THE IMPACTS OF PRESTIGE PROJECTS ON THE SKYLINE OF ISTANBUL

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Abstract
The concept of prestige projects for cities is related to governments’ politics and visions. Under the effects of globalization, central and local authorities have constructed competitive cities. But these cities also have important historical qualities hence these processes have to be made by a holistic planning vision and conservation strategy. For instance, if a city waterfront skyline has a strong image; new constructions should be designed in harmony with the local topography and urban pattern. This paper is based on mathematical and computer based approaches for evaluating aesthetic qualities of city skylines. Therefore a case study on high rise buildings in the main prestige CBD of Istanbul is done. GIS models of Maslak-Zincirlikuyu axis is made and its past, present and future skylines are extracted by database querying and visual analysis. The skylines derived are finally measured by entropy analyses based on formal aesthetic characteristics.

Keywords: GIS models; urban skylines; aesthetic quality; entropy; prestige projects.

INTRODUCTION
City skylines are admitted as rates for visual identity. They reflect cities' spatial transformation especially in terms of three dimensional features. “Especially in last decades, high speed and continuous flow in global extent, has altered the program of urban development and architectural output. With the integration of political, economical and cultural information network, present environment and cities can be defined by a chaotic and multi-layered structure” (Görgülü and Koca, 2009). Thus this process has complicated the preservation of historical features of city skylines.

In such competitive circumstances for gaining a world city vision, local governments today handle cities with prestige projects. Along with this approach, prestige projects have also become initiator factors for spatial transformation of Istanbul. "When urban transformation is implied in Istanbul, prestige projects that will constitute the sterile spaces of ‘global city vision’ come in mind” (Kahraman, 2006). However, interests shown by local governors in prestige projects have triggered high-rise building and dense urbanization in Istanbul since 1980’s. Most of them have been built in a disorganized and unplanned manner, interfering with the most significant visual identity of Istanbul, Bosporus skyline. Therefore, the aim of this paper is to review the skyline transformation process by mathematical models and discuss the impacts of prestige projects on Istanbul’s waterfront skyline.

THE CONCEPT OF PRESTIGE PROJECTS IN ISTANBUL
Prestige projects mean high quality investments for the images of cities. These projects are constructed by new technologies. These high rise and high tech building groups usually show the economic power of the country together with political authority. Therefore, central and local authorities always have a desire to reconstruct world cities like Istanbul.
“The commodification of space has led to a close relationship between space production and the cyclical nature of the markets, resulting in cycles of urban development” (Madanipour, 1996). The urban transformation process in Istanbul is related to construction of prestige projects. “Istanbul is shaped by new and converter global city image and prestige projects” (Kahraman, 2006). In terms of these kinds of transformations Istanbul have some similarities to London. “In response to the global restructuring of industry in 1970s and 1980s, elected governments of economically depressed cities have increasingly adopted growth-orientated local economic development policies. A key component of pro-growth local economic development strategies, adopted by UK city governments and central government agencies has been investment in, and promotion of, high-profile prestige property developments and civic booster activities” (Loftman and Nevin, 1996). In terms of these kinds of transformations, Istanbul has some similarities to other globalizing world cities like London.

APPROACHES OF ISTANBUL MUNICIPALITIES FOR PRESTIGE PROJECTS

Municipalities are decision-making units for planning urban districts and areas. Therefore, they are main actors in the development process of the city or district. However, planning process in municipalities is also related to political expectations. In planning process, urban planners have different roles and tasks. This is both a technical, political and social process. “Places are formed through the development of buildings and other structures. Since buildings involve highly complex and valuable arrangements of materials, services and spaces, it is not surprising that their form is heavily influenced by relationships of ownership and control as well as political processes and cultural practices” (Roberts and Lloyd-Jones 2001). “Governments, both central and local, should take on a more central role in cities to lead development initiatives and ensure that basic needs are met” (Mutizwa-Mangiza 2009). On the other hand, local governments are highly focused on big investment projects such as “prestige projects” for their political publicity rather than finding suitable conditions for low and middle income classes. For Istanbul, enlivening the vision towards prestige projects can be detected from the chronological timeline of political visions as follows;

“In traditional Turkish architecture, several written and non written rules were existent for regularizing the skyline of the city. For example in the generation of district, mosque was to be visible and ezan was to be audible. And mansion house was to be situated at the corner and other houses were to be built a little behind and lower than the mansion house” (Konuk, 2008). “The historical skyline reflected that Istanbul was the centre of a military based empire and religion played a big role and mosques’ and palaces were its images. Therefore, the skyline of the city reflected the social and economical structure of the city” (Öke, 1991). In preliminary planning projects, there was no demand for restricting building heights. “The planning insights, which were adopted quite late, were perceived as making good advantage of zoning rights. However in Europe, planning meant to use zoning rights while standing back and coordinating publicity first” (Konuk, 2008). “The zoning improvements which have transformed Istanbul city and its skyline within time, in some occasions these transformations ended up with more destructive results than natural disasters” (Çavuşoğlu, 2006). Between major zoning operations can be cited as Prost’s (1936-1937), Menderes’s (1956–1960), and Dalan’s (1984–1989).

With the new millennium, Istanbul has entered a new era where global impacts in architecture are accepted without any consideration for the existing urban pattern. After 2000, prestige projects triggered by the concept of urban transformation have transformed the city’s form and skyline significantly. Today besides the desire for development, there is also a political force for the city to be destructed and rebuilt almost completely due to the probable forthcoming earthquake. Hence a strategy is essential for preserving the city’s unique values.

After 1980’s, speculative estate markets appeared in cities, which participated in the dynamics of global economic system. In this period, capital being invested in the commercial estate market generated new building types such as business and shopping centers, plazas and luxury hotels. In top level global cities such as London and New York, besides the national real estate market even an international estate market has initiated. After 1980’s, similar tendencies
were seen in Istanbul where capital began to reproduce itself via investments on business and shopping centers etc.

In 1980’s, developments in Istanbul were mainly private sector based shopping centers and office buildings besides the few, which were government and metropol driven. The major actors of these projects were the owners of big capital and multi-national companies acting in different sectors of economy. “Similar to other financial centers and world cities, a highly speculative estate market has become a major component of Istanbul” (Özdemir, 2000). “Land as a buyable and sellable asset, has become the most precious speculation object which determined the city’s spatial span” (Keyder, 2009).

After 2003, urban land profit raised and along with national and international capital local and central authorities grew interests in those profits. Continuously huge urban and redevelopment projects came in order and foreign architects and planners developed projects for Istanbul. “Development slowed down a bit but still continued with new aspects of indigence” (Çavuşoğlu, 2006). Time would display whether Istanbul Metropolitan Planning Department could succeed in creating policies for determining the future of the city. “Whilst global policies were being practiced within national borders, Istanbul's redevelopment had been handled as a 'grandiose project' and a political tool’ and used as a ‘public relations strategy’ to reach the masses” (Akpınar, 2008).

“When neo-liberal globalism is the criterion, Istanbul has revealed a success graphic. The city, is a business platform for elitists working in multinational companies and is a big store for cosmopolist consumers who wish to carry on a global life style. Recently built high rise office blocks, luxurious gated communities and dozens of shopping centers which offer special shopping experiences are available” (Keyder, 2009). “The new criterion for the transforming city is money” (Tütengil, 2001). After 1980’s, which are called as the breaking point, the multi-dimensional socio-spatial transformations, diversities and inequalities were reflected on the urban context. Land use changed, rant factors emerged, disparity arose in income distribution, delays appeared in service sectors and spatial distribution occurred between social income groups which were the pieces that make up urban dissociation’s image. These overlooked pieces were the breakdowns that lead the city to 'profitopolis'. Along with similar views that base the tendency of high-rise building on expediency theories, there are also contrary views which relate global skyline with the dynamics of modernization. The common ground for all the planning practices explained above is the priority of Bosporus skyline preservation.

“Bosphorus was developed in Ottoman era and Bosphorus civilization was formed” (Ağat, 1963). “Bosphorus was edited as a theater stage where the two banks of Istanbul could watch the other. It became a magnificent water boulevard, which was the new space for ceremonies of sultans and festivals” (Artan, 1989). “Bosphorus has carried on its urban image and its identity of ‘magnificent Water Boulevard’ during the few decades after The Republic of Turkey was proclaimed. But 1950’s has witnessed the beginning of an urban development process which destroyed this cultural landscape” (Yenen et al., 1993). The dynamics created by economic development strategies in the beginning of 1950’s have started the mass immigration from rural to urban area and triggered a rapid urbanization in Turkey. During this period, land and building rates increased rapidly and nearly all public crowds started out racing for a share from the speculative urban land market. “Bosphorus, as a special place has got its share from speculative building explosion. Specifically the economic strategies of 1980’s and afterwards together with public interventions in accordance with these ideologies played a central role rising the speculative tendencies in Bosphorus” (Enlil et.al, 2001).

AESTHETIC QUALITIES OF CITY SKYLINES
An urban skyline represents a memorable reference value of the city by reflecting its specific identity, general characteristics and aesthetic qualities. “Aesthetic appreciation of urban environment is primarily visual and kinesthetic” (Carmona et al., 2003). Thus in studies of urban design and aesthetics, aesthetic evaluation is handled either objectively or subjectively. Using
objective methods in the fields of architecture and planning for aesthetic evaluation is a quite new concept. Among various objective methodologies, the use of mathematical and computer based methods have an outstanding importance (Bostancı and Ocakçı, 2009). In the aesthetic evaluation of the city these mathematical methods involve approaches which are related with the formation of urban form in different scales. During the last four decades in studies of design and aesthetics, objective methods have gained increasing importance since they are able to present much more precise and innovative approaches in the evaluation of characteristics of cities.

**Different Characteristics of Istanbul Skyline**

Istanbul is a complex city with intersections of multi-cultures, diversities, monumental structures, green landscapes and waterfront relations. It has a unique panorama owing to its location on both Asian and European continents. Due to its waterfront relations, historical background and aesthetic dimensions, the skylines of Istanbul has remarkable urban patterns. These various characteristics of skylines can be observed from different locations of the city and some of these skyline types can be seen in Figure 1 and 2.

![Figure 1: The Main Symbolic Historical Skyline of Istanbul (The Historical Peninsula)](source)

![Figure 2: The Global City Skyline with High Rise Buildings (Beşiktaş-Maslak)](source)

**METHODOLOGY**

In this paper, two distinct mathematical methods; GIS and entropy are coordinated to validate the measurability of skyline and its temporal transformation. Initially, a GIS model is composed to visualize the skyline transformation of Istanbul from 1980’s to present and near future. Temporal skylines are extracted from the model by GIS analyses. These linear skyline representations are then coded manually according to several formal aesthetic qualities: contour, mass, vertical,
horizontal and hierarchy values. The entropy values of these five distinct aesthetic criteria are finally compared to discuss the effects of high rise prestige projects on skyline.

Adapting entropy method to GIS in Aesthetic Evaluation of City Skylines
While urban environment is being formed in the duality of randomness and design, aesthetic qualities of the spatial form are composed. Nasar defined that, there are two types of variables in urban design: formal and symbolic (Nasar, 1994). “According to this approach, the concepts that compose the aesthetic qualities of cities can be separated into two groups as being formal and symbolic. While defining the formal aesthetic qualities of cities, evaluations on the concepts of diversity, harmony and clarity can be made. On the other hand, the concepts of meaning and function, spatial experience and belonging, which is closely related with urban life, are prominent among symbolic aesthetic qualities” (Bostancı and Ocakçı, 2009; Bostancı, 2008).

Cities are complex structures and so are their skylines. Skylines embody all the formal and symbolic codes of the cities which are integral to their aesthetic evaluation. In a city skyline formal and symbolic codes are concealed in building layers and topography. From the definitions and relations between city skylines and aesthetics Table 1 can be formed as below.

Layers comprising the formal characteristics of skyline, which are building and topography, are modeled mathematically via GIS. Skylines belonging to different periods are visualized by GIS analysis. The linear outputs of skyline analyses are then interpreted using entropy method, which is based on the formal aesthetic qualities of skylines. Hence, a new methodology for the objective evaluation of the skyline transformation is introduced. Despite the fact that skylines are mostly recalled by people according to their symbolic aesthetic qualities, these subjective judgments have been accepted from entropy calculations at this stage. In future research, they may also be included through statistical results of surveys on the attractiveness, satisfaction and preference levels etc. of skylines. So that entropy methodology restricted with the formal characteristics of skylines here may also be affirmed their symbolic aesthetic qualities in future.

GIS Methodology for Skyline Analysis
Designers use several mapping techniques to understand and represent the relations between city levels. Visualizing and querying information in relation with space reveals invisible interrelations within the built environment. Geographic Information Systems (GIS) mainly used by geographers, own a similar rationale of mapping. GIS software’s enable the following:

• view spatial data,
• create layered maps,
• perform basic spatial analysis,
• manipulate shapefiles and geodatabases,
• edit and analyze 2D and 3D data,
• share spatial information.

Thus, in time GIS software have become important mapping tools for architects and urban designers. Besides hosting 3D city simulations, some geodesic virtual globes like ArcGlobe (www.esri.com) also have advanced 3D analysis tools. In the paper ‘skyline tool’ is used to automatically derive the skyline of chosen building(s) from selected viewpoint(s) over the topography. The extracted lines are then assessed via entropy method.

**Entropy Methodology for Skyline Analysis**

Urban skyline composes a visual frame that can be coded with entropy approach. In order to carry out measurements in this frame, generally skyline photographs and schemas derived from photographs or 3D models (as in the paper) are used (Bostancı, 2008) The visual codes in images are obtained and their entropy values are calculated.

In the application of entropy to aesthetic evaluation in urban design, entropy is used as an aesthetic evaluation methodology and a measurement unit for urban skylines. Therefore, entropy is used for finding aesthetic value of urban skylines. The concept of aesthetic information measurement, which is based on the combinational properties of elements in a given environmental universe, is used. The idea here is to measure the amount of information relative to the probability distribution of elements – types which have appeared on a given universe, such as the elevation of a building. This is done by measuring the amount of information conveyed in a facade scanning process on the basis of transitional probability distribution (Bostancı, 2008; Bostancı and Ocakçı, 2011). In the measurements among several formal aesthetic evaluation criteria; contour effect, mass effect, horizontal effect, vertical effect and hierarchy can be analyzed. Evaluation tables in respect with the visual coding quantities are prepared and the operation shown at equation below is applied.

\[
H = - \sum_{i=1}^{n} p_i \log_2 \left( p_i + \varepsilon \right)
\]

In equation, while \( n \) represents the number of cases, \( \varepsilon \) value is a very small value preventing the logarithmic expression to approach infinity. In the context of the formula, the use of logarithm and probability based quantitative approach is seen. The \( H \) in the equation is the entropy value and has a quantitative expression on “bit” basis. \( p_i \) is the quantity of the probable cases and in this research the probable cases are the visual code quantities of the formal aesthetic evaluation criteria.

**CASE STUDY: MASLAK-ZÎNCÎRLÎKUYU AXE AS A SYMBOLIC SKYLINE OF GLOBAL ISTANBUL**

After 1980’s under the effects of globalization Büyükdere Avenue: Zincirlikuyu-Maslak axis which has rapidly become a Central Business District (CBD) in Istanbul (Figure 3). In this paper temporal transformations due to high rise office blocks and shopping centers in this CBD, which is known as Levent district, are analyzed over past, current and future skylines (Girginkaya, 2011; Güney et al, 2012).
Analyzing Maslak-Zincirlikuyu Skyline with GIS Model

The skyline development in Istanbul is represented below by three dimensional modeling and visualization functions of ArcGIS Desktop 10 (Figure 4 and 5). In Figure 5, the skylines are created geometrically with the advanced visual analysis tools of ArcGIS 3D Analyst extension. In this skyline analysis, formal characteristics such as smoothness, which gives the number of times a skyline is broken, affects view quality of the cityscape.

Skyline analysis carries important potentials in terms of evaluation of urban aesthetics. By visualizing and testing proposed urban design guidelines over the cityscape, their impacts can be examined. Threats to the city’s historical skyline, such as visual dominancy of high-rises can be obstructed. Also landmarks symbolizing the modern side of the city, such as the two Bosporus Bridges or 256 meter high Sapphire Building can be displayed more effectively. Even the visual impact of future projects such as, the third bridge can be considered.

Figure 4: Transformation of Büyükdere Avenue Skyline: View From Gayrettepe to Levent (a) Skyline in 1999, (b) Skyline in 2008, (c) Skyline in Near Future (Source: Authors).
In Figure 5, the dimension of temporality has been incorporated into the 3D geo-visualization of skylines. The orange line displays the current skyline, the grey line illustrates the former skyline and the red line indicates the evolving skyline of CBD in Istanbul viewed from a selected viewpoint. The geometrical lines obtained by this skyline analysis include the metrics of spatiotemporal changes.

**Analyzing Maslak-Levent Skyline with Entropy Method**

Entropy method makes it possible to measure aesthetic qualities of urban skylines through a variety of concepts. These concepts are defined as formal aesthetic evaluation criteria. For skyline evaluation, while each criterion represents a probability value according to its appearance frequency, the observation frequency of these criteria composes the entropy value (Bostancı, 2008). Below are Figure 6-7-8 and 9 showing entropy analyses for the evaluation of CBD skyline transformation from 1999 to near future. Schematic skyline of Levent viewed from Sarayburnu is coded according to its formal characteristics and entropy values of five different criteria; contour, mass, verticality, horizontality and hierarchy are measured. The numerical results of entropy analyses are revealed in Table 1-2. The analyses can be varied in future.
Figure 6: Contour Effect in Transforming Skylines of Levent Viewed From Sarayburnu (a) Skyline in 1999, (b) Skyline in 2008, (c) Skyline in Near Future (Source: Authors).

Figure 7: Mass Effect in Transforming Skylines of Levent Viewed From Sarayburnu (a) Skyline in 1999, (b) Skyline in 2008, (c) Skyline in Near Future (Source: Authors).
Figure 8: Vertical Effect in Transforming Skylines of Levent Viewed From Sarayburnu (a) Skyline in 1999, (b) Skyline in 2008, (c) Skyline in Near Future (Source: Authors).

Figure 9: Hierarchy in Transforming Skylines of Levent Viewed From Sarayburnu (a) Skyline in 1999, (b) Skyline in 2008, (c) Skyline in Near Future (Source: Authors).
Table 2. Typical Aesthetic Analysis by Entropy Method, (On Levent Skyline Viewed from Sarayburnu in 1999) (Source: Authors).

<table>
<thead>
<tr>
<th>Entropy Criteria</th>
<th>Visual Codes</th>
<th>Entropy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contour Effect</td>
<td>55</td>
<td>0.437612574</td>
</tr>
<tr>
<td>Mass Effect</td>
<td>14</td>
<td>0.414014238</td>
</tr>
<tr>
<td>Vertical Effect</td>
<td>9</td>
<td>0.326683525</td>
</tr>
<tr>
<td>Horizontal Effect</td>
<td>5</td>
<td>0.228562944</td>
</tr>
<tr>
<td>Hierarchy</td>
<td>8</td>
<td>0.306942999</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>91</strong></td>
<td><strong>1.71581628</strong></td>
</tr>
</tbody>
</table>

1.716 bit

Table 3. Change of Aesthetic Values within Years (Source: Authors).

<table>
<thead>
<tr>
<th>Entropy Criteria</th>
<th>1999 Skyline</th>
<th>2008 Skyline</th>
<th>Future Skyline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contour Effect</td>
<td>0.44</td>
<td>0.45</td>
<td>0.47</td>
</tr>
<tr>
<td>Mass Effect</td>
<td>0.41</td>
<td>0.41</td>
<td>0.48</td>
</tr>
<tr>
<td>Vertical Effect</td>
<td>0.33</td>
<td>0.37</td>
<td>0.35</td>
</tr>
<tr>
<td>Horizontal Effect</td>
<td>0.23</td>
<td>0.21</td>
<td>0.15</td>
</tr>
<tr>
<td>Hierarchy</td>
<td>0.31</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>1.72</strong></td>
<td><strong>1.74</strong></td>
<td><strong>1.75</strong></td>
</tr>
</tbody>
</table>

Table 2, shows the entropy values obtained by visual coding, done manually, over a typical skyline. Table 3, gives entropy value distributions for formal aesthetic criteria of each skyline belonging to 1999, 2008 and near future respectively.

In Table 3, the most dominant characteristic appears to be the contour and mass effects while hierarchy effect decreases in such a low extent. Since the total sum of entropy value is consistent, horizontal and vertical effects decrease despite the increase in the number of buildings within time. Spatial perception of a person varies due to several contrast effects; such as horizontal-vertical, space-mass, foreground and background etc. While these contrast effects are eligible enough, space becomes identifiable and memorable. Although the aim of planning approaches is to keep visual impacts in the city, constant high rise building have ended up in complex contours and heavy masses which have blurred vertical and horizontal effects together with mass hierarchy. This reveals that the attitude of continual rising in cities will lead to visual chaotic skylines.
In order to make further interpretations, the number of skylines whose entropy values are measured and the number of formal aesthetic values used in entropy measurements here should be varied. Also, different urban scenarios such as those having similar characteristics and those having totally distinct characteristics should be modeled and analyzed by GIS in order to find optimum entropy value ranges for the aesthetic evaluation of skyline transformations. To conclude, the paper has been limited with a single case yet, since the objective has been to achieve a methodology for the objective aesthetic assessment of skyline transformation.

CONCLUSION

Urban design has a wide range of research content interrelated with various disciplines. Within this content, especially when the formal characteristics of the urban environment are examined, computer and mathematic based models contribute to the discipline as innovative approaches. From the case study, it can be understood that GIS is a useful tool for understanding the topological relations for urban skylines. Aesthetic evaluation of the skylines can be advanced by implementing different methods to GIS such as the information theory based entropy method explained above.

The studies about urban entropy have so far indicated that those urban skylines and their aesthetic values, which are measurable and comparable via entropy method, shall also contribute on the detection of visual problems appearing in urban environment. Among the important inputs of these researches are the implementation of the measurability of aesthetics in a certain rate and the determination of quantitative aesthetic values concerning urban form. Furthermore, interpretations on the aesthetic qualities of skylines can be made with the entropy value ranges found for urban skylines. With this method, the aesthetic qualities of urban skylines are made comparable. Therefore, the entropy method has been put forward as an applicable innovational approach in the matter of aesthetic evaluation in urban design” (Bostancı and Ocakçı, 2011).

In the paper, together with GIS entropy method has been put forward as an innovative approach in the matter of aesthetic evaluation in urban design. The methodology is original in coordination of two different mathematical models for aesthetic assessment of skylines. The approach can be improved for the solution of different urban problems. Several aesthetic assessments can be done on distinct skylines varying due to their viewpoints, details, scales, close and distant views etc. The scale of skylines may vary from close views that exhibit details such as roofs, windows, doors, materials and front projections to street fronts scale, to remote urban skyline scales represent scales where a wider panorama of the city is visible. Over the general fabric of the region, specific areas can be approached in a variety of scales and their close affiliations can be examined in details.

The numerical outputs of the entropy method may be used as inputs for designing more aesthetic skylines. Due to globalizing trends all over the world, the symbolic skylines of cities are threatened by high rise buildings which are mostly welcomed with no questioning over the local pattern, such as in Istanbul. In the need of more systematic design and planning tools for preserving historical skylines and developing global world cities, skylines and their formal and symbolic aesthetic values can be used as criteria for detecting urban transformation.

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