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# Understanding the Cultural Influence through Space Syntax on the Spatial Configuration of Temple Towns of Kerala, India

**Josna Raphael P. [1]and A.K.Kasthurba[2]**

[1]*Government Engineering College, Thrissur, India*
[2]*NIT Calicut, India*

**Abstract—***Built environments are basically organization of space as they consist of space (un- built) and matter (built). The spaces are linked to each other, forming a "system of spaces". The way these individual spaces are formed and most importantly, linked together; is responsible for spatial configurationof the built environment. The socio cultural aspects in terms of the user preferences are responsible for the evolution of spatial configuration in a built environment, over a period of time. Thus, the built environment and the social environment are two sides of the same coin and that is the "system of spaces".The research is intended with the need of understanding built environments in a selected traditional urban core of Kerala which is the cultural capital as well as a traditional temple town. The place is analysed in terms of their configuration to understand culture specific human preferences about space proxemics over a period of 200 years evolution from 1805 till 2012. The research has been fostered by questions: (1) How to understand and quantify the spatial configurations of organically evolved built environments of urban cores? (2) To deduce the human aspects in terms of user preferences about space proxemics The strong influence of various factors like religious, cultural, historic etc is analyzed to trace the development of architecture in Thrissur. The analysis shows the integration of cultural aspects as the most important defining aspect of the spatial organization of the traditional urban core. The result of 2012 after 200 years clearly shows the unchanged morphology of spatial configuration even after the intense urbanization.*

**Keywords:** *Culture, Historic Centers, Spatial configuration, space syntax, Urban Transformation*

## 1. INTRODUCTION

Most of the historic Indian cities usually have a traditional settlement as an urban core, developed in the medieval period with an organic pattern and almost frozen in time, protecting its labyrinthine qualities, till the19thcentury. The spatial configuration seems quite in harmony with the users of that environment there. But this harmony is getting lost in the emerging urban environments in the developing cities. This is because of the lack of understanding of user preferences, while planning and designing the urban built environments. India, being in a rapid phase of urbanization; the majority of the small and medium size cities are growing since last decade. For planners, such built environments withan organic spatial organization are usually chaotic due to obvious geometric irregularity which is considered as "disorder". The patterns of new spatial configuration, based on the "urban rationality" of the modern planning practices, are being grossly applied to the existing built environments or the developing new built environments in India; without actually understanding its appropriateness to the Indian situations. This has a lot of physical and social implications such as environmental and socio-cultural conflicts. One can observe the repercussions of the approach adopted to deal with the urban built environments, in the metro cities of India which are already developed and are facing innumerable threats. Do the culturally significant historic centers have the potential to sustain in the rapid urbanization of the City? This does not mean that these growing medium size cities should not develop. However, there is a need to understand user preferences and to deal with the emerging urban built environments appropriately.

## 2. BACKGROUND

Continuity and linkages with its kinesthetic is an important characteristic of traditional Indian built environment. Hence, there is a need to understand built environments in the traditional urban cores as a "system of spaces" with its topology and embedded logic about its human aspects. Space syntax is selected as a major theoretical premise for the research undertaken.

The research is intended with the need of understanding built environmentsintermsoftheirconfigurationtounderstandcultures pecifichumanpreferencesaboutspace proxemics. The research has been fostered by questions(1) What are the underlying forces that promote or impede the development of historical centers in the whole city context?(1)to what extend can the morphological transformation of the historic centers be reflected by its spatial configuration? (2) Are the intangible cultural heritage of the historical centres influenced by the

spatial structure in a centrality process? (3) Based on the configuration parameters, can one understand the human aspects in terms of user preferences about the space proxemics? (4)can the role of historicalcenters within the wider city be described by the interaction between spatial configuration and culture of the place?

## 3. PROBLEM IDENTIFICATION

Trichur highly acclaimed as the Cultural Capital of Kerala, God's own country well known for its temples, festivals and other religious events. The land has a singular, diversified physical configuration . The town is situated on a rising ground with Vadakkunathan Temple complex at its summit. Trichur , the granary of agrarian resources attracted many traders from different places and thus the area evolved as a commercial centre. That further led to the development of several settlements in and around Trichur. The view points are the development layers of the City, the cultural and religious nodes, the paths and its formations over the years , its close nit relation to the culture and religion, Its transformation till date without changing its cultural significance, the built forms and urban blocks which goes hand in hand with culture and religion.

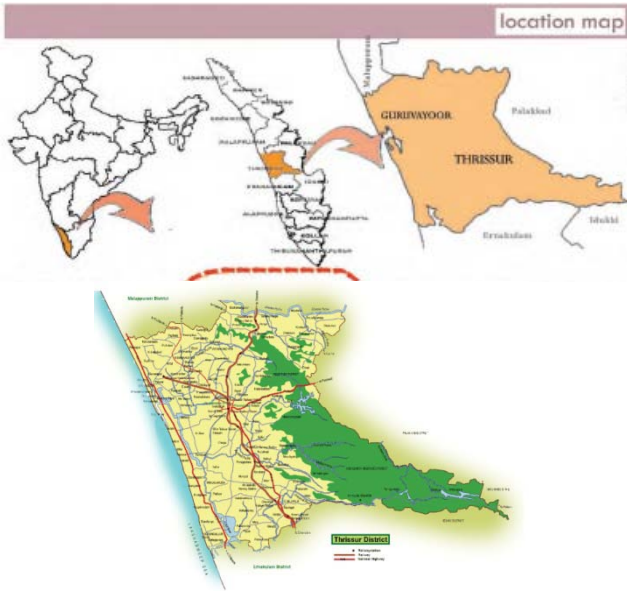



**Fig. 1: Location Map**

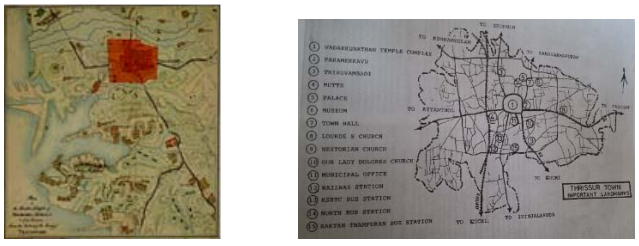
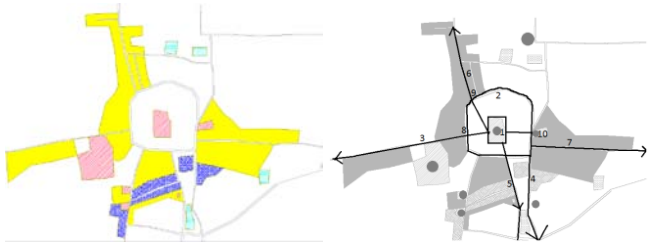


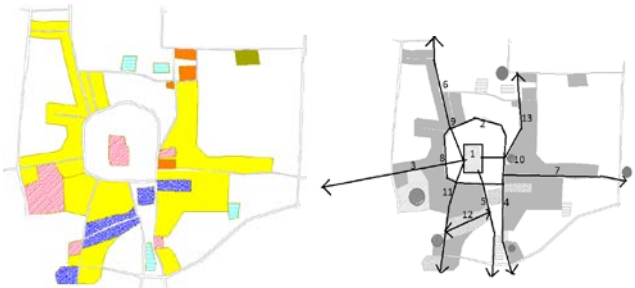
**Fig. 2: Plan of Thrissur in 1700 (Plan of the Hindu temple of Travancore in Kerala from the section ofsurvey of Travancore)**

Trichur City has a radial pattern with the central temple and streets radiating from it. Trichur Pooram which has found place in the list of national festivals and world tourism calendar plays the greater role in modeling the pattern of the urban core. TRICHUR POORAM The most important cultural event of Kerala, the main procession path of which takes place in the Swaraj round . The round has got a densely lined stretch of old buildings which forms the hard space of the urban block. Pooram is the important event that retains the urban core with its ancient traditional character in its planning as well as architecture. Unlike other cities and towns of Kerala where urban artifacts deteriorate and is ultimately destroyed through attack by natural and human agents , Trichur town is distinctively different from the point of view of rich cultural values it pocess.The traditional design sensibility cannot be viewed in other towns in Kerala as much of it has been lost in the process of urbanization. But in Trichur it is in the midst of urban chaos that we can find so much that we have managed to unconsciously retain: all credits to the cultural background of the town

The study is divided based on six stages of evolution: 1805, 1900, 1936, 1985, 2005 and 2012.



**1805**



**1900**

**1936**

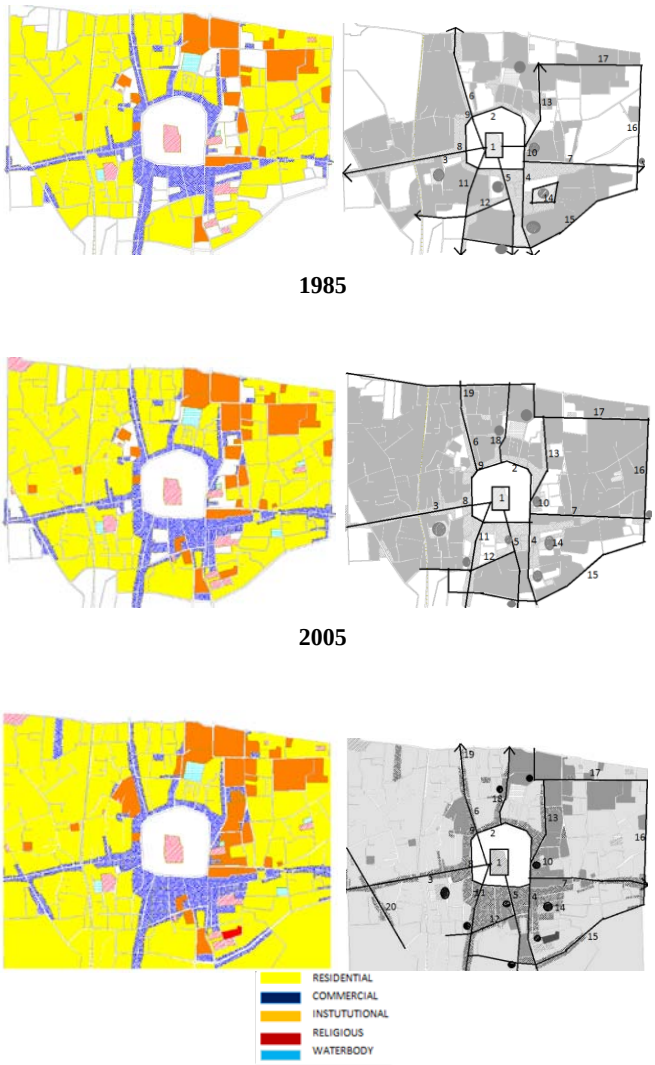



**Fig. 3: Evolution of central area of Thrissur Urban Core from 1805 till 2012.Left Side; Land use in central core, Right Side: major cultural networks**

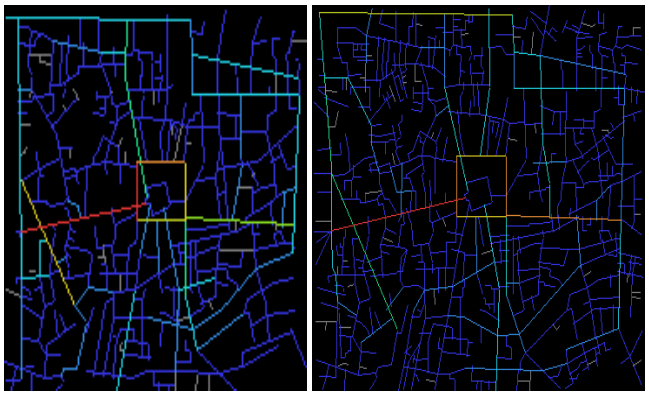
## 4. SPATIAL ANALYSIS OF HISTORIC CENTRAL CORE OF THRISSUR

The visual inspection in fig:3 reveals the tendency of centrality to occur in the central area of Thrissur. The following section compares the shapes and locations of the integration core chronologically. The central areas that are historical centers at various times are studied within the context at hand. Based on the historical map the street system is transformed into an axial map which is the geometrical model in space syntax theory. The urban development of Thrissur is syntactically investigated by performing segmental analysis at various scales. In this manner the spatial characteristics of urban structure globally and locally during different periods is analysed to gain better understanding of the development of the urban structure of Thrissur. In the above mentioned road network the numbers of network is based on the historical evolution of the city with the earlier ones are 2 to 7 with number 1 as the central temple around which the town has developed.

Based on the historical map the street system is transformed into an axial map which is the geometrical model in space syntax theory. The urban development of Thrissur is syntactically investigated by performing segmental analysis at various scales. In this manner the spatial characteristics of urban structure globally and locally during different periods is analysed to gain better understanding of the development of the urban structure of Thrissur.

Compared with the whole structure, the central area is well connected and more accessible than the context. The core areas are effectively integrated in terms of internal development. Apart from development, the urban central area interact with each other and aims to achieve a more integrated cluster of cultural historic centers, which then recreates the relationship between the centers.

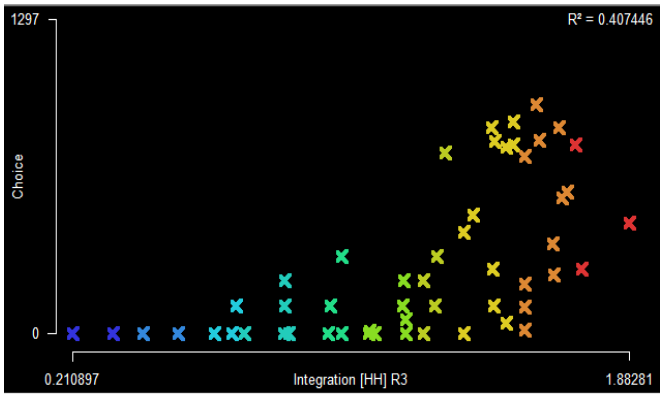
The historical cultural area in the central system undergo normalized segmental analysis at all radii to explore the relationship among the historical centers. During the modernization process, one trend is very obvious in both cases that the city structure has strengthened with the central organic patterns towards a more organized configuration, more integrated and more synergized due to the cultural significance of the center.



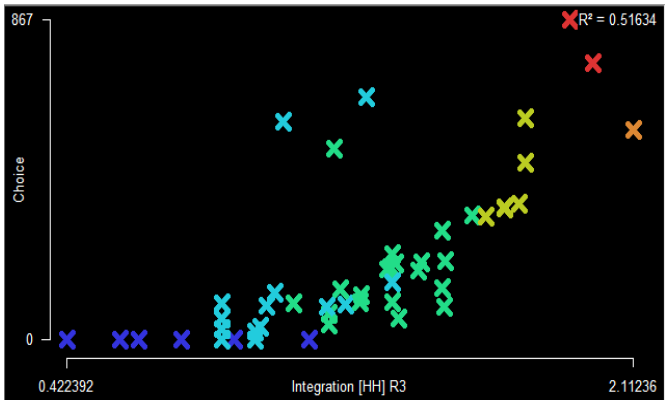
2005 2012

**Fig. 4: Angular Choice Structures of Thrissur Urban Core from 1805 till 2012, (Segmental Model (Rn)**

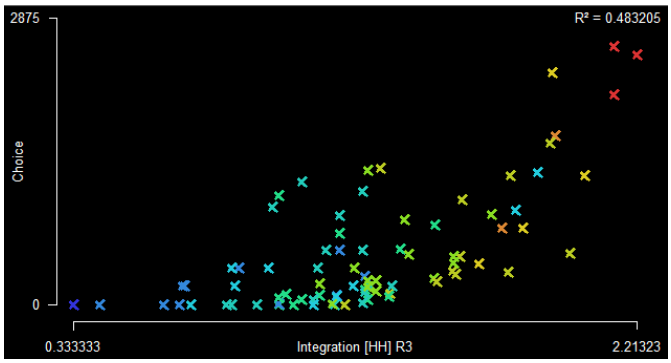
By recording the results of the normalized segmental analysis on the syntactic parameters we can gain the statistical view of the morphological changes in the historical centers of Thrissur.The choice value clearly suggests that over the period of transformation the central historical cultural areas are getting more and more accessible and used by the public even with the increased urbanization of the outer ring road.



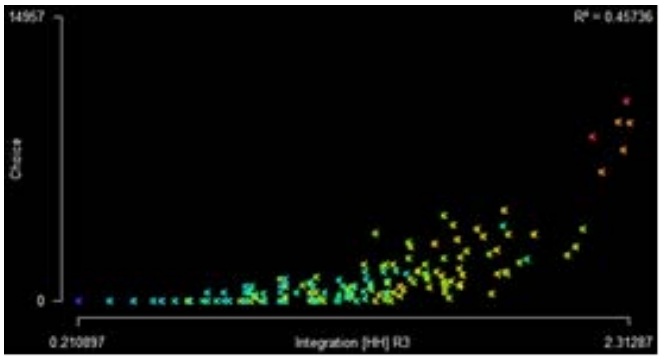

**1805**



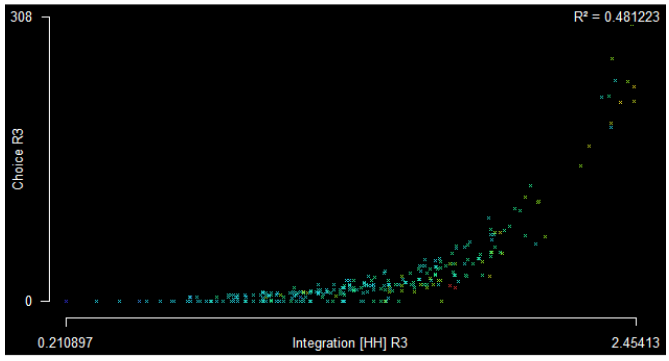

**1900**



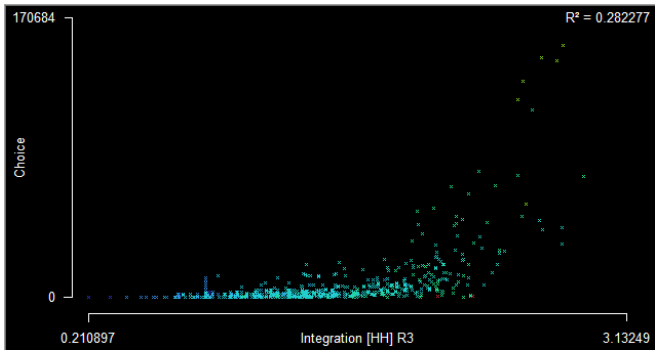

**1936**




**1985**




**2005**




**2012**

**Fig. 5: Scatterplots of Correlationbetween Choice and Integration Rn**

The strong correlation between choice and integration suggests that even after the transformation over the period the central historical cultural areas are getting more and more preferred by the public even with the increased urbanization of the outer ring road.

## 5. EFFECTS OF URBAN AND CULTUREELEMENTS ON SPATIAL ORGANISATION OF HISTORIC CENTRAL CORE OF THRISSUR

Thrissur pooram: Popularly known as pooram of all poorams is the only festival that holds a place in the world tourism calalender from Kerala. A cultural highlight par excellence, celebrated in the malayalam month medam (April/may). The two century old festival of spectacular procession of caparisoned elephants and enthralling percussion performances in a never ending succession is an 36 hours marathon event of incredible beauty, a feast for the eye and the ear, unfolding between 6 am to 12 noon the other day. Different from the usual temple festival, thrissur pooram is participated and conducted by people across all barriers of religion and caste.

Origin of Thrissur Pooram is an act of reprisal and also in a bid to assuage the wounded feelings of temples denied from the then known largest festival aarattupuzha pooram, Sakthan thampuran invited all these temples to bring their deities to thrissur where they could pay obeisance to lord vadakumnathan, the deity of the vadakumnathan temple. Although a strong spatial correlation exists syntactically between the historic urban centres and spatial pattern it would be interesting to know what kind of elements influence the formation of functional clusters without the without a clear syntactic values.

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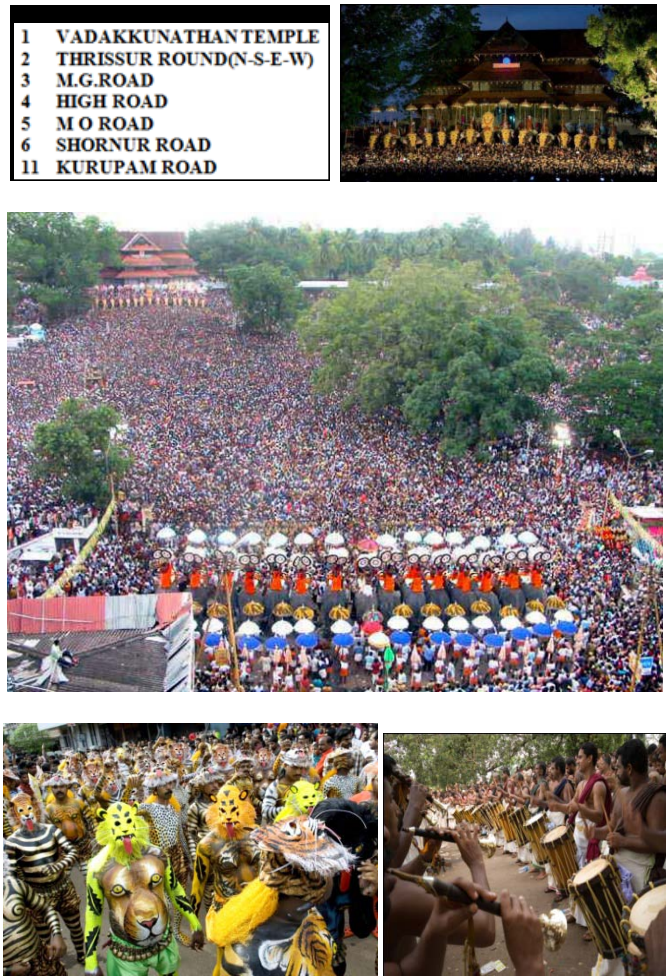



**Fig. 6: Locations of Historical Urban Elements**

Based on the preliminary survey it can be argued that the historic cultural centers still acts as attraction which maintains the permeability, accessibility and the preferences by the people even after the urbanization of the peripheral outer rings.

## 6. ROLES OF HISTORIC CULTURAL STREETS ON SPATIAL ORGANISATION

By observing the distribution of syntactic values of historical urban streets throughout the radii even in 2012 it is clear that the prevailing high values are still for the historic cultural streets which holds the maximum cultural events of the city.

The MG road is the main cultural linkage which defines complete annual cultural events of the city. Thrissur Pooram gets defined only with the access from the MG Road. Rest of all the events throughout the year happens around the central round and the space which holds these linkages defines the city as a a place. High Road acts as the main core for all Christian religious events as well as the market place of Thrissur. All other mentioned linkages holds a major role in the annual cultural events of the city.

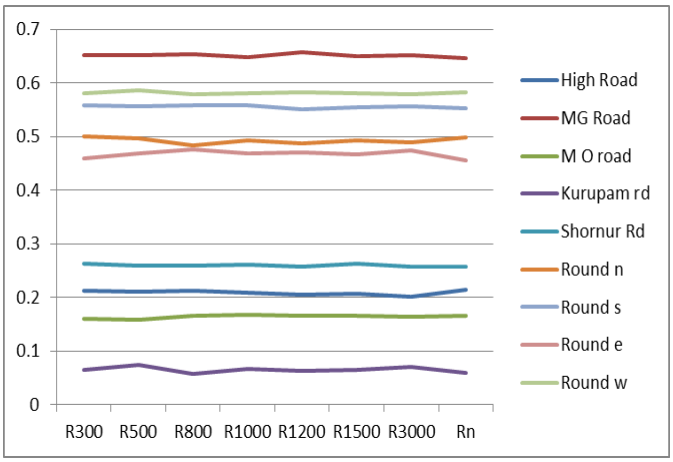
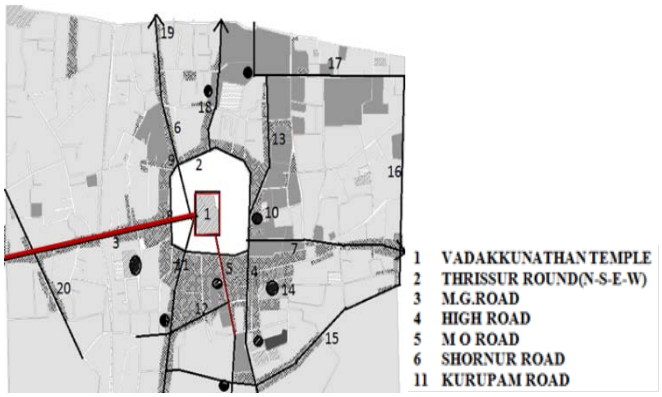



**Fig. 7: Roles of Historical cultural centers based on their syntactic values at all radii in 2012.**




An isovist isthe field of view from a particular pointin the spatial configuration. A comparison of isovists following the people's movement shows how the views along the routes became more and more defined overthe years. Their patterns became more directional, approximating a visual axis. What the map of isovists also reveals are the areas that remained constant in the transformation of the visual field along the procession and major event routes. A comparison across the years shows the transformation of the most overlays of isovists from a wider visual field to a more linear visual axis. It is possible to say that the view was becoming more controlled. However, the route of the rituals and festivals remained more or less the same. This indicates that the ritualistic practice of the major celebrations followed a spatial pattern that was pre-determined and present in space. The spatial pattern of the ritual existed before the creation of that space. It demonstrates the prevalence of mental representation of space over space itself. Even with the different sky lines the cultural definition remains the same in the isovist Analysis with a high visibility at all angles.

Pooram events starts from MG Road in the morning from where all other small participating temple processions proceed towards the main central temple. The people participating in the same would be gathered in the central open space where each one can feel the richness of the festival because of the spatial organization of the city which is proved by the isovists and axial lines analysis. Processions in the after noon with the kudamattom(umbrella changing ) with 30 elephants in a raw happens in the south side on the M.O.road. Fig. 12 shows a set of point isovists with 360° which were recorded at every turn of the procession-route during the festival time. Both the isovists shows convexity, the tendency of stretching into four directions at an angle of 90°. It is noticable that all the two are much similar and have a higher convexity even after 200 years of urbanization

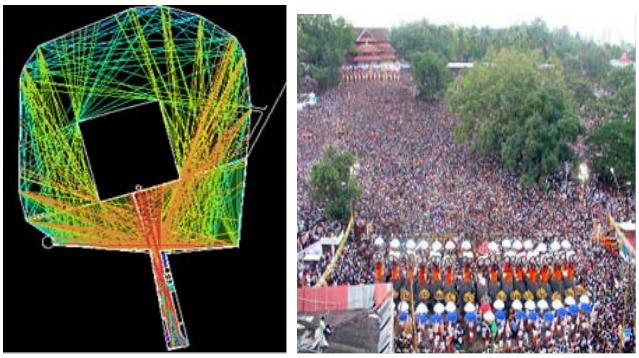


**Fig. 8: Isovist analysis of M.O Road in all angles from 90 degree to 360 degreein 2012**

**Fig. 9: Isovist analysis of M.G Road in all angles from 90 degree to 360 degreein 2012**

## 7. CONCLUDING REMARKS

In all these years thelocal and global choice and integration measures of all segments are still maintaining a constant high level. It turns out that most of the segments that were most frequently involved in the religious festivals had relatively high local and global integration values from the 1805 till 2012.

Especially the high integration values indicate that even though these segments had an important role for this festivity and therefore a high symbolic value, they also had the potential to work instrumentally. The choice values of the selected segments alsoshow a high variance.

**Table 1: Syntactic parameters of the spatial configuration of Thrissur Urban Core from 1805 till 2012.**

| Syntactic Parameters | 1805 | 1900 | 1936 | 1985 | 2005 | 2012 |
|---|---|---|---|---|---|---|
| Mean depth | 4.2391 | 5.01 | 6.06 | 6.6905 | 7.551 | 8.66 |
| Integration Rn | 0.8764 | 0.7979 | 0.7912 | 0.7525 | 0.6847 | 0.7580 |
| Integration R3 | 1.1694 | 1.234 | 1.2363 | 1.1163 | 1.0728 | 1.2607 |
| Max.Normalized Choice | 2 | 1.5 | 2 | 2 | 2 | 2 |
| Max.Normalized Integration | 1.518 | 1.254 | 1.322 | 1.393 | 1.7451 | 1.0 |
| Mean.Normalized Choice | 0.2001 | 0.166 | 0.116 | 0.0994 | 0.0916 | 0.015 |
| Mean.Normalized Integration | 0.8547 | 0.801 | 0.799 | 0.752 | 0.689 | 0.7580 |
| Connectivity | 2.6521 | 2.6538 | 2.6804 | 2.4239 | 2.2484 | 2.5686 |
| Synergy | 0.8648 | 0.6731 | 0.6819 | 0.6802 | 0.4675 | 0.5318 |
| Intelligibility | 0.3664 | 0.4851 | 0.4569 | 0.4111 | 0.2212 | 0.1935 |
| Choice n R3 | 0.4074 | 0.5163 | 0.4832 | 0.4573 | 0.4813 | 0.2822 |
| Mean segment length | 7392 | 7437 | 7123 | 5016 | 3541 | 2515 |

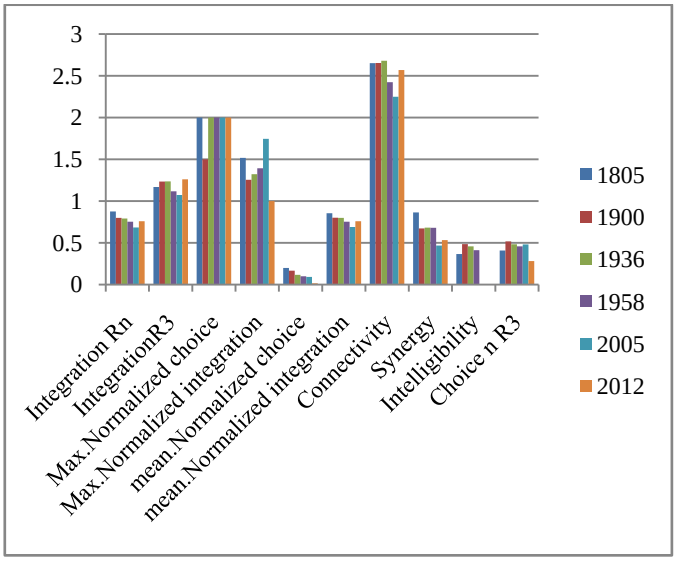



Fig. 10: Comparative analysis of Syntactic parameters from 1805 till2012

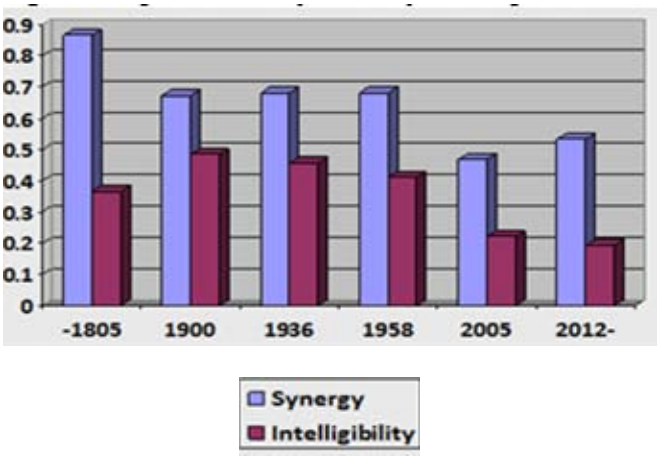



**Fig. 11: Comparative analysis of Synergy and Intelligibility from 1805 till2012**

The Evolution of the whole city as well as the formation of new outer ring roads effects the cultural historic centres in terms of their global integration and connectivity. But one can clearly read the integration with all the readings which maintains an average correlation which proves the fact that the cultural integrity plays the key role in the spatial organization of the city. Historic centers and the land use will maintain the social and economic positions in the whole city.

The correlation between connectivity and global integration is an important indicator of how clear an urban system is for its users; and is called as Intelligibility. The relationship between local integration R3 and global integration Rn, is called synergy. It indicates the relationship between parts of the spatial system to whole system. These parameters can quantify the spatial configuration. If Intelligibility and synergy are considered, the urban core of Thrissur is maintaining a higher value all these 200 years may due to the strong cultural definition of its users.

Secondly, theimportantreligious, administrativeorcommercialurbanactivitynodesevolvealong movement patterns, depending upon the culture specific space proxemics about public spaces supported the syntactic value to remain almost constant all these years. Hence, this clearly indicates the need to understand the human preferences in terms of norms about culture specific space proxemics, the placement of important religious, administrative or commercial urban activity nodes, in the overall spatial configuration.

The research of built environments in Traditional temple town of Kerala, Thrissur intermsoftheirspatial configurationclearly defines theculturespecifichumanpreferencesaboutspace proxemics. Fromthisresearch, aneffortismadetomakeexplicit the spatial configuration as concealed spatial rules or principals of urbanism in Indian built environments, so as to evolve a humane approach towards spatial design of emerging built environments in urban India. More detailed analysis is required to exactly assess the user preferences, but this study is representative of its possibility. Also, the study can be furthered for number of cities.

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