into the relationship between the spatial dispersion of settlements & objective quality of life parameters: a case study of the rural urban continuum development in Kerala, India’ , Un published Comprehensive viva report, Department of Architecture and regional planning, IIT Kharagpur.


JH Ansari,K Raman unni(1960) - Working paper, school of planning and Architecture, New Delhi


Maynooth, N. U. I., & Martin, B. S. (2000) - "Irish rural structure and Gaeltacht areas National spatial strategy. Centre for Local and Regional Studies"


