THE EVALUATION OF HIGH-RISE BUILDINGS IN ISTANBUL

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Abstract — *This paper aims to propose a model to be implemented in the analysis of the qualitative and the quantitative aspects of high-rise buildings and the evaluation of existing high-rise buildings to define objectives and strategies considering the conditions for today and the future. The computer-aided approach adopted in the model is based on the implementation of Microsoft Excel enables flexible, explicit and dynamic flow of the relevant information required for evaluation. The proposed interactive evaluation model comprises two major stages; implementation of an evaluative method for the assessment of the high rise buildings in relation to a preset criteria, implementation of an utility analysis method for the evaluation.*

INTRODUCTION

The aim of the study is to propose a model to be implemented in the analysis of the qualitative and the quantitative aspects of the high-rise buildings and the evaluation of existing high-rise buildings to define objectives and strategies considering the conditions for today and the future. Istanbul has been chosen for the case study for being the most active and most criticized region in Turkey for its high-rise buildings, being the most populated city of the nation primarily due to domestic migration; and possessing a remarkable cultural heritage. (Figure.1)

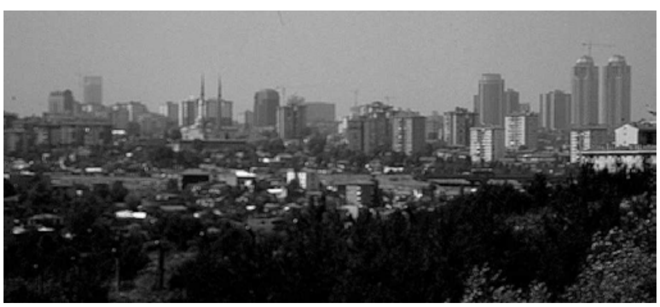

FIGURE. 1

The proposed evaluation model comprises three major stages:

- Implementation of an evaluative method for the assessment of the high rise buildings in relation to a preset criteria,
- Implementation of a utility analysis method using Microsoft Excel for the evaluation of the high rise buildings under consideration and,
- Definition of objectives and strategies considering the conditions for today and the future.

HIGH-RISE BUILDINGS IN ISTANBUL

High-rise building constructions involve many complex problems; requiring high technology use, need of considerable knowledge and experience through serious discussions and decisions at design level. In developing this important and essential building type in Turkey, initial problems faced are how to control such projects according to different side effects and how to identify and evaluate its advantages and disadvantages [3].

Therefore the following specifications are used for the definition of high-rise buildings in various countries (Table I):

TABLE I

Country name	Buildings defined as "high-rise"
Germany	22m.height and over
U.S.A (Massachusetts)	21m.height and over
U.S.A (San Francisco)	23m.height and over
Britain	28m. height and over
Switzerland	25m. height and over
Russia	9 floors and over
Austria	10 floors and over
Poland	12 floors and over
Hungary	11 floors and over
Czechoslovakia	Shows variations according to buildings around the neighborhood
Mexico	30m. height and over
Turkey	10 floors and over

Slender buildings like towers and minarets reaching the skyline have a long history in Turkey, but multi- storey and multi-functional buildings started to be developed as recent as 1950's. Istanbul, which is one of the most important cities

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of the world, with its natural and historical beauties rapidly began to grow in size and population in 1950's due to political and social reasons. The technical and financial deficiencies of local authorities added further problems on the undisciplined growth in industrial, commercial and servicing functions, hence the city's development became extremely unplanned and disorderly. The high prices of land due to heavy demand for construction areas, which has already been developed, caused the horizontal expansion of the city in an uncontrolled and unstoppable way. The constant decrease in land, increases in price, speculative pressures brought about a dense use of land through development of high-rise buildings, which added further functional, environmental and constructional problems on the existing city pattern. Particularly the inefficiency of existing control plans and constant changes made on them necessitated planning and development of high-rise buildings.

FIGURE. 2

After 1985 high-rise buildings became status symbols, which started to mushroom around Taksim - Gümüşsuyu - Maçka, Beşiktaş- Levent - Ayazağa, Mecidiyeköy - Zincirlikuyu, Ataköy-Zeytinburnu regions. (Figure.2)

DESCRIPTION OF THE EVALUATION METHOD

.In order to highlight the qualitative and the quantitative values of high-rise buildings a chosen utility analysis method is implemented. The aim of the proposed utility analysis method of evaluation is to guide the decision making process related with future developments. The program Microsoft Excel is adopted in the method. Using the means of a computer makes it possible to archive data about high-rise buildings properly, to work with tables having compatible format and to achieve results rapidly and correctly. The created evaluation files are flexible, explicit and dynamic [1].

The advantages of the above mentioned evaluation method could be summarized as follows:

- Value criteria for preservation are made explicit.
- By using the weight assignment method during the evaluation process, the relative importance of initial criteria and expert opinions are properly reflected during all stages of implementation.
- Initial decisions can be revised by reconsidering the weight assignments of various factors if and when necessary.
- Results of evaluation, due to its explicit structure, can be easily reviewed and checked by those who are outside the group of the decision-makers at any stage.

The proposed method is arranged so that it can evaluate each high-rise building individually by reflecting its intrinsic value. The method with its aforementioned explicit, flexible and dynamic structure provides a proper basis for the evaluation of the high-rise buildings. The described evaluation method can be summarized in the following stages:

- The development of a system of objectives by the experts, which come under the five headings:

    - Architectural and cultural objectives;
    - Technical objectives;
    - Environmental objectives;
    - Environmental control objectives;
    - Financial objectives.
    -

These objectives, in turn, have their appropriate sub-objectives, which are listed in Table II, III and IV, Column 1.

- A priority assignment method has been used in connection with the first stage of the synthesis. Weights are assigned to the sub-objectives to reflect their relative importance. (Table II, Column 2-4). Here, the experts assign a value on a scale of 0 to 10, for each sub-objective on Table II, Column 2 of the program. Through Microsoft Excel, to accelerate the effect of the most important sub-objective; related weights are reorganized according to the adopted Churchman Ackoff method (Table II, Column 3) [2]. The last step of the weight assessment process, through Microsoft

Excel weights are standardized and real values for evaluation are determined (Table II, Column 4).

TABLE II

PRELIMINARY ANALYSIS

OBJECTIVES	SUB-OBJ. WEIGHT 1. STEP	SUB-OBJ. WEIGHT 2. STEP	SUB-OBJ. WEIGHT 3. STEP	WEIGHT OF EXPERTS 1	2	3	4	5	6	EXPERTS TOTAL WEIGHTS
1. ARCHITECTURAL & ARTISTIC OBJECTIVES										
1.1 ARTISTIC VALUE	7	22	3,67	4,0	0,5	2,5	0,5	0,5	2,0	10
1.2 AESTHETIC VALUE	9	37	6,18	4,0	0,5	2,0	0,5	0,5	2,5	10
1.3 ASSOCIATION WITH IMPORTANT EVENTS	6	16	2,67	4,0	1,5	1,5	0,5	0,5	2,0	10
1.4 WORK OF A WELL KNOWN ARTIST	5	11	1,84	4,0	1,5	1,5	0,5	0,5	2,0	10
1.5 SCARCITY VALUE	7	22	3,67	3,0	3,0	2,0	0,5	0,5	1,0	10
1.6 FAÇADE VALUE	6	16	2,67	4,0	1,0	0,5	0,5	3,0	1,0	10
1.7 SPATIAL ORGANIZATION VALUE	6	16	2,67	4,0	0,5	0,5	0,5	0,5	3,0	9
1.8 HISTORICAL VALUE	5	11	1,84	3,0	2,0	3,0	0,5	0,5	1,0	10
2. TECHNICAL OBJECTIVES										
2.1 TECHNICAL INNOVATION VALUE	5	11	1,84	1,0	3,0	0,5	2,5	2,0	1,0	10
2.2 CONSTRUCTIONAL VALUE	7	22	3,67	3,0	3,0	1,0	1,0	1,0	1,0	10
2.3 EARTHQUAKE RESISTANCE VALUE	9	37	6,18	3,0	4,0	1,0	1,0	0,5	0,5	10
2.4 FIRE CONTROL VALUE	9	37	6,18	0,5	0,5	0,5	4,0	4,0	0,5	10
2.5 LIGHTNING PROTECTION VALUE	6	16	2,67	0,5	0,5	0,5	4,0	4,0	0,5	10
2.6 STRUCTURAL SYSTEM VALUE	9	37	6,18	2,0	4,0	1,0	1,0	1,0	1,0	10
2.7 LEGAL ASPECTS AND REGULATION	9	37	6,18	3,0	3,0	1,5	1,0	1,0	0,5	10
2.8 MECHANICAL TRANSPORTATION VALUE	5	11	1,84	2,0	2,0	0,5	2,0	2,0	1,5	10
2.9 SOIL PROPERTIES VALUE	3	4	0,67	2,0	4,0	1,0	1,0	1,0	1,0	10
2.10 SECURITY VALUE	6	16	2,67	3,0	1,0	1,0	2,0	2,0	1,0	10
2.11 AIR TRANSPORT SECURITY VALUE	10	46	7,68	3,0	3,0	1,0	1,0	1,0	1,0	10
3. ENVIRONMENTAL OBJECTIVES										
3.1 ENVIRONMENTAL LANDMARK VALUE	6	16	2,67	4,0	0,5	4,0	0,5	0,5	0,5	10
3.2 ENVIRONMENTAL SYMBOL VALUE	6	16	2,67	4,0	0,5	4,0	0,5	0,5	0,5	10
3.3 ENVIRONMENTAL GROUP VALUE	4	7	1,17	4,0	0,5	4,0	0,5	0,5	0,5	10
3.4 SKYLINE VALUE	7	22	3,67	4,0	0,5	4,0	0,5	0,5	0,5	10
3.5 DENSITY VALUE	5	11	1,84	4,0	0,5	4,0	0,5	0,5	0,5	10
4. ENVIRONMENTAL CONTROL OBJECTIVES										
4.1 MICROCLIMATE EFFECTS	6	16	2,67	4,0	0,5	3,0	1,0	0,5	1,0	10
4.2 SOLAR CONTROL	4	7	1,17	4,0	1,0	0,5	3,5	0,5	0,5	10
4.3 NATURAL VENTILATION	2	2	0,33	4,0	1,0	0,5	0,5	0,5	3,5	10
4.4 WIND MOVEMENTS IN & AROUND BUILDING	4	7	1,17	3,0	3,5	2,0	0,5	0,5	0,5	10
4.5 ORIENTATION OF BUILDING	2	2	0,33	4,0	0,5	4,0	0,5	0,5	0,5	10
4.6 COLOR OF BUILDING	2	2	0,33	4,0	0,5	3,5	0,5	0,5	1,0	10
5. FINANCIAL OBJECTIVES										
5.1 COSTS	7	22	3,67	2,0	2,0	0,5	2,0	1,5	2,0	10
5.2 SALE & REVENUE VALUE	7	22	3,67	2,0	2,0	2,0	1,5	1,5	1,0	10
5.3 FUNCTIONAL VALLUE	7	22	3,67	4,0	0,5	1,5	0,5	0,5	3,0	10
TOTAL		599	100,00							

Likewise the experts from different disciplines (architect, structural engineer, town planner, mechanical engineer, electrical engineer, interior architect) have been subject to a similar weight assignment to enable them to evaluate sub-objectives according to their disciplines (Table II, Column 4-9). Weighing the expertise of the participating experts requires the partaking of the total of 10 points among the experts in regard to their fields and its probable relation to the sub-objectives. This completes the preparation procedure of the evaluation method.

- Weights determined during the preparation process are then transferred to the Table III, where each expert contributes his/her field of expertise followed by the evaluation of each sub-objective on a scale of 0-4 (Table III, Column 2).

TABLE III

EXPERTS EVALUATION TABLE

IDENTIFICATION NR. OF THE BUILDING: 1

EXPERTS DISCIPLINE CODE NR: 1

OBJECTIVES	VALUE OF SUB-OBJ.	WEIGHT OF SUB-OBJ.	WEIGHT OF EXPERTS 1	2	3	4	5	6	SUB-OBJ. UTILITY VALUE
1. ARCHITECTURAL & ARTISTIC OBJECTIVES									
1.1 ARTISTIC VALUE	2	3,67	4,0	0,5	2,5	0,5	0,5	2,0	29,4
1.2 AESTHETIC VALUE	3	6,18	4,0	0,5	2,0	0,5	0,5	2,5	74,1
1.3 ASSOCIATION WITH IMPORTANT EVENTS	0	2,67	4,0	1,5	1,5	0,5	0,5	2,0	0
1.4 WORK OF A WELL KNOWN ARTIST	1,5	1,84	4,0	1,5	1,5	0,5	0,5	2,0	11
1.5 SCARCITY VALUE	1	3,67	3,0	3,0	2,0	0,5	0,5	1,0	11
1.6 FAÇADE VALUE	2	2,67	4,0	1,0	0,5	0,5	3,0	1,0	21,4
1.7 SPATIAL ORGANIZATION VALUE	3,5	2,67	4,0	0,5	0,5	0,5	0,5	3,0	37,4
1.8 HISTORICAL VALUE	0	1,84	3,0	2,0	3,0	0,5	0,5	1,0	0
2. TECHNICAL OBJECTIVES									
2.1 TECHNICAL INNOVATION VALUE	1	1,84	1,0	3,0	0,5	2,5	2,0	1,0	1,8
2.2 CONSTRUCTIONAL VALUE	3	3,67	3,0	3,0	1,0	1,0	1,0	1,0	33,1
2.3 EARTHQUAKE RESISTANCE VALUE	3	6,18	3,0	4,0	1,0	1,0	0,5	0,5	55,6
2.4 FIRE CONTROL VALUE	3	6,18	0,5	0,5	0,5	4,0	4,0	0,5	9,3
2.5 LIGHTNING PROTECTION VALUE	2	2,67	0,5	0,5	0,5	4,0	4,0	0,5	2,7
2.6 STRUCTURAL SYSTEM VALUE	2	6,18	2,0	4,0	1,0	1,0	1,0	1,0	24,7
2.7 LEGAL ASPECTS AND REGULATION	4	6,18	3,0	3,0	1,5	1,0	1,0	0,5	74,1
2.8 MECHANICAL TRANSPORTATION VALUE	2,5	1,84	2,0	2,0	0,5	2,0	2,0	1,5	9,2
2.9 SOIL PROPERTIES VALUE	2	0,67	2,0	4,0	1,0	1,0	1,0	1,0	2,7
2.10 SECURITY VALUE	3	2,67	3,0	1,0	1,0	2,0	2,0	1,0	24
2.11 AIR TRANSPORT SECURITY VALUE	4	7,68	3,0	3,0	1,0	1,0	1,0	1,0	92,2
3. ENVIRONMENTAL OBJECTIVES									
3.1 ENVIRONMENTAL LANDMARK VALUE	2,5	2,67	4,0	0,5	4,0	0,5	0,5	0,5	26,7
3.2 ENVIRONMENTAL SYMBOL VALUE	2	2,67	4,0	0,5	4,0	0,5	0,5	0,5	21,4
3.3 ENVIRONMENTAL GROUP VALUE	2	1,17	4,0	0,5	4,0	0,5	0,5	0,5	9,3
3.4 SKYLINE VALUE	3	3,67	4,0	0,5	4,0	0,5	0,5	0,5	44,1
3.5 DENSITY VALUE	2,5	1,84	4,0	0,5	4,0	0,5	0,5	0,5	18,4
4. ENVIRONMENTAL CONTROL OBJECTIVES									
4.1 MICROCLIMATE EFFECTS	2,5	2,67	4,0	0,5	3,0	1,0	0,5	1,0	26,7
4.2 SOLAR CONTROL	2,5	1,17	4,0	1,0	0,5	3,5	0,5	0,5	11,7
4.3 NATURAL VENTILATION	0	0,33	4,0	1,0	0,5	0,5	0,5	3,5	0
4.4 WIND MOVEMENTS IN & AROUND BUILDING	2	1,17	3,0	3,5	2,0	0,5	0,5	0,5	7
4.5 ORIENTATION OF BUILDING	1,5	0,33	4,0	0,5	4,0	0,5	0,5	0,5	2
4.6 COLOR OF BUILDING	2	0,33	4,0	0,5	3,5	0,5	0,5	1,0	2,7
5. FINANCIAL OBJECTIVES									
5.1 COSTS	3	3,67	2,0	2,0	0,5	2,0	1,5	2,0	22
5.2 SALE & REVENUE VALUE	2	3,67	2,0	2,0	2,0	1,5	1,5	1,0	14,7
5.3 FUNCTIONAL VALLUE	2,5	3,67	4,0	0,5	1,5	0,5	0,5	3,0	36,7
TOTAL		100,00							

- Through the evaluation of the sub-objectives; Microsoft Excel determines related values, weights and weights of expertise of the participating experts, utility value of each sub-objective. The determined values are transferred to Table IV, where displayed in relation to other experts' opinions. This constitutes the last step of the evaluation process (Table IV).

TABLE IV

SUMMARY OF EVALUATION RESULTS

IDENTIFICATION NR. OF THE BUILDING: 1

OBJECTIVES	THE UTILITY FOR EACH SUB-OBJECTIVE ASSIGNED BY THE EXPERTS					
	1	2	3	4	5	6
1. ARCHITECTURAL & ARTISTIC OBJECTIVES						
1.1 ARTISTIC VALUE	58,8	5,5	18,4	5,5	3,7	14,7
1.2 AESTHETIC VALUE	74,1	7,7	30,9	7,7	6,2	46,3
1.3 ASSOCIATION WITH IMPORTANT EVENTS	0	0	0	0	0	0
1.4 WORK OF A WELL KNOWN ARTIST	7,3	4,1	1,4	0	0,9	5,5
1.5 SCARCITY VALUE	0	11	11	2,8	1,8	3,7
1.6 FAÇADE VALUE	21,4	2,7	1,3	2,7	16	5,3
1.7 SPATIAL ORGANIZATION VALUE	21,4	3,3	2,7	2,7	4	28
1.8 HISTORICAL VALUE	0	0	0	0	0	0
2.TECHNICAL OBJECTIVES						
2.1 TECHNICAL INNOVATION VALUE	1,8	11	0,9	9,2	7,3	1,8
2.2 CONSTRUCTIONAL VALUE	22	33,1	9,2	9,2	11	11
2.3 EARTHQUAKE RESISTANCE VALUE	55,6	61,8	15,4	18,5	9,3	9,3
2.4 FIRE CONTROL VALUE	9,3	6,2	6,2	49,4	49,4	9,3
2.5 LIGHTNING PROTECTION VALUE	2,7	3,3	3,3	26,7	21,4	2,7
2.6 STRUCTURAL SYSTEM VALUE	37,1	74,1	12,4	12,4	12,4	12,4
2.7 LEGAL ASPECTS AND REGULATION	74,1	64,9	37,1	21,6	24,7	12,4
2.8 MECHANICAL TRANSPORTATION VALUE	11	9,2	2,3	9,2	9,2	6,9
2.9 SOIL PROPERTIES VALUE	1,3	4	0,7	1,3	1,3	1,3
2.10 SECURITY VALUE	16	5,3	8	16	16	8
2.11 AIR TRANSPORT SECURITY VALUE	92,2	92,2	30,7	30,7	30,7	30,7
3. ENVIRONMENTAL OBJECTIVES						
3.1 ENVIRONMENTAL LANDMARK VALUE	32,1	2,7	26,7	3,3	3,3	3,3
3.2 ENVIRONMENTAL SYMBOL VALUE	21,4	3,3	10,7	2,7	2,7	2,7
3.3 ENVIRONMENTAL GROUP VALUE	9,3	1,2	14	1,8	1,8	1,2
3.4 SKYLINE VALUE	44,1	5,5	44,1	5,5	5,5	5,5
3.5 DENSITY VALUE	22	2,3	14,7	1,8	2,8	2,3
4. ENVIRONMENTAL CONTROL OBJECTIVES						
4.1 MICROCLIMATE EFFECTS	32,1	3,3	20	6,7	3,3	6,7
4.2 SOLAR CONTROL	4,7	2,3	0,6	8,2	1,2	1,5
4.3 NATURAL VENTILATION	0	0,2	0	0	0	0
4.4 WIND MOVEMENTS IN & AROUND BUILDING	7	10,2	5,8	1,5	1,2	1,2
4.5 ORIENTATION OF BUILDING	2,7	0,3	2	0,3	0,3	0,3
4.6 COLOR OF BUILDING	2,7	0,3	3,5	0,2	0,2	0,7
5. FINANCIAL OBJECTIVES						
5.1 COSTS	14,7	18,4	4,6	29,4	22	22
5.2 SALE & REVENUE VALUE	22	22	14,7	11	11	7,3
5.3 FUNCTIONAL VALLUE	44,1	5,5	16,5	5,5	4,6	27,5
SUM:	765	476,9	369,8	303,5	285,2	291,5

TOTAL SUM: **2491,9**

DESCRIPTION OF THE SUB-OBJECTIVES

During the application of the proposed method the experts in regard to the relations with various attributes of the entities evaluate sub-objectives. [1]

The relevant sub-objectives of the objectives system can be listed as follows:

1. Architectural and aesthetic objectives

1.1. Artistic value: Artistic value can not be defined by any objective criteria, though it is a long and intriguing process of formation though accumulated knowledge and common wisdom gained by humane expertise. Notably, the design approach for a building and its integrity with its built and natural environment as well as its location within it are the main constituent factors for this formation.

For the determination of the artistic value, factors such as its relative comparisons with building of the similar characteristics and spatial organizations should also be taken into account.

1.2. Aesthetic value: Aesthetic value is based on a number of complicated factors, such as, variety of elements, rhythmic effects, different materials and pattern, play of matte and reflective surfaces, play of light and shadow.

There is no objective method for the determination of the aesthetic value, it can be only established by a comparative analysis of several different buildings by the experts

1.3. Association with important historical events: Important buildings have a documentary value, since they reflect the trends of the eras in which they were completed. A high-rise building could be constructed to symbolize the beginning or the end of a significant historical event. Many buildings are also the most reliable witnesses of the political, social and cultural aspects of the times in which they were built.

1.4. Work of a well-known artist: A historical or contemporary work of an architect, who is master in design approach, has a remarkable value, which should be considered in the overall valuation.

1.5. Scarcity value: A high-rise building, which has unique characteristics such as a path-breaking and innovative approach in design and construction, should be considered as symbol of the development.

1.6. Facade value: Surface treatment reflects the scale and important lines of a high-rise building. Articulation of the building, cladding material, material changes, play of light and shadow, reflections on the surface, color and ornaments are some of the important factors in the ultimate formation of the visual effect of the façade.

1.7. Spatial organization value: A building is a synthesis of exterior skin and interior organization. Interior design also includes decoration, furniture system, sculptures and other works of art. Other factors, such as allowing maximum design flexibility in the interior space for technology upgrades in the future must be taken into account by the determination of the spatial organization value.

1.8. Historical value: Buildings are lasting memorial with their locations as well as their capacities to reflect the urban and social history of the times they were built.

2. Technical Objectives

2.1. Technical innovation value: A high-rise building can be innovative in its design approach, construction and structural system and become the symbol of a new development.

2.2. Constructional value: The valuation should also cover beside aesthetic appeal technology and construction elements.

2.3. Earthquake resistance value: Turkey, especially Istanbul, is situated in a potential earthquake zone; therefore the structural systems of all high-rise buildings should conform with the earthquake design criteria to withstand any deformations to be caused by the possible future earthquakes.

2.4. Fire control value: The initial objective should be to take every precaution to prevent fire incidence. Sprinkler systems, smoke exhaust systems, pressurized stairwells, dedicated recall firefighter elevators, emergency exits supported with a sophisticated fire command center are the main elements for these precautions.

2.5. Lightning protection value: High-rise buildings should accommodate strong lightning conductors for lightning and similar natural causes.

2.6. Structural system value: In the selection of the structural systems for the high-rise buildings, time and cost calculations are the foremost priorities. The structural systems should provide the necessary lateral resistance to the forces of wind and earthquake, while supporting the vertical loads.

2.7. Legal aspects and regulations: Various authorities from the beginning of the design level to the end of construction process should enforce controlling mechanisms. The inefficient legal procedures and regulations may cause serious problems. All high-rise buildings should be evaluated both under the city and building scales.

2.8. Mechanical transportation value: Elevators and escalators should be planned and constructed by using high-tech, considering the building's mode of function and the density at peak hours.

2.9. Soil properties value: The soil characteristics and the problems of bearing capacity of the ground at the building site should be checked with soil examples taken from the site and with their appropriate laboratory tests. The evaluated input from these tests will help deciding the structural system.

2.10. Security value: The quality of a newly completed high-rise building should reflect proper security measurements. The computer-controlled environmental safety and security systems, such as interior automation control (air conditioning, elevators etc.), security measurements (alarms, detectors, visual control systems etc.), emergency plans for fire, earthquake, accidents etc. are the main elements of the safety and security measurements.

2.11. Air transport security value: Location of high-rise buildings can endanger air traffic. Due to security reasons high-rise building projects must be developed outside flying routes and airport borders.

3. Environmental objectives

3.1. Environmental landmark value: In the geographic, historic and economic environment a high-rise building rises as a focal point of the skyline. They are visible landmarks and dominate the skyline.

3.2. Environmental symbol value: With the historically accumulated public interest a building may have a special aura hence becomes a symbol of its location. With their impressive appearance great buildings become symbols of their city.

3.3. Environmental group value: A high-rise building can be an important element in defining the urban streetscape or a square. It may provide continuity or define a boundary in the skyline.

3.4. Skyline value: Historical developments and general characteristics of a city define its skyline. The protection of Istanbul's natural and historic skyline, which goes back to hundreds of years, is very essential. The placement of high-rise buildings should take the existing skyline into account and should be carefully decided with various skyline studies carried out from different viewpoints of the city.

3.5. Density value: The additional problems related with the infrastructure (traffic, electricity, water, sewer etc.) must be identified at project level. The density must be decided according to existing characteristics of the region.

4. Environmental control objectives

4.1. Microclimate value: Elements like the buildings' shadow effect and period, air corridors between buildings, prevention of sunlight that effect the microclimatic value of the building should be solved at design level.

4.2. Solar control: The effects of high-rise buildings to neighbouring buildings and open space should be checked from the health point of view. Sufficient sunlight should be available during the day. This is especially important for the solar energy facilities if and when they are available.

4.3. Natural ventilation: Suitable positioning of openings can improve the natural ventilation and lower air-conditioning costs.

4.4. Wind movements in & around building: The positioning of a high-rise building should minimize the unwanted air turbulences within the surrounding area.

4.5. Orientation of the building: The orientation on the site should serve functional as well as aesthetic purposes. Suitable positioning can improve sun shading, which results in lower lighting, heating and air-conditioning costs. A strategically located high-rise building can be visible from every axis of the city. The design should be determined primarily through conformity with technical specifications such as shadow restrictions, positioning the building to minimize heat lost on the northern face. Adjacent buildings and views of the city are also vital factors to be considered.

4.6. Color of the building: The color and the material used in the exterior surfaces are important decisions for the building. Selection of the color should be based on environmental conditions such as the existing city pattern, far and near appearances, silhouette and building type.

5. Economical objectives

5.1. Costs: There are elements that can dramatically effect the structural unit costs. These are mainly the use of cladding and interior materials, the selected structural systems, as well as the number of floors, method of transportation of materials, construction equipment etc.

5.2. Sale and revenue value: The market value of the building indicates its sales or interchangeability value. The revenue value, on the other hand, is the income obtained from rental or entrée fee etc.

5.3. Functional value: The functional value bases on the composition of several spaces, the determination various functions and flexible spaces.

CONCLUSION

Istanbul's topographical and historical location makes it necessary to evaluate the high-rise buildings on different scales. The potential problems must be discussed both under city and building scales. The city's constructional state and the territories should be examined for achieving the targets for a healthy city life with high-rise buildings.

Istanbul's structural status and existing high-rise buildings should be evaluated and objectives and strategies should be defined by considering conditions for today and for the future developments. Especially in Istanbul, high-rise building sites must be evaluated, based not only on the area they cover but with the surrounding environment data as well [3].

A healthy territory research should be carried out to define

- The restricted zones for high-rise buildings,
- The zones that are permitted whether certain conditions are met,
- The zones that high-rise building constructions may be encouraged.

Istanbul's natural, cultural and historic specifications should be preserved within these definitions.

Proposed model is designed to evaluate the high-rise building in Istanbul and through the implementation of the utility analysis method of evaluation; objective values of the entities under consideration were made explicit in order to determine the guiding principles in future decisions. Within the framework of set objectives for evaluation, the findings related to architectural analysis of the buildings and available data related to them can be used as guidelines for the future developments.

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