

Seeking the Best Urban Form

Tsouderos Ioannis, Dimelli Despina

(Tsouderos Ioannis, Professor National Technical University of Greece, Anagnostopoulou 43, Athens, Greece, itsou@mail.ntua.gr)
(Dimelli Despina, Lecturer, National Technical University of Crete, Sarantaporou 6, Ilioupoli, Athens, Greece, ddime@tee.gr)

1 ABSTRACT

Researches that are taking place show that the daily journeys in the urban tissue constitute the main cause of energy consumption and consequent atmospheric pollution creation. Every effort for this phenomenon's confrontation tries to intervene correctively, discouraging the use of private vehicles and encouraging the use of mass transport means, without however the required results.

The present research tries to investigate the best positions and the relations of urban functions, so that the daily urban journeys are minimized and simultaneously the residents needs, are satisfied.

Categorizing the economic activities of an area based on the access frequency, but also their groupments in the urban area, the research tries to formulate the urban functions best positions. These positions accessed by mass transport and constant orbit means will ensure the less and smaller possible urban journeys. This way Urban Planning tries to solve the problem of urban journeys creation, predefine, up to a point, the posts of departure and destination but also to formulate the ways of urban movements, in order to achieve the best sustainable development of urban tissue.

Thus the search of B.U.S.¹ consists in the ensurement during Urban Planning of urban elements groups and their areal forms that will lead to the configuration of an Urban structure which will result the minimal possible energy consumption with the simultaneous minimization of pollutants emissions via the optimization of daily function. These two goals will be achieved if the Urban tissue shaped by the allocated land uses can ensure the optimal planning for private cars, mass transport means and pedestrians use.

This will be achieved when the form of Urban tissue's structure incorporates evidently the local and supralocal movement in daily journeys.

2 URBAN ACTIVITIES IDEAL THEMATIC CATEGORIZATION.

From the continuous researches of functional structure's ascertainment in the Athens Basin Urban tissue, which we will use as model for our ideal planning, results the categorization of:

- a) land uses groups and
- b) their distribution in the Urban Web.

It is a fact that in the studied functional status of 1978-1988-1994 and 2001 result incomplete Functional linear relations of urban functions that hardly explain 50-55% of the total variance matrix.

This fact is logically expected since via the used Urban plans in combination with the being in effect Land uses decree, in the substance impose an odd "laissez – faire" on land uses distribution, therefore it depends henceforth on the market forces that they ensure and impose any regularity that rationalizes the city's daily function in a higher degree.

Generally from the revealed Functional Structures we can formulate "causal structures" that not only reveal the functional causes of the initial structure but also summarize the examined city's function.

More specifically economic activities are grouped in "Four Theoretical Functional Dimensions" (T.F.D. Theoretical Functional Dimension), that is to say

- TFD1 = Production–Catering of personal (permanent and equipment products) and intermediary products (industry, constructional and circulation sector).
- TFD 2 = Personal (permanent and equipment) products retail trade.
- TFD 3 = Services, and
- TFD 4 = Products Storages (Import and Rejection).

¹ B.U.S.-Best Urban Structure

These four Functional Dimensions summarize with a specific way city's function, and these theoretical dimensions must be allocated in the ideal city areal model in order to make it complete.

3 THE BEST AREAL DISTRIBUTION OF CITY'S FUNCTIONAL DIMENSIONS.

The total solve of city's areal distribution should be expressed in functional hierarchical levels with inductive form where each initial structural element composed in total will constitute the structural element of superior hierarchically level in a way that the targeted ideal structure runs through from the lower in its higher part.

The basic therefore question that is posed for the configuration of ideal Urban Structure is the determination of economic activities areal distribution in the Urban tissue.

The theoretical point that has already been formulated is that the circulation function diagram is determined initially, as well as the circulation types, and above these circulatory diagrams, Land Uses groups should be allocated. The relation of the circulatory model with the served Land Uses will ensure the proper and hence sustainable city's function.

As second basic theoretical point it is posed that the Personal retail trade is allocated on both sides of road axes or in the centers of residence areas. That is to say they will be mixed with the strictly residence areas that will allow easy access without automotive use.

4 BEST URBAN STRUCTURE'S AIM.

The combination of types (constant orbit means, steady itinerary means etc.) and forms (areal forms of urban tissue) of movement for the service of the daily needs and activities expressed in the total urban tissue i.e. combination of urban tissue with the distributed land uses adapted hierarchially in the existing social structure needs harmoniously will lead us to the best urban structure. The harmonious way consists in the ensurement of minimal possible energy consumption and the simultaneous minimisation of pollutants emission at city's daily function. These elements constitute the basic attributes of B.U.S. Their harmonious way presupposes also their general distribution in the city's total area, fact that will ensure its wider ecological function.

The above will be ensured with the conformed configuration of the two urban tissue's essential basic elements a) the circulatory tissue form and b) land uses allocation in it.

5 THE AREAL FORM OF URBAN LAND USES AND CIRCULATION TISSUE.

Urban tissue's form should be determined mainly from the proper circulatory flows for city's total service. Thus the used available transport means are:

- a) Mass Transport means of constant orbit (metro, tram and others),
- b) Conventional or electric Buses of steady itinerary,
- c) free circulation of private cars with the corresponding parkings and
- d) pedestrian movement.

The above will be closely associated in hierarchical levels according to the land uses they serve.

At the same time the circulation forms must be areally expressed so that they cover the classically acceptable land uses allocation via a formulation of Urban tissue that will serve their general and special requirements in daily and weekly base.

Thus the basic structural elements of B.U.S. are considered

- 1. One way peripheral axes so that self-existent functional regions are shaped (residence, centres, specialised centres, general activities, e.t.c..)
- 2. The via-central axes, of linear or circular form
- 3. Sub-centers peripheral axes
- 4. Supralocal axes, the basic entrances and exits of the city,
- 5. The basic urban tissue (internal streets) for the internal service of self-existent regions, in dimensions adapted to the land uses special requirements, that serves and is reliably expressed with an hierarchical ippodamius tissue, in a conformed planning so that the city's total is covered.

Thus the total city's form is progressively shaped with its structural elements "the residence cores" as below: The "basic residence core" is defined with C level Region Centre (CC1,2,3,4,5,6) and influences a region of 1.000 metres radius. The defined region's area is 31,41 ha and it can accommodate, with clearly ecological terms, from 40.000 until 100.000 residents depending on the established layout factor that can be defined from 1 until 2,5. Inside each core the TFD2 (Personal products retail trade) will be allocated in order to cover the daily and weekly needs of its population, as it is described above.

In shape 1 the basic structural elements of B.U.S. are shown in a linear form of three "residence zones"(R.Z.) constituted from seven cores each, as also the way they are circulatory served with metro, tram and peripheral axes. The mentioned form of three R.Z linear developments, based always on the "residence cores", and the creation of three central regions is achieved with second level functional centres CB1, CB2, CB3. The estimated population amounts in 240.000 residents for each R.Z.

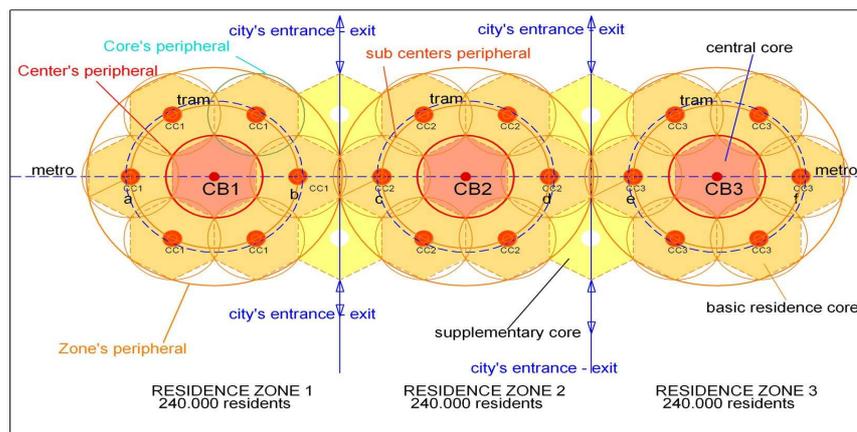


Figure 1: Best Urban Form, Structural Elements Linear connection of three residence areas, each composed by seven residence cores, served by metro, tram and peripheral axes.

The linear development of residence areas occupies 2.194 ha each, has more advantages than the central nuclear form in the point of city's extension, mainly from circulatory point of view because it gives us better possibility for total circulatory resolution which is in deed adapted more easily at the linear extension. This appears clearly in shape 2 where the allocation of the Theoretical Functional Dimensions is shown.

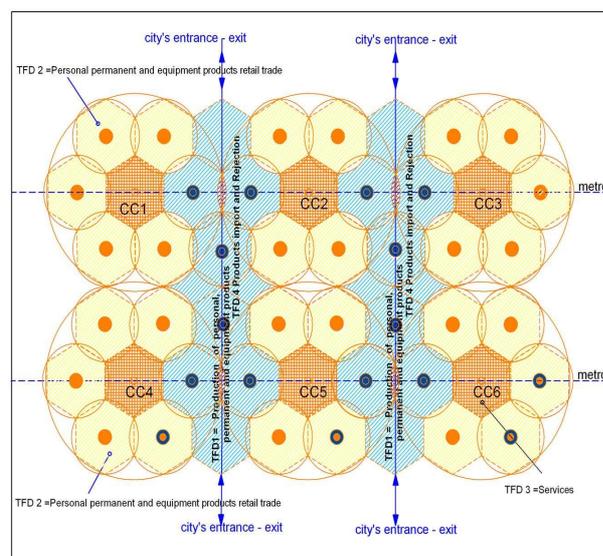


Figure 2: The ideal allocation of the four functional dimensions in six built up zones, with 1.120.000 residents capacity, served by metro, tram and peripheral axes.

For the achievement of the above, Production–Catering of personal intermediary products (TFD1) will be allocated inside the zone that is created by the two supplementary cores of two possessed R.Z that also occupies the two adjacent cores totally shaping a zone of eight cores. The Personal permanent and equipment products retail trade (TFD2) will be allocated inside the residence cores, as it is described above. Services (TFD 3) are placed in central cores CC1, CC 2, CC 3, CC4, CC5 and CC6. Each one of these occupies an area of 31,41 ha . The Services region totally occupies 188,46 ha. The Products import and rejection (Storages) (TFD 4) is allocated with TFD1.

This composition's form allows the horizontal and vertical spatial extension achieving the creation of wider residence areas with all the essential human functions and circulations. Thus the above following distributions are proposed in the diagram of the linear B.U.S. (shape 2).

6 THE ECOLOGICAL DIMENSION OF THE PROPOSED STRUCTURE.

It should be emphasised that with the proposed urban forms the soft, from ecological point, city's behavior is ensured. Thus the circulation inside the basic residence core, that occupies an 31,41 ha area is achieved from

- a) the regions that are influenced by 3rd level centers (CC1-CC6), that can be accessed on foot in 15 minutes in a 1.000 meters maximum distance.
- b) the passage from CC1 in the other six CC1,2,3,4,5,6 centers with constant orbit mean in a perimeter of 10.882 meters length.
- c) in positions (a) and (b) the re-embarkation in the corresponding metro stations is taking place. With this way a three region area that occupies 659,61ha and can accommodate 720.000 inhabitants is covered by transport.

The all therefore city's service is achieved by the most distant point with hardly 15 minutes walking and afterwards with land and underground mass transport means. The road network circulation is covered (shape 1) with the four peripheral axes of a) basic residence core area, b) centre's core (CB1 to CB6), c) residence zone area and d) sub-centers peripheral axes (CC1 to CC6).

7 REFERENCES

- BERRY (B.J.L.), City Classification Handbook, Methods and Applications, Wiley 1972, New York..
- BERRY (B.J.L.), Do variations in urban form affect environmental quality, IIASA, 1974, SCHLOSS LAXENBURG, Austria..
- CICERI M), MARCHAND (B), RIMBERT (S), Introduction a l'analyse de l'espace,Masson, Paris 1977.
- N.S.S.G.-National Statistical Services of Greece Athens 1997.
- NORUSIS (M, J), Statistical Package for Social Sciences, SPSS/PC+, SPSS inc.Illinois, 1986..
- NATIONAL STATISTICAL SERVICES OF GREECE, Census of economic activities of 1988.
- TSOUDEROS (J), Etude Evolutive de l'Industrie Urbaine, Doctorat a l'Universite Louis Pasteur a Strasbourg 1989..
- TSOUDEROS (J), Organic Sectorization of Urban space, Athens 1990, Urban and Regional N.T.U.A. Department's Publications.