The Analysis of Urban Features that Affect Land Values in Residential Areas

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Abstract
There has always been a demand for real estate with the aim of accommodation and/or making investments. The real estate is also vital for a country's economy as urban land value is determinative in both urban planning and real estate activities in economies of today's world. Knowing the factors affecting the urban land values is an important advantage in identifying the future of urban development and anticipating probable changes. The study aims to discuss urban and spatial factors which affect the urban land values in residential areas and based on this discussion to propose an original model with reference to Istanbul, a world metropolis. In studies determining the effective factors for urban land values, the structural variables both at dwelling and building level, the variables of neighborhood unit, natural and built environment and the socio economic characteristics of built environment have been considered. There are many factors affecting the urban land values. Among all, this study will examine the spatial and environmental factors related to economic values. An original method has been developed, which aims to observe and determine the factors affecting the changes at the dwellings' values. This study has been conducted using GIS database, statistical methods as well as space syntax method.

Within the proposed model, there are five main headlines that represent the factors affecting the land values in residential areas: spatial configuration, accessibility, environmental features, security and density. In this model the spatial configuration is examined based on two different integration parameters, local and global, used in space syntax approach. The accessibility variable consists of 16 parameters in 5 different heading, namely; educational institutions, recreation sites, commercial activities, transportation facilities and the distance from the sea. While the environmental features are examined under the title of visual quality in streets (15 parameters) and in buildings' street facades (5 parameters), the other variables examined are security (4 parameters) and density relations (one parameter). In the scope of this study, there are 43 different variables that are analyzed in 504 streets in Istanbul. The data collected is entered in GIS and statistical analyses have been conducted. Based on the analysis, spatial integration values, the distances from the sea, the distance from the central business district, universities and sanitary facilities as well as the variable of color of building facades are effective factors in determining residential land values. This study is important as it offers a possibility of integrating different approaches including space syntax, which examines factors affecting the residential land values. This study with its original method proposed is expected to contribute the further studies in city planning, urban design and real estate.

1. Introduction

The reaction of the man to the environmental conditions is not only a natural reaction, but also a regulatory action. Cities are also a part of this artificial environment where humans are formed and molded with its own culture. If cities are handles as an artificial environment; it demonstrates that they appear in a way closed to the ideas and ideals of their inhabitants. The physical structure of modern towns represents the existence or the absence of social spirit (Hough 1990).

The physical environmental structure of a city is formed by natural and structured elements. Natural environment elements are composed of elements like the city's sea, river, topographic structure, vegetation, air pollution and temperature. Nevertheless, built environment includes all the elements of the houses, working buildings, recreational areas and the technical infrastructure connects all these different functions to each other.

Housing lands are the most extensive and bulky elements of the built environment. Service areas in residential areas and networks which link them to each other play a key role in the formation of the built environment and give a city a basic identity.

In a city, in order to balance the housing market, it is necessary to find an equal environmental and social structure among localities. Furthermore, the difference in income level is not only reflected in the present housing conditions, but it is also effective on the housing demand. Therefore the general features of houses and the changing socio-economic structure define largely the selection of a location. (Dökmeci et al, 1994). Beyond this fact, decrepit houses cause migration from one locality to another. The inner-city activities and the duration of these activities in a specific location may decline the attraction of some localities whilst it increases the attraction of some other localities. This situation causes a change in the city's spatial structure and this change guides to development plans of a city. In order to make more efficient development plans and to use the land more effectively with real estate investments, the production process of land and space must be well-considered.

An important matter about the housing lands, considered as both a living area and an investment tool, it is not only evaluated by the structural characteristics of the property but also it is evaluated physically and physiologically by the other urban and spatial particularities surrounded to the land. It is very important to the production of healthy environments which provides all kind of needs of the human community socially, psychologically and physiologically. The rise of life standards in the world has increased the individual's expectations for an outdoor of high-quality. Jacobs and Appleyard (1987) bring out the environmental concepts of viability, identity and control, access, authenticity, public life, urban self reliance and environment for all. Carmona and others (2003) define the concepts of permeability, variety, clarity and flexibility whereas Bentley (1990) define the qualities of permeability, variety, clarity, visual conformity and customization.

The outdoor quality can be defined with the capacity level to meet human requirements objectively and subjectively (Özsoy et al, 1995).

The value of a land is not only depended to the physical characteristics of a building but also it is depended to the built environment surrounds to that building.

In many studies, carried out on this subject, several variables are produced such as the inner specificity of the housing, the unit of neighborliness the housing is included in, the distance of the housing land to the important centers and service areas in the city, the local characteristic of the neighbourhood unit, the architectural and aesthetical structures and even the scenery factors, etc. (Muth, 1969; Richardson et al, 1974; Goodman, 1979; Li and Brown 1980; Arimah, 1992; Daniere, 1994; Moorhouse and Smith, 1994; Smith and Huang, 1995; Asabere, 1996, Egdemir, 2001, Özus et al, 2007).

2. Background

Istanbul is the pioneer city of Turkey at all meanings and it is the only city stands on the conjunction of two different continents in the world. It is maybe the most attractive city for people to settle in throughout the history. The settlement areas were grown on four centres during the 7th century. Those settlements are listed as Byzantium(Sarayburnu) and Sykae(Galata) at the Europeand side of the city and Khalkedon(Kadikoy) and Chrispolis(Uskudar) at the Asian side of the city(Kubat et al 2007).

Istanbul is subjected to a fast migration flow from the different cities of Turkey since 1950s. It is also the most industrialized city of the country. The population of Istanbul has increased very much during migration period and population increase has caused significant spatial change on the city's landscape. The new migrated people are settled to the suburbs of the city and new centres have shifted to the past historical centres to new centres. The quality of life has also decreased in the city because of the uncontrolled and unplanned house production, illegal housing land occupations and lack of infrastructure. Namely, Istanbul has sprawled rapidly and has transformed to a dispersed agglomeration. Today, the city could not reply the infrastructural requirements such as bridges, roads, etc. which the rapid population increases had enforced it. The development plans and the modern planning laws have increased the differences in different localities and the quality of life at different locations. These facts cause marked differences in residential and land prices between the localities (Dökmeci et al., 1994).

3. Method

In the study, the land values of the residential areas were only evaluated for their urban and spatial effects. In this scope, an original model was designed to measure the urban and area effects (Figure 1).

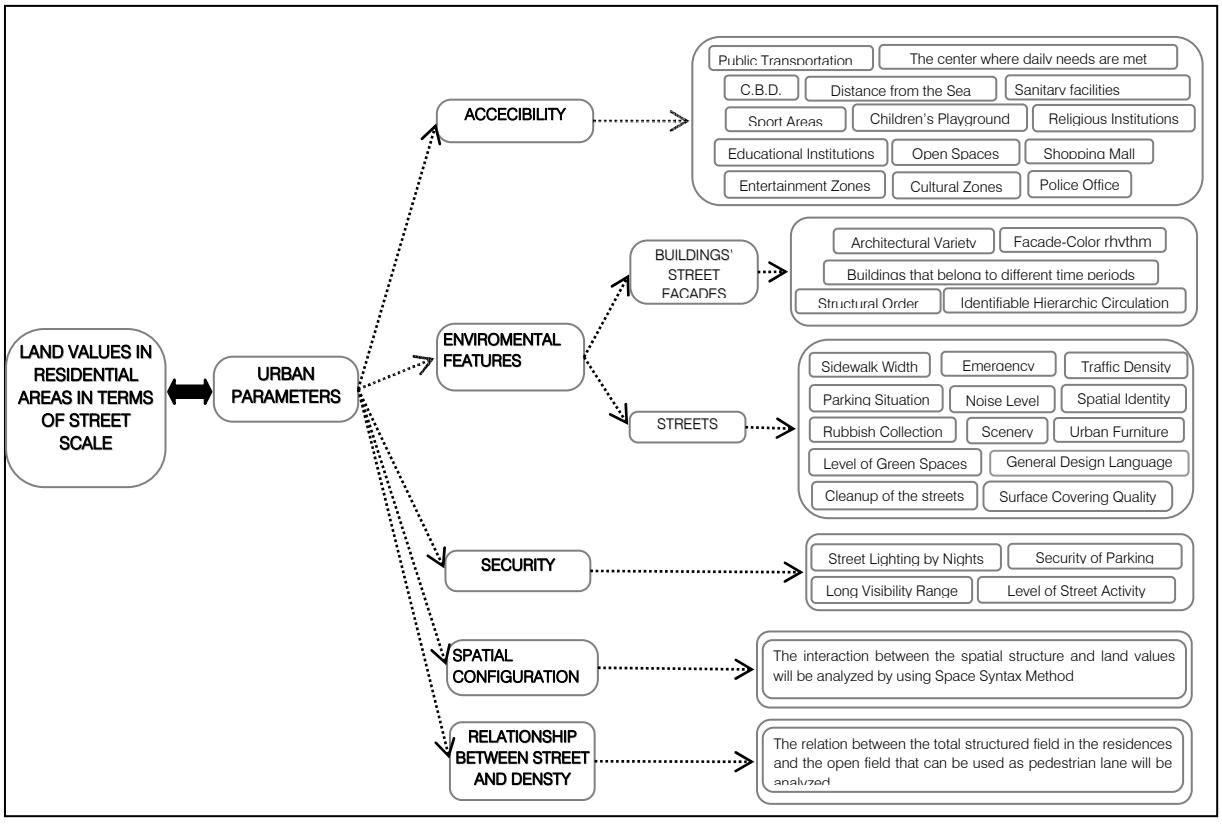

Figure 1
Model designed between land values and urban parameters

In this context, 13 neighborhoods of Istanbul were selected from various districts with random sampling method. Nine of these neighborhoods are from the European side and the other of 4 neighborhoods is from Anatolia side of the city. Three main criterions were used in the selection of the neighborhoods.

- These neighborhoods include mostly residential areas.
- The types of the houses are similar to each other in terms of form, height and density.
- The housing land values are different despite the house types are similar.

The streets were chosen as the research scale for measuring the spatial effects of the change process of land values in residential areas. In the study, the axis maps were shaped and every street was represented by an axis in the maps. In the proposed model, the data was gathered with various methods to be able to make an evaluation of the specific urban parameters(accessibility, visual and environmental quality, security, street/density relationships and space syntax) on a common ground(street level). Then, all the data gained from the proposed model by using GIS were typed to the entire axis one by one. 504 streets were examined at 13 districts for the study.

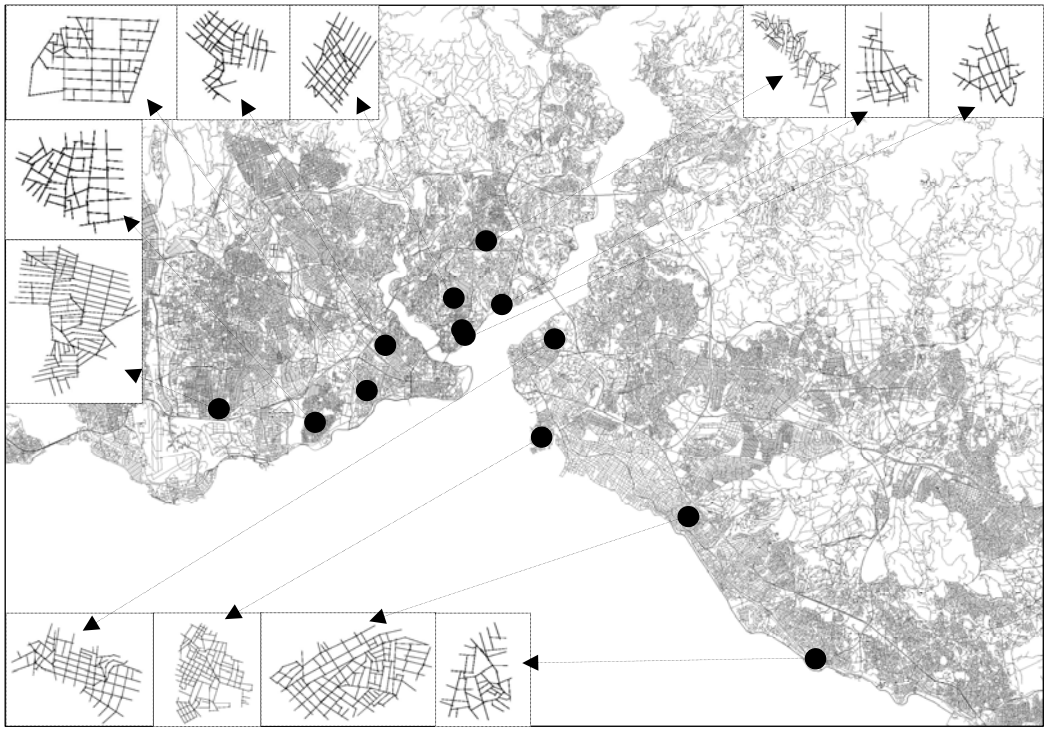

Figure 2
Positions and axis maps of selected neighborhood of Istanbul

4. Data Collection

4.1 Land values

The data which includes the land values of Istanbul at street level and which had generated by the Revenue Administration of Turkey was used in this model.

4.2 Accessibility

In this study, the accessibility parameter is defined as the distance between every single street and the public service units stand at the nearest location of the streets. The public service units are characterized as primary schools, high schools, universities, cultural zones, health services, commercial centres(CBDs, shopping centres, retails), entertainment areas, recreational areas(greenfields, sport area, children's playground), police stations, place of worship and seaside.

4.3 Visual and environmental quality factors

In the scope of the literature research, the scale criteria, which the visual and environmental quality factors have been taken into consideration in the design process, was reduced from settlement to street and buildings' street facades and places of every street and they were graded from 1 to 5. Furthermore, the average data was used for every scale criteria which has produced according to the judgments of three urban design professionals. The professionals were graded to the buildings' street facades according to the urban design parameters listed below: architectural and historical value, the construction material, the specific beauty and variety in the building's façade, the visual effect of the building to its environment, the harmony between clustered buildings in terms of height and size, the functional and physical relations between the buildings, the type and color of the covering material of the buildings, etc.

A similar method was used at the grading process of the street values. Three urban design professionals have given grades to the streets from 1 to 5 to specify the value of the street. The parameters listed below were used for grading process by the professionals: the size of the streets which let to service vehicles easy access to the street, the covering material of the street floor, the traffic density of the motor vehicles and pedestrians on the streets, the existence of car parking lots, the position and usage of trees on the streets, the position of the litter bins on the streets and their clearance service frequency in a week, the frequency of the use of urban furniture, the strength of the noise in the street, the landscape, good sitting and sight points on the streets, the existence of the tags on the streets, the well-camouflage of the infrastructural elements such as cables or utility pole, the presence of a general design language in the street, etc.

4.4 Security

Under this title, four criterias were used to identify the security level of the streets. These are parking security, street lightening at night, street activity level and visibility range for pedesterians on the street.

4.5 Street / density relationship

An index, named as 'livable area index', was used to identify the relationship between streets and its density. This index gives a correlation between the total area of built environmet and the total area of open spaces in a street zone. The open space concept was defined in a more detailed way in this study as well. Open space concept was divided into three parts as pedestrian's areas, parking areas and recreational areas. (Bölen, et al, 2005).

4.6 Space syntax

Space syntax has emerged with the concern of defining the indefinable within analysis model. Design may be produce with the mixture of causality and intuition. Space syntax analysis model aims to make more logical and definable the indefinable intuition. With this model, Architectural design is integrated to the full extent to intuition instead of being only an art bases on logic. It suggests a model based on indefinable structures technique, .Space syntax analysis model, integration correlation in the urban space, the properties of space formation (Hillier, 1996). Formation not only defines the simple relations in urban space, but also complex relations between each part of urban space together.

The method exposes the city's integral structure not according to the volumes but by examining the open area of urban life within these volumes. It is intent to explain the correlation between spaces by developing "axis maps", made up of the smallest number and the longest axis, and array maps in the whole city (Hillier, 1996).

In this context, space syntax method was included to the model after a two stages application. In the first application, the integration values at neighborhood level were transformed to the integration values at street level by using space syntax method. In the second application, the axis maps were formed for each streets of the selected 13 neighborhoods separately. At the end, by using the obtained data, the integration values were calculated for each neighborhood by using space syntax method.

5. Evaluation and Conclusion

In the proposed model, the data which was generated for the parameters of accessibility, Visual and environmental quality, security, Street/density relationship and space syntax were compared with the land values. The relationship between the parameters and the land values were examined as well. The land values were chosen as dependant variable and specific urban parameters mentioned above were chosen as independent variable in the model. In this context, these variables were used for the regression analysis to understand exactly what were the most effective parameters on land values.

First of all, the accessibility concept was studied in the 13 selected neighborhoods. The accessibility distances of the residents, which are living in the selected streets, to the specific equipping were measured as air-distance. In the scope of these measurements, the land values on the streets and relational results were analyzed (Table 1). The analyses show that the most relevant parameters were the distance from the sea and the distance from the city center. The next relevant parameters were the distance values from the sport areas, entertainment zones and cultural zones. It is also confirmed that the least relevant parameter was the distance from the retail centers where daily needs are met.

Accessibility Variables	**Correlation**
Distance from the Sea	0.387
Distance from C.B.D.	0.364
Distance from Sport Activity Areas	0.339
Distance from Entertainment Zones	0.293
Distance from the Police Office	0.249
Distance from Cultural Zones	0.284
Distance from Sanitary Facilities	0.277
Distance from High Schools	0.248
Distance from Universities	0.211
Distance from Open Zones	0.195
Distance from Shopping Malls	0.172
Distance from Children's Playing Fields	0.108
Distance from the Public Transportation	0.103
Distance from Primary Schools	0.095
Distance from Religious Institutions	0.081
Distance from Center of Daily Needs	0.016

Table 1

Correlation between accessibility parameters and land values

The visual and environmental quality is examined by using the space quality parameter. The space quality was determined and valued for every street separately according to factors listed below: historical value, identical and symbolic value, construction value, architectural originality and style value, the harmonical and relational value between buildings and visual value of buildings' facades. According to the test results, it was revealed that the harmony between building facades and colors were the most effective factor on land values. Besides, it was revealed that the historical and the architectural factors were also effective positively on the land values following the harmony factor. Interestingly, ANOVA test has shown that the construction type and building structure were the less effective factor on land values.

With regard to spatial elements in the streets, it was seen that the covering material of the buildings was played a key role to increase the land values which were graded with highest points by the professionals as well. Similarly, the green areas, graded with high points by professionals, have a significant positive impact on land values. Although the visibility range and the existence of tags in the streets were graded with high points by the professionals, the test has shown that these factors have a little positive impact on land values.

With regard to security matters, the test has revealed that the busiest streets have got the highest land values. So, the street activity was played an important role on land values in the test. Again, good sitting and sight points, graded with high points by professionals, have got a reasonable effect on land values. However, the sufficiency of night lightening and obstacles in the streets were not effective on land values according to ANOVA test.

In term of street density, no significant correlation was found between land values of the studied neighborhoods and density at these streets.

In the evaluation of Space syntax, it was asked the correlation between integration values, represented in integration maps prepared for Istanbul streets in the limits of neighborhoods selected for this study, and land values of the streets (Figure 3). In this inquiry, a small correlation rate of 0.15 was found between land values of each 504 streets and their integration values.

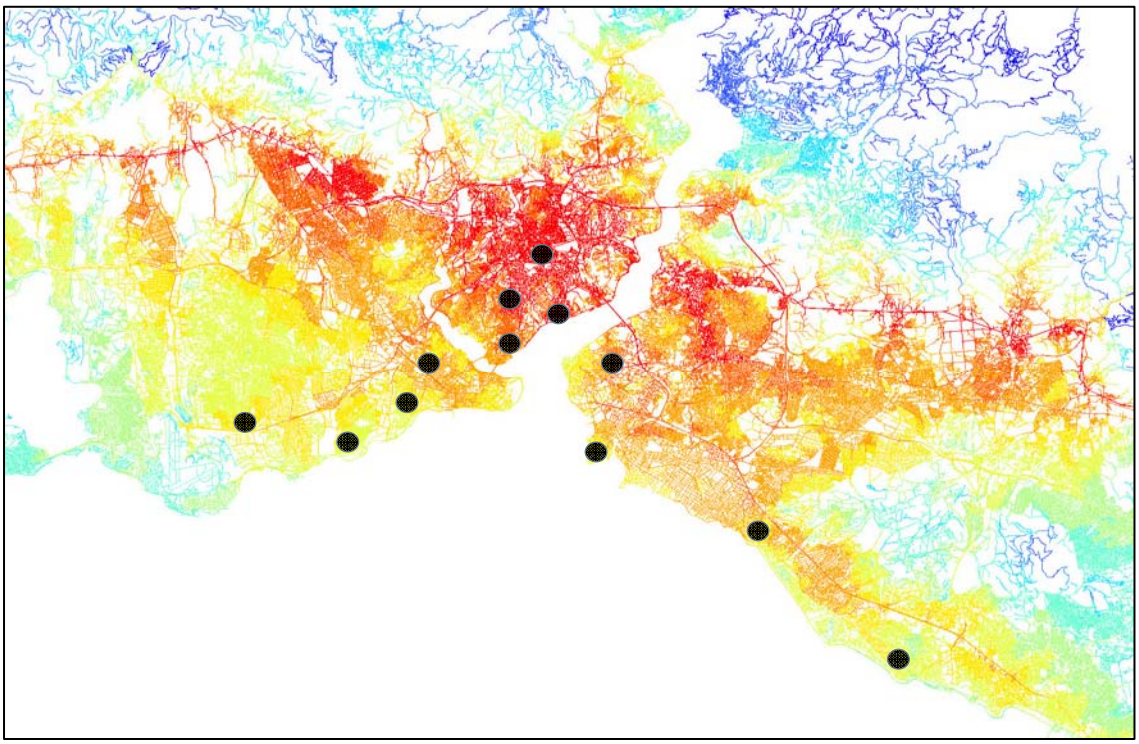

Figure 3
Positions of neighborhoods in the Istanbul integration map (Kubat et al., 2007)

The correlation between the integration values and land values was studied with respect to the spatial configuration of selected neighborhoods with their own limits (Figure 4). When we look to the correlation between all the results obtained from the 13 neighborhoods and land values, a high correlation of 0.40 was found. The Space syntax method was represented an important improvement in terms of obtaining a more significant result by studying the correlation between the economical structure and the spatial configuration instead of using the urban design, the pedestrian mobility and morphology themes.

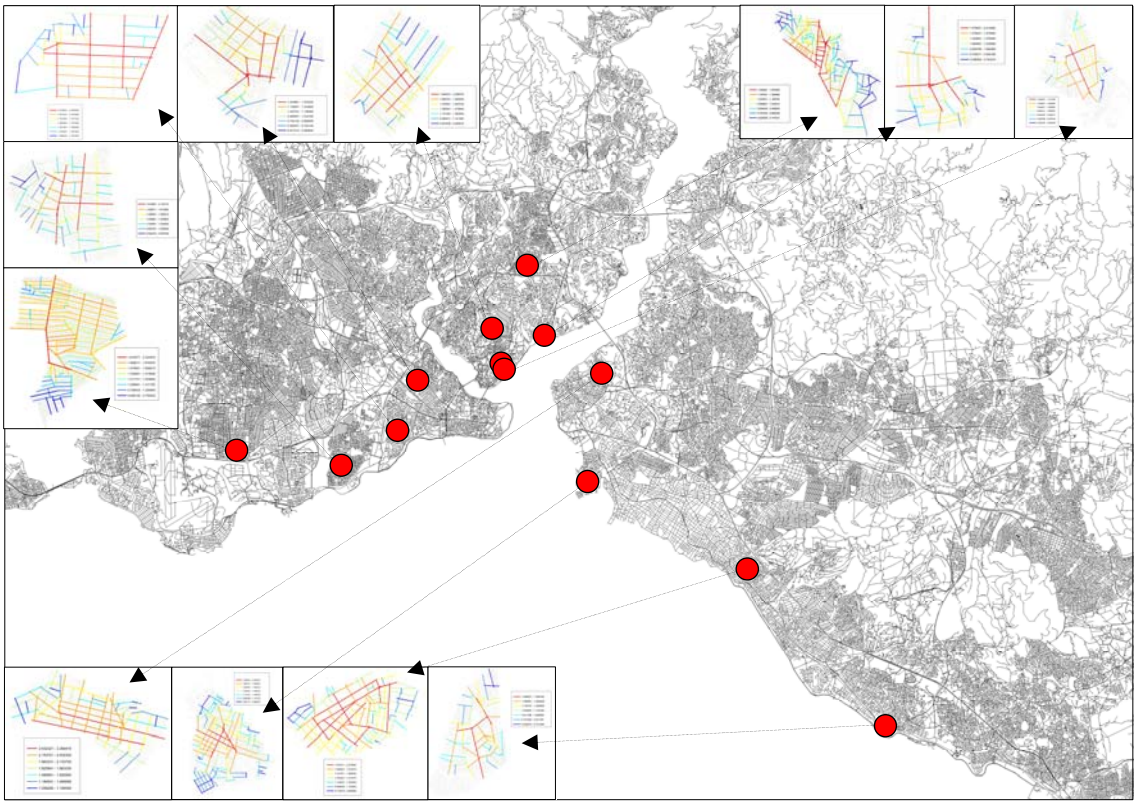

Figure 4
Local syntactic maps of the selected neighborhoods

Regression analysis :
A regression analysis was made by using all the data gathered from the case areas and they were evaluated in the scope of the designed method. In the regression analysis, land values were used as dependent variables and all the data, gathered for the city, was used as independent variables. In the regression analysis, the parameters which define the land values in residential areas were mentioned step by step (Table 2).

Model	R	R^2	Adjusted R^2
Integration	.401	.161	.159
Distance from C.B.D.	.535	.286	.284
Distance from the sea	.632	.399	.396
Distance from the University	.708	.501	.497
Distance from the sanitary facilities	.765	.586	.581
Facade of the buildings on streets in harmony with surroundings	.788	.622	.617

Table 2
The results of regression analysis

According to the results of regression analysis, the integration values, obtained by using space syntax method, were the first parameter used in the model for understanding the changes of land values but it was seen that integration value (selected neighborhoods) is not enough stand alone on explaining the changes of land values in residential areas. So secondly, the distance to CBDs value was entered to the model. Istanbul was a multi centered city that's why CBDs are used here plural. The results were significant because the land values were changed clearly according to the distance from CBDs. Thirdly and fourthly, the next parameters which are the distance of the street

from the sea and the distance of the streets from to the university campuses were entered to the model. And then, the other parameters which are distance of streets from the health services and facade of the buildings on streets in harmony with surroundings were entered to the model respectively. And finally, the regression analysis was applied to all these six parameters at the same time. As a result, R2 was observed as 61,7.

Today more than one digital explanatory measurement tools are considered throughout the world. Different techniques and outcomes are displayed with these models lead the researches to open for improvement (Topçu, 2008)

Findings of this research could be helpful for the real estate sector actors in decision making processes. Investors, home owners, brokers, valuators could use this model to evaluate the current situation and helping to define house prices. On the wide perspective local governments decisions on different scales could have wider effect.

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