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Evaluation of the Most Influential Criteria of Desirability of High-rise Buildings in Urban Landscape Using ANP

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ABSTRACT: Tall buildings are defined as signs and certain points in urban view, if located and constructed properly, and their appropriateness indicators based upon urban view by determined Strategies, policies, rules and regulations, shall play significant and peculiar role in upgrading the quality of life of citizens. Quality upgrade of urban public places, once will find its optimal process and fulfilment that indicators such as impact on strategic views, definition of sky-line, legibility participation as a sign, impact on inseparable environment and etc., to be based upon ideas of experts, stakeholders and utilizing effective and scientific methods. Since there are various ideas about most effective indicators of appropriateness for tall buildings, the objective of the article is the identification of most effective indicators of appropriateness for tall buildings (using Analysis of Network Process, ANP). This article as a descriptive analysis research method and was based on documentary-library studies, field surveys, going directly to the beneficiary organizations and competent owners, and also was based on questionnaires. Accordingly, first extracting issues associated with the tall buildings and the urban view and then providing ANP conceptual model which includes three benchmarks and several indicators and the results of the surveys were analysed with the software SUPER DECISION. Due to the sheer size of the operation, only a few of inputs were written in the article as samples. The results of this study shows that the most effective criteria of tall buildings, performance indicator 0.75 and the most effective indicator "impact on strategic views" is value of 0.277 that in determining its policies and strategies should be prioritized to tall buildings which shapes an optimal urban view.

Keywords: High-rise Buildings, Urban Landscapes, Impressive Indicators, ANP.

ORIGINAL ARTICLE

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INTRODUCTION

Tall buildings of each culture represent its most important characteristics. In ancient Athens, Parthenon on Acropolis hill has been constructed to worship the guardian goddess of Athena city. Islamic minarets which have been built since the beginning of Christian ninth century, were used for Islam prophet followers for prays. The Eiffel tower was an ode sang by industrial age for the praise of technology age. Human inventions done as much to meet his needs for what he wished to achieve. Human always wanted to reach to the sky, to set up symbolic monuments. Economic necessity of tall buildings due to land prices increase was just a factor for increasing the speed to construct a kind of building which survives through whole history (Kobori, 1990). City is a collection of natural, social and built environment by humans that the population is set to become a regular and customs have devised for. The rapid growth of urbanization phenomenon in recent decades, especially in developing countries, highly developed and changed the urban views. With the growing trend of urbanization and high-speed changes, today, urban view in structure of the city is what at risk more than anything else is considered as the sign of crisis in urban design, visual planning and management of urban public places. Urban view is the result of human and urban level of contact. In this regard, human not only affect in the structure of visual urban landscape through own activities, but also the behaviour and mental perception of citizens is affected by contact with the urban landscape (Kiani et al. 2011). Understanding these interactions in urban beautification process, citizen's morale, appropriate urban areas and visual understanding of the citizens is effective. Urban view with various physical dimensions, functional and conceptual has a particular importance and position in visual organization of urban environment and the quality of urban areas and understanding of visual and structural integration of buildings, streets and the areas in which make the environment and urban areas is effective (Hosseini and Asl, 2008). Lack of attention to the appropriateness of urban views in tall buildings constantly has an irreparable effects on the efficiency, meaning and beauty of the urban environment and reduces the quality of the urban environment and the consequent increase in urban problems, illegibility, Anonymity, reducing participation of people in collaborative activities, being indifferent toward the city, irreparable effects on the psychological health of citizens (Karimi, 2010). The aim of this research is to identify the most important parameters affecting the utility of high-rise buildings in the urban landscape, using the model of "network analysis process" ANP.

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Literature Review

In relation to the high-rise buildings, the book "High-rise buildings Tehran-regulation and localization" established by Zista consulting engineers in 2004 and it was spoken about the important and determining factors in formation of the desired high-rise buildings in the discussion of "construction" and "localization". But in action, just the spatial cover associated with high-rise buildings was discussed and didn't pay attention to urban landscape issues and the most effective and optimal criteria of High-rise buildings in the urban landscape (Zysta Consulting Engineers, 2004).

The research hypothesis

It seems that indexes such as improving the Strategic vision, creating legibility (as visual indication). definition of sky line, quality of construction conformity with the aesthetic principles in field and Historical, religious, cultural symbolic reference have maximum impact respectively in creating desired high-rise buildings in the urban landscape.

MATERIAL AND METHODS

Descriptive analytical method based on Documentary, library and field surveys studies, has been used in this research that was conducted by visiting the Islamic Azad University, Science and Research Branch of Tehran and using a questionnaire to access to pundits information. Because the statistical population is 380 people according to the statistical relation to estimate the number of sample size (Cochran), so, initially the most significant numerical measures required in the ANP model based on sources, interviews and questionnaires were collected and then by using the model of ANP Multi indicators decision making (analytical network process) and Super Decision software (to speed up the computation of complex matrices),and it's possible to achieve to the most important and influential criteria and indicators that are involved in desirability of in high-rise buildings in urban landscape with numerical values.

The definition of tall building

The definition of high-rise buildings in the world is very different. So that in some cities of US 40-storey buildings are defined are as the short buildings (Bemanian, 1998). Urban housing can be divided into two patterns of Single-family and apartment. Apartments can be divided into two main groups in which Conventional or short buildings define up to 8 floors and more than that can be called high-rise or towers (Chiara and Crosbie, 2001).

Although in Iran, tall buildings are told the buildings over than 6 floors accordance with terms & Regulations of the Supreme Council of Architecture and Urban Planning approved in 1998. But this definition based on Tehran Comprehensive Plan, adopted in 2007, is referred buildings over 12 floors. In some cities of UK like London, High-rise buildings have different definition based on location. As an example, the height of 75 meters for within the City of London and 25 meters for the surrounding of "Thames" river and 30 meters for other places have been considered as tall buildings (Mayor Of London, 2001). According to the definition of Plymouth city, the Building with height of 20 meters, or any building with a height more than 5-6 floors, that is taller than height of surrounding indicator buildings or any building that affect in city's sky line (Plymouth City Council, 2005).

Definition of urban landscape

Landscape means to the field that are perceived by the public. So that their features are the result of action and interaction of natural and human factors. Gordon Cullen in book "Selected urban landscape," writes, if asked me to define the urban landscape, I would say that, an architectural building, two buildings next to each other, is the urban landscape (Gordon, 2003; Zandieh and Razieh, 2010). Urban landscape, is the understanding of citizens from the city which takes place due to the perception of its symbols (urban physical dimensions)and concepts associated with them (mental and memory aspects). The three goals of urban landscape are, 1 - aesthetics 2 - 3 Cultural identical - performance (practical) (Mansoori, 2008). The factors affecting the landscape of the city have three objectives: 1- visual 2- Performance 3- meaning (Rezazadeh, 2007). According to the definitions mentioned above, urban landscape means Simultaneous attention to urban framework and Citizens' cognition from the city as well and urban landscape is investigated from three aspects of 1 - Performance 2 – identical and 3 – aesthetics.

1-Performance: Legibility of environment, creating sky line, relaxing the environment, strengthening the visual corridor, access to urban transportation network, Creating vitality and enhance the quality of life, Sense of community life and civic participation, creating opportunities for tourism development, sustainability, (Rezazadeh, 2007; Kiani, 2011).

2 – Identical (meaning): meaning (Concept, signs, symbols, metaphors, and codes), culture (the customs and beliefs), history (historical references) (Abel, 2008; Kapn 2004 and Lynch, 1997).

3 - Aesthetics (physical): Eye-catching of space or combination of color quality, , form, style design and Building materials associated with context and environment with respect to simulated rank, adjacency, continuity, proportion, human scale, simplicity and complexity, the principle of similarity, symmetry, rhythm, balance, harmony and order (Mansoori, 2008; Rezazadeh,2007 and Mahmoudi, 2006).

Evaluation's criteria of desirability of High-rise buildings in urban landscape

1. Performance of high-rise building in an urban landscape: Performance of tall buildings in urban landscape, in particular, include issues of: Participation in environment legibility as a sign (indicator form with wide scope) readability, defining the sky line, their potential in improving the strategic vision, creating vitality with participation in public activities, impact on the immediate environment through the amount of ghosting, or buildings overcome in other spaces and buildings. Rate of connection with surrounding pedestrian, green and public spaces related to buildings as well, due to high density in these buildings, manner of communication with the public transportation system, the position of buildings place to streets and around highways and the impact on

environment id historic (Taji, 2010). Even the performance of the buildings on the ground floor and the roof can cause a great impact on creating vitality and participation in public spaces. In terms of performance, high-rise buildings can have both positive and negative roles in Urban Landscape (Karimi, 2010).

2. Giving identity of high-rise buildings to the urban landscape: High-rise buildings as buildings affecting sky line are in inconsistent with context in terms of height and this will lead to the issue that building can get sign personality in field. The identical aspect of building is including of: giving Identity of High-rise buildings into urban landscape with symbolic allusions (Cultural, Historical meaning), creating sense of superiority and economic, social, cultural development and creating a sense of ego or the general public. In issue of identity, created meaning and symbols by the use of high-rise buildings in urban landscape is considered. Because in addition, symbols and signs in creating high-rise building are as important as indicator points of a city, because people should be able to communicate with this symbol as urban signs (Karimi, 2010).

3. The Aesthetics of tall buildings in urban landscape: Tall building as an important building and with the realm of high impact on the city regardless of the place must have appropriate and worthy quality, as urban signs. In aesthetic evaluation of tall buildings, improving the urban visual quality is including of factors such as: building's proportion and harmony with surrounding environment, materials, methods and design style (same source). An Important point to evaluate the aesthetics factors in urban landscape is not related to the building but it is related to building's transplantation with context that items of simulated rank, adjacency, continuity, proportion, human scale, simplicity and complexity, symmetry, similarity, rhythm, balance and harmony are essential to considered (Tabatabai, 2011).

Analysis of recognition by using AHP and provide the most effective criteria and sub criteria of high-rise buildings in formation of optimal urban landscape

According to the above done recognition, to the High-rise buildings indicators of desirability, we are going to the prioritization of criteria and indicators (sub-criteria) with the help of ANP model and using Super Decision software. Remarkably, the numerical measures that will be used in this section, has been getting from professors of Islamic Azad University, Tehran Science and Research.

The overall process of ANP model

Step 1: Creating the model and converting the issue into a lattice structure

Step 2: Formation of binary matrices and determining the vectors of internal priority (comparison of criteria with each other, against of goal, Binary Comparison of criteria with controlling each one of them Sub criteria comparison against own yardstick, creating relationships and dependencies between sub-criteria etc.).

Step 3: Formation of inharmonious super matrixes and then harmonious super matrix and convert it to limit super matrix by SUPER DECISION matrix and finally determine the priority and importance of the criteria and sub criteria with respect to each other.

Step 4: prioritize the options using the final weights of sub criteria, and rating them by each sub items (Zebardast 2010).

Method of giving weight to the criteria and indicators of ANP model giving weight to of criteria and indicators of ANP model has been done based on output data obtained from the questionnaire results and prioritizing the faculty of Arts and Architecture. Based on the weight range of ANP model that includes the range of 1 to 9 (Tofigh, 1993).

RESULTS

The results of ANP model based on priorities of criteria and indicators of High-rise buildings desirability in urban landscape: First, schematic model of ANP is created (Figure 1). After that, examples of the Blower Clusters And Nodes in the ANP Model are given (Figure 2). Then, examples of methods unweighted super matrix, (containing priority is obtained by binary comparison) in the ANP model, are presented (Table 1). And examples of methods weighted super matrix (array elements are multiplied in the cluster weight (in hierarchy, weighted matrix, and non-weighted matrix do not differ), in the ANP model are given (Table 2). After that, examples of a limited matrix (this matrix is derived from exponentiation of weighted matrix until convergence to the optimal response) in the ANP model are shown (Table 3). Finally, Priority of Clusters (Groups) are presented (Figure 3).

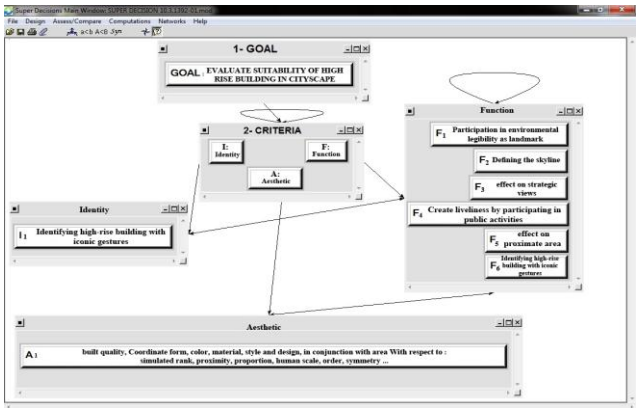

Figure 1. Schematic Model of ANP

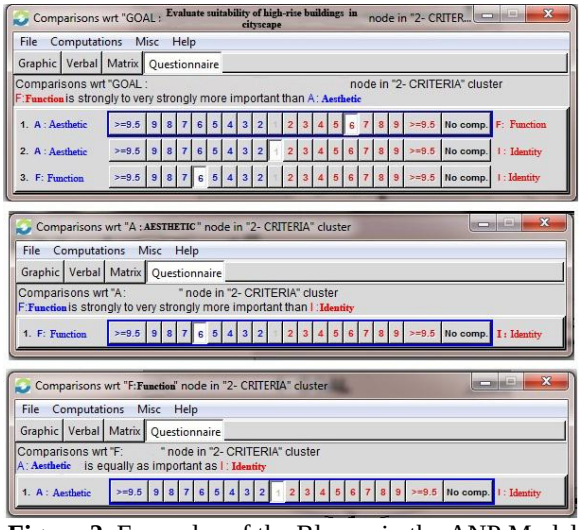

Figure 2. Examples of the Blower in the ANP Model (Clusters and Nodes).

Table 1: Examples of Methods Unweighted Super Matrix In The ANP Model.

Un-weighted Super Matrix : Matrix Containing Priority Is Obtained By Binary Comparison.													
Cluster Node Labels		**GOAL1-**	**CRITERIA2-**			**Aesthetic**	**Function**						**Identity**
		GOAL: Evaluate suitability of high-rise buildings in cityscape	A. Aesthetic	F. Function	I. Identity	A1: built quality, Coordinate form, color, material, style and design, in conjunction with area With respect to: simulated rank, proximity, proportion, human scale, order, symmetry	F1 Participation in environmental legibility as landmark	F2 Defining the skyline	F3 effect on strategic views	F4 Create liveliness by participating in public activities	F5 effect on proximate area	F6 effect on historical district	I1 Identifying high-rise building with iconic gestures
1- GOAL	GOAL : Evaluate suitability of high-rise buildings in cityscape	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2- CRITERIA	A. Aesthetic	0.125	0.000	0.500	0.142	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	F. Function	0.750	0.857	0.000	0.857	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	I. Identity	0.125	0.142	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aesthetic	A1: built quality, Coordinate form, color, material, style and design, in conjunction with area With respect to: simulated rank, proximity, proportion, human scale, order, symmetry	0.000	1.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	1.000	0.000
Function	F1 Participation in environmental legibility as landmark	0.000	0.000	0.150	0.000	0.310	0.158	0.000	0.480	0.000	0.000	0.104	0.229
	F2 Defining the skyline	0.000	0.000	0.112	0.000	0.270	0.164	0.000	0.405	0.000	0.714	0.000	0.000
	F3 effect on strategic views	0.000	0.000	0.484	0.000	0.000	0.584	0.000	0.000	0.000	0.000	0.769	0.695
	F4 Create liveliness by participating in public activities	0.000	0.000	0.090	0.000	0.106	0.048	0.000	0.114	0.000	0.142	0.000	0.000
	F5 effect on proximate area	0.000	0.000	0.119	0.000	0.253	0.000	0.000	0.000	0.875	0.000	0.126	0.000
	F6 effect on historical district	0.000	0.000	0.042	0.000	0.059	0.044	1.000	0.000	0.125	0.142	0.000	0.075
Identity	I1 Identifying high-rise building with iconic gestures	0.000	0.000	0.000	1.000	0.000	1.000	0.000	0.000	0.000	0.000	1.000	0.000

Table 2: Examples Of Methods Weighted Super Matrix In The ANP Model.

Weighted Super Matrix : In This Matrix Array Elements Are Multiplied In The Cluster Weight.(in Hierarchy, weighted matrix, and non-weighted matrix do not differ)													
Cluster Node Labels		**GOAL1-**	**CRITERIA2-**			**Aesthetic**	**Function**						**Identity**
		GOAL: Evaluate suitability of high-rise buildings in cityscape	A. Aesthetic	F. Function	I. Identity	A1: built quality, Coordinate form, color, material, style and design, in conjunction with area With respect to: simulated rank, proximity, proportion, human scale, order, symmetry	F1 Participation in environmental legibility as landmark	F2 Defining the skyline	F3 effect on strategic views	F4 Create liveliness by participating in public activities	F5 effect on proximate area	F6 effect on historical district	I1 Identifying high-rise building with iconic gestures
1- GOAL	GOAL : Evaluate suitability of high-rise buildings in cityscape	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2- CRITERIA	A. Aesthetic	0.125	0.000	0.159	0.110	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	F. Function	0.750	0.662	0.000	0.662	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	I. Identity	0.125	0.110	0.159	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aesthetic	A1: built quality, Coordinate form, color, material, style and design, in conjunction with area With respect to: simulated rank, proximity, proportion, human scale, order, symmetry	0.000	0.227	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.125	0.000
Function	F1 Participation in environmental legibility as landmark	0.000	0.000	0.102	0.000	0.310	0.118	0.000	0.480	0.000	0.000	0.077	0.229
	F2 Defining the skyline	0.000	0.000	0.076	0.000	0.270	0.123	0.000	0.405	0.000	0.714	0.000	0.000
	F3 effect on strategic views	0.000	0.000	0.329	0.000	0.000	0.438	0.000	0.000	0.000	0.000	0.577	0.695
	F4 Create liveliness by participating in public activities	0.000	0.000	0.061	0.000	0.106	0.036	0.000	0.113	0.000	0.142	0.000	0.000
	F5 effect on proximate area	0.000	0.000	0.081	0.000	0.253	0.000	0.000	0.000	0.875	0.000	0.094	0.000
	F6 effect on historical district	0.000	0.000	0.028	0.000	0.059	0.035	1.000	0.000	0.125	0.142	0.000	0.075
Identity	I1 Identifying high-rise building with iconic gestures	0.000	0.000	0.000	0.227	0.000	0.125	0.000	0.000	0.000	0.000	0.125	0.000

Table 3: Examples of a Limited Matrix In The ANP Model

Limited Super Matrix : This matrix is derived from exponentiation of weighted matrix until convergence to the optimal response.													
Cluster Node Labels		**GOAL1-**	**CRITERIA2-**			**Aesthetic**	**Function**						**Identity**
		GOAL: Evaluate suitability of high-rise buildings in cityscape	A. Aesthetic	F. Function	I. Identity	A1: built quality, Coordinate form, color, material, style and design, in conjunction with area With respect to: simulated rank, proximity, proportion, human scale, order, symmetry	F1 Participation in environmental legibility as landmark	F2 Defining the skyline	F3 effect on strategic views	F4 Create liveliness by participating in public activities	F5 effect on proximate area	F6 effect on historical district	I1 Identifying high-rise building with iconic gestures
1- GOAL	GOAL : Evaluate suitability of high-rise buildings in cityscape	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2- CRITERIA	A. Aesthetic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	F. Function	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	I. Identity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aesthetic	A1: built quality, Coordinate form, color, material, style and design, in conjunction with area With respect to: simulated rank, proximity, proportion, human scale, order, symmetry	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
Function	F1 Participation in environmental legibility as landmark	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171	0.171
	F2 Defining the skyline	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178	0.178
	F3 effect on strategic views	0.227	0.227	0.227	0.227	0.227	0.227	0.227	0.227	0.227	0.227	0.227	0.227
	F4 Create liveliness by participating in public activities	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
	F5 effect on proximate area	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073
	F6 effect on historical district	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207
Identity	I1 Identifying high-rise building with iconic gestures	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047

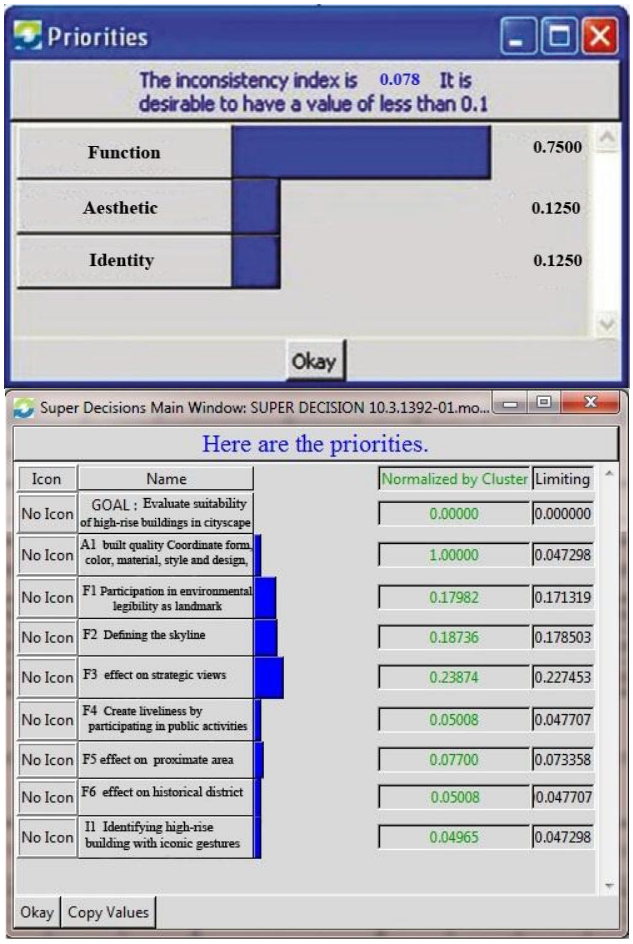

Figure 3: Priority Of Clusters (Groups), (Source: Authors, 2014).

Most effective criteria and indicators in desirability of High-rise buildings in the urban landscape:

The priority of criteria: First, the functional (0.75). Second, aesthetic and identity (sense), each 0.125

The priority Indicators:

1 - Impact on strategic view 0.227

2 - Definition of sky line 0.178.

3 - Participation in the environment legibility as the sign 0.171

4 - Impact on the immediate environment 0.073

5 - Creating Vitality by participating in public activities 0.0477, giving identity to high-rise building with symbolic allusions 0.0477 (historical, cultural, religious),and quality of construction and harmony of form, colour and materials with respect to the parallels, rhythm, and the impact on the historical environment for each of them 0.0477.

CONCLUSION

High-rise buildings are an important component of the urban landscape and as an important and significant visual indication of urban landscapes that can cause to legibility and navigation in surrounded environment. Three criteria of functional, identical- semantic, and aesthetic have a fundamental role in desirability of High-rise buildings perspectives. With the help of ANP Model and software of Super Decision and measures that have been to criteria and indicators by professors of Islamic Azad University, Science and Research Branch of Tehran, order of effectiveness and importance of each criterion relative to other indicators were shown with numerical values, in the desirability of high-rise building urban landscape.

According to evaluation and analysis that was done, the following results were obtained:

1-considering indicators such as developing strategic vision, creating legibility (as the visual sign),definition of sky line, quality of construction conformity with the principles of aesthetic in, historical, , cultural, religious symbolic allusions are items create desired high-rise building in urban landscape .

2-functional and index criteria and effect of strategic visions has the most importance in urban landscape of high-rise building that must be taken into consideration adopting strategy and policy-making and regulations of creating high-rise building, and indexes like improving strategic vision , Creating legibility (as the visual sign),definition of sky line , quality of construction conformity with the principles of aesthetic in, historical, , cultural, religious symbolic allusions are the next steps of importance.

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