INVESTIGATING THE AESTHETIC IMPACT OF TALL BUILDINGS ON URBAN LANDSCAPE

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Abstract
In this paper, we tried to investigate the aesthetic role of tall buildings in urban landscape to provide a better understanding of future tall buildings. In this study first we explained aesthetics in urban landscape; since our focus was on scenic beauty, we reviewed some techniques for evaluating visual aesthetics. In the second part, we discussed aesthetics of tall buildings in urban landscape. Finally we derived the most important factors in aesthetic impacts of tomorrow's tall buildings. In reviewing tall buildings, it was found that the top is the most important component of the tall building in terms of its impression in the city silhouette. We also found out that factors, such as "the degree of silhouette complexity", "shape", "number of view corridors", "the height of tall building against the natural backdrops", and "skyline" are important factors in the aesthetics of tall buildings in the city context.

Key words: Aesthetics, scenic beauty, tall buildings, urban landscape, visual impact.

INTRODUCTION

During the first half of the twentieth century, a significant shift to general aesthetic theory took place which attempted to apply aesthetic theory between various forms of art, including the literary arts and the visual arts, to each other. Mathematical considerations, such as symmetry and complexity, were used for analysis in theoretical aesthetics. Judgments of aesthetic value rely on our ability to discriminate at a sensory level. Aesthetics examines our affective domain response to an object or phenomenon. Viewer interpretations of beauty possess two concepts of value: aesthetics and taste. Aesthetics is the philosophical notion of beauty while taste is a result of an education process and awareness of elite cultural values learned through exposure to mass culture. Aesthetic judgments may be linked to emotions or, like emotions, partially embodied in our physical reactions. Seeing a sublime view of a landscape may give us a reaction of awe, which might manifest physically as an increased heart rate or widened eyes. These unconscious reactions may even be partly constitutive of what makes our judgment a judgment that the landscape is sublime. Evaluations of beauty may well be linked to desirability. Thus, judgments of aesthetic value can become linked to judgments of economic, political, or moral value (Holm, 2006). Aesthetic judgments can often be very fine-grained and internally contradictory. Likewise aesthetic judgments seem often to be at least partly intellectual and interpretative. It is what a thing means or symbolizes for us that is often what we are judging. Thus aesthetic judgments might be seen to be based on the senses, emotions, intellectual opinions, will, desires, culture, preferences, values, subconscious behavior, conscious decision, training, instinct, sociological institutions, or some complex combination of these, depending on exactly which theory one employs.

Landscape aestheticism is a positive reaction that occurs in the dialogue between the viewers and the landscape. A single object might trigger different aesthetic responses from different viewers (Wang and Yu, 2012). Landscape designers draw upon design elements such as axis, line, landform, horizontal and vertical planes, texture, and scale to create aesthetic variation within the landscape. They may additionally make use of aesthetic elements such as pools or fountains of water, plants, seasonal variance, stonework, fragrance, exterior lighting, statues, and lawns. According to Nohl (2001), in terms of the landscape and its aesthetic value, there are four different levels as prerequisite of aesthetic joy which are (1) perceptual level: at this level, viewer quickly gain relevant information through senses (viewing, hearing, or smelling), (2) expressive level: at this level, all perceivable elements and structures are accompanied with the viewer's feelings and emotions, (3) symptomatic level: physical things of the landscape refer to something beyond themselves, and objects are understood as signs or symptoms denoting something else, and (4) symbolic level: visible things in landscape refer to something else, but its difference with symptomatic is that the contents, attached to the indicating or symbolizing things, are not real.

Many studies have been done in landscape aesthetics (Thorne & Huang, 1991; Nohl, 2001; Junker & Bucheker, 2008; Chen et al, 2009), and aesthetic impacts of tall buildings on the urban landscape (Health et al, 2000; Daniel, 2001; Zacharias, 1999; Nasar et al , 2001; Stamp, 2002). Based on conducted studies, it became clear that factors such as physical complexity wherein the

building is located, height ratio of tall building related to landscape backdrops such as mountains in the backgrounds of urban landscape, and skyline model created by tall buildings are some of the effective factors in the aesthetics of tall buildings in the urban context. In our study, the aim is to study aesthetic impacts of tall buildings on urban landscape. Fist we discuss about aesthetics in urban landscape and tall buildings. In the second part, we explain aesthetic impact on landscapes and its different evaluation methods.

AESTHETICS IN URBAN LANDSCAPE

Aesthetics also can be studied in the field of urban landscape. A study of the urban world from the aesthetic perspective would suggest a more compelling link to the world of art and architecture. The aesthetic refers to the beautiful, its creation and its appreciation. Landscape aesthetics evaluation is an important concern in environmental planning, a search for beauty, pleasantness and balance of human works and environment. There are different approaches to landscape aesthetics evaluation including: objective, subjective, expert-based, perception-based, scenic, and ecological approaches. These approaches have some similarities and differences from each other. The *objective approach* is based on certain assumptions adopted by experts. Landscape is assessed according to these assumptions. The *subjective approach* regards the aesthetic quality of landscape as a product of the human mind based on an interpretation of what we perceive (Lothian, 1999). "The *expert-based approach* has dominated in environmental management practice and the *perception-based approach* has dominated in research. Both approaches generally accept that landscape quality derives from an interaction between biophysical features of the landscape and perceptual/judgmental processes of the human viewer." (Daniel, 2001)

According to Gobster (1999), *ecological aesthetics* takes the biological principles of ecosystem management (biodiversity, sustainability, etc.) while *scenic aesthetics* focus on visual perception and affective responding (like/dislike judgments) as assessed through "simple" scalar reactions to photographic stimuli (cited in Parsons and Daniel, 2002). Since in this study our focus is on scenic aesthetics, in table 1 we provide its more characteristics compared to ecological aesthetics and then we review different presented methods for scenic aesthetics evaluation.

Table 1: Comparison of scenic aesthetics and ecological aesthetics (source: Parsons and Daniel, 2002)

Scenic aesthetics	**Ecological aesthetics**
Perceptual/immediate	Knowledge-based
Stimulus-response	Experiential
Affective/emotional	Cognitive/refined
Visual/static/inanimate	Multi-modal/dynamic/animate
Picturesque/composed	Vernacular/symbolic
Naturalistic/dramatic	Natural/subtle/unscenic
Passive/object-oriented	Active/participatory
Benefits/outcomes	
Pleasure	Understanding and pleasure
Short-term mood change	Long-lasting, restorative, deep values, unity, sense of place
Maintains status quo	Catalyst for internal and external change

Methods for evaluating visual aesthetics

According to Laurie (1975), landscape scenic aesthetics evaluation may be defined as "the comparative relationships between two or more landscapes in terms of assessment of visual quality". In fact this is inspired by experimental methods presented by Gustav Fechner (1876) including methods of choice, production, and use. In line with this definition, Tuan (1979) says: "Landscape… is not to be defined by itemising its parts. The parts are subsidiary clues to an integrated image. Landscape is such an image, a construct of the mind and of feeling". Beauty in landscape comes from two main sources which cannot be separated: from the object and from the observer"; so, the landscape perceived by one person is not the same as that perceived by another (cited by Arriaza et al, 2004). There are different techniques for landscape scenic aesthetics evaluation. In assessing landscape visual quality there is an assumption that landscapes have an intrinsic or objective beauty (Shuttleworth, 1980). According to Briggs and France (1980) there are two methods for the evaluation of landscape: direct and indirect: *Direct methods* compare the scenic preferences of public members

for landscapes to reach a consensus; *indirect methods* evaluate the landscape based on the presence and/or intensity of designated features. Arriaza et al in 2004 used direct and indirect techniques of landscape valuation for assessing the visual quality of agricultural landscapes. Crofts (1975) presented two types of technique: *preference* and *surrogate component*, while Arthur et al. (1977) used the terminology of *public preference models* and *descriptive inventories* methods. These are similar to direct and indirect methods, respectively. Shafer et al. (1969) presented a compromise between descriptive methods and preference models, namely, holistic models such as *psychophysical and surrogate component models*. Recently, this approach has been used supported by the use of statistical techniques to determine the mathematical relationships between landscape components and the scenic preferences of observers (Wherrett, 2000, Real et al., 2000 and Daniel, 2001). Daniel and Vining (1983) split the methods into *ecological, formal aesthetic, psychophysical, psychological* and *phenomenological models*. Garcia and Cañas (2001) divided the methods into five classifications: *direct models*, *models to predict public preferences*, *indirect models*, *mixture models* and *economic evaluation models*. There are also another methods for assessing scenic beauty of landscapes: *cartographic representations*, *simulated assessments*, and *questionnaire surveys*. Cartographic representation involves the selection of landscape features and their recording on maps to illustrate the scenic beauty of an area. In simulated assessment, a group of observers evaluate the photographs, slides or short films of a landscape and express their opinions, which are categorised. A questionnaire survey has the advantage of reaching a reasonably representative group of people in a short period of time, providing the means to generate data that can be quantified and analyzed, thereby providing a chance to assess different issues by collecting the views of people with different social, economical and geographical backgrounds (Appleton, 1994; Oppenheim, 1992; Akbar et al., 2003).

Aesthetics of tall buildings in urban landscape

The definition of a high-rise building, or how many floors building must have in order to start being perceived and defined as high, is subject to variations. According to Gifford (2007), a building above three floors tall can already be considered tall. Based on the human scale and the safety of the occupants of buildings as a limit of verticality, a building would be high if it were taller than five floors, as this is the maximum height allowed in many countries for vertical movement without the use of elevators (Gonçalves, 2010). Council of Tall Buildings and Urban Habitat (CTBUH) has no current definition for tall buildings strictly in terms of number of floors or height, and a building can be classified as such by presenting one or more characteristics in different categories. Thus, the height is relative to the context since the perceived height of a building depends on the height of buildings in a context and on the location of the observer. Buildings that do not have many floors but are narrow in width may seem like a tall building, especially when in an urban context of buildings that are not as tall. The parameter for defining the height from which a building can begin to be considered high, can only be considered in relation to the human scale, proportion, and of the heights permitted by the master plans of each city.

"Buildings considered tall can have a substantial impact in the areas where they are built; impact with regards to: the economy (real estate appreciation or depreciation), infrastructure (increased population density, overloading networks, intensification of traffic), microclimate (shading, ventilation), urban landscape (alteration and adulteration of the local landscape), and the use of urban space." (Gregoletto and Reis, 2012)

In respect to their effect on the environment and visual perception, all tall buildings should be composed of three distinct sections: base, shaft, and top (Sev, 2009). The designer can use this information as a basis for an analysis of tall building. *Base* is the part that is seen from street level, is contained within the 40° cone of vision. Depending on the depth of open space in front of the building, this section usually rises to a height of five to eight stories. Having little effect on the urban decoration, base has significant impact on the scale and definition of the street and the humanizing effect of tall buildings (Ali and Armstrong, 1995). *Shaft*, which extends from the base upward, is the prominent form of a tall building. It is important in altering the quality of interaction between a building and surrounding conditions (Sev, 2009). *Top* rarely affects the surrounding condition, but significantly impacts the city's skylines. Tall buildings assume the role of high-level icons for the city, and can create an epic-scale skyline. The top is the most important component of the tall building in terms of its impression in the city silhouette. The tops of tall buildings impose their profiles on the urban landscape of the skyline (Ibid.).

According to *London View Management Framework 2009*, for assessing the impact of high-rise buildings, following factors should be referred:

i. "The scale, grain and massing of the proposal in relation to the existing townscape;
ii. Its appearance and materials (including texture, colour, scale and reflectivity);
iii. The effects on the skyline;
iv. The obstruction of existing views and any loss of views to the identified landmarks;
v. The visual relationship of the proposal to its setting and surroundings;
vi. Night-time effects/lighting, including aviation and other lighting, and their impact on the landmarks and the viewing experience generally;
vii. Seasonal changes, weather conditions and any shadowing from other buildings." (Greater London Authority, 2009).

With growing recognition of the effect of tall buildings on the aesthetic quality of urban environment, there is a tendency toward making regulations with aesthetic effect (Delafons, 1990; Habe, 1989; Preiser and Rohane, 1998; Appleyard, 1969; Appleyard and Fishman, 1977; Nasar, 1988). Stamps (1991) investigated the influence of height, complexity, and style on preference for individual buildings. Lim and Heath (1993) developed a mathematical model that permits the construction of synthetic skylines with characteristics reflecting those of actual cities. Smith et al (1995) investigated the interaction of the proportion and spacing of tall buildings in influencing preferences (Heath et al, 2000).

According to Dornbusch and Gelb (1977), aesthetic issues are the most important evaluators of environmental quality for city residents and workers. Zacharias (1999) investigated public preference for urban views of a natural amenity using drawings. He compared preferences for three relationships between buildings and landscapes (Fig. 1). The stimuli were 11 scenes of high rise buildings against a mountain ridge. He found that preserving a limited number of view corridors while restricting building height was preferred over policies for uniformly low buildings or for taller buildings with multiple views.

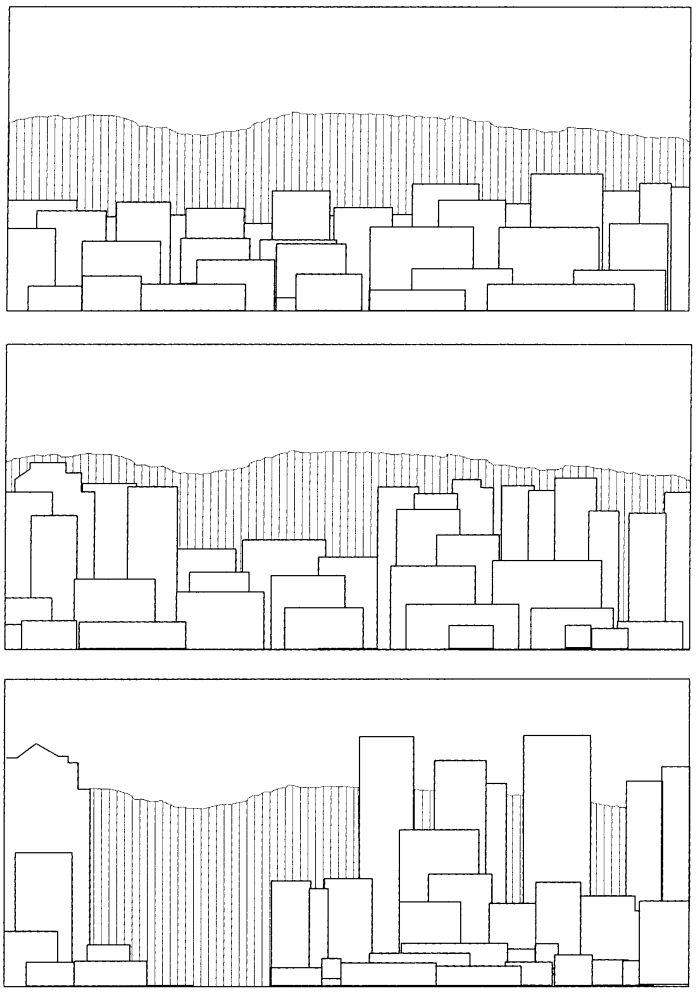

Figure 1. Skylines in which all buildings are low (top), some buildings reach the mountain ridge line (middle), or some buildings break the ridge (bottom) (source: Stamps, 2002)

According to Heath et al. (2000), “the visual complexity of the tall buildings that make up the urban skyline can vary according to the degree of silhouette complexity and the extent to which the façade is articulated”. They investigated the effect of silhouette and façade complexity of tall buildings on preferences for skylines. Silhouette complexity was evaluated based on the number of straight segments, the number of ornamental projections, the number of curved or sloping segments, and whether the shape was symmetric about a vertical axis. Façade articulation was assessed based on Gestalt ideas such as genuine elements, groupings, hierarchy, and symmetry. In the skyline experiment, each of the nine scenes contained seven tall buildings above a row of smaller buildings (Fig. 2). They concluded that the strongest influence on preference, arousal, and pleasure was the degree of silhouette complexity, with higher silhouette complexity associated with higher levels of perceived complexity and preference and higher arousal and pleasure. Another empirical study of skylines investigated the effects on visual appeal of periods of convex mounds and shape entropy of synthetic skylines (Nasar et al., 2001). There were three periods of convexity: one, two and four mounds. There are three conditions as for a convex shape; one, two, and four mounds (Fig. 3). Results showed that participants preferred skylines with the most building diversity and an overall simple shape.

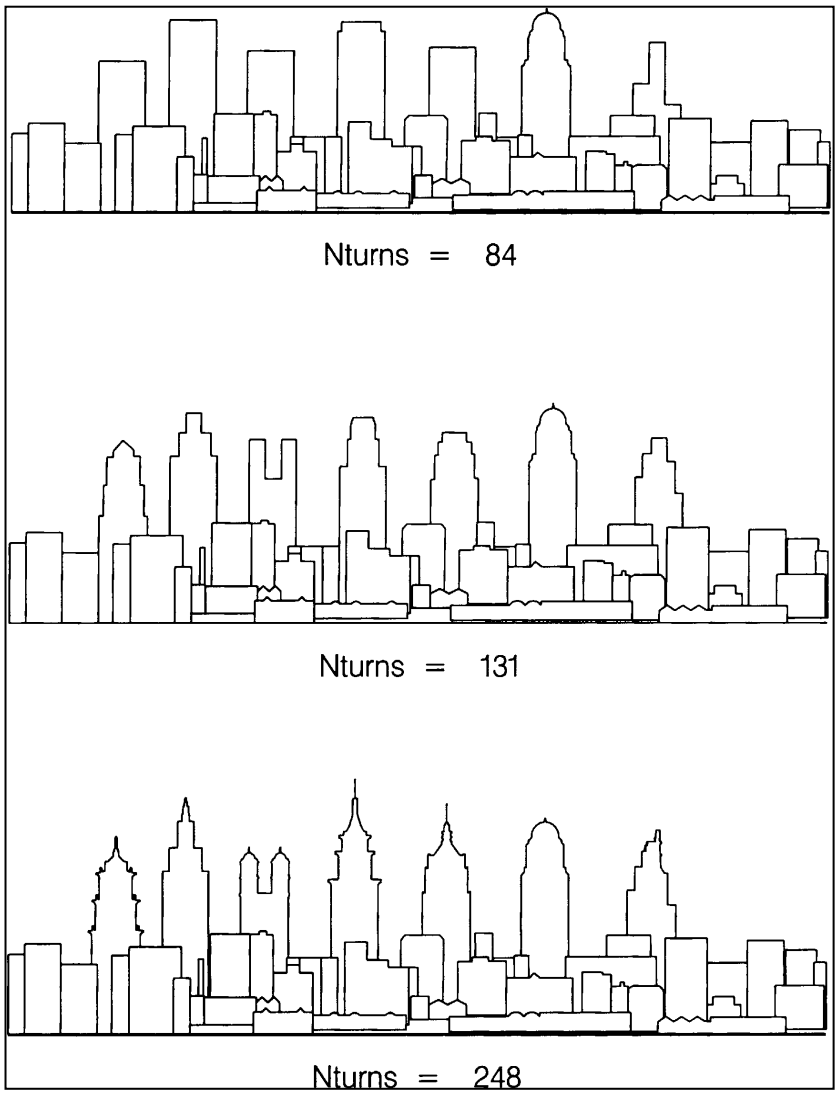

Figure 2. Skylines with different numbers of turns in the silhouette (source: Stamps, 2002)

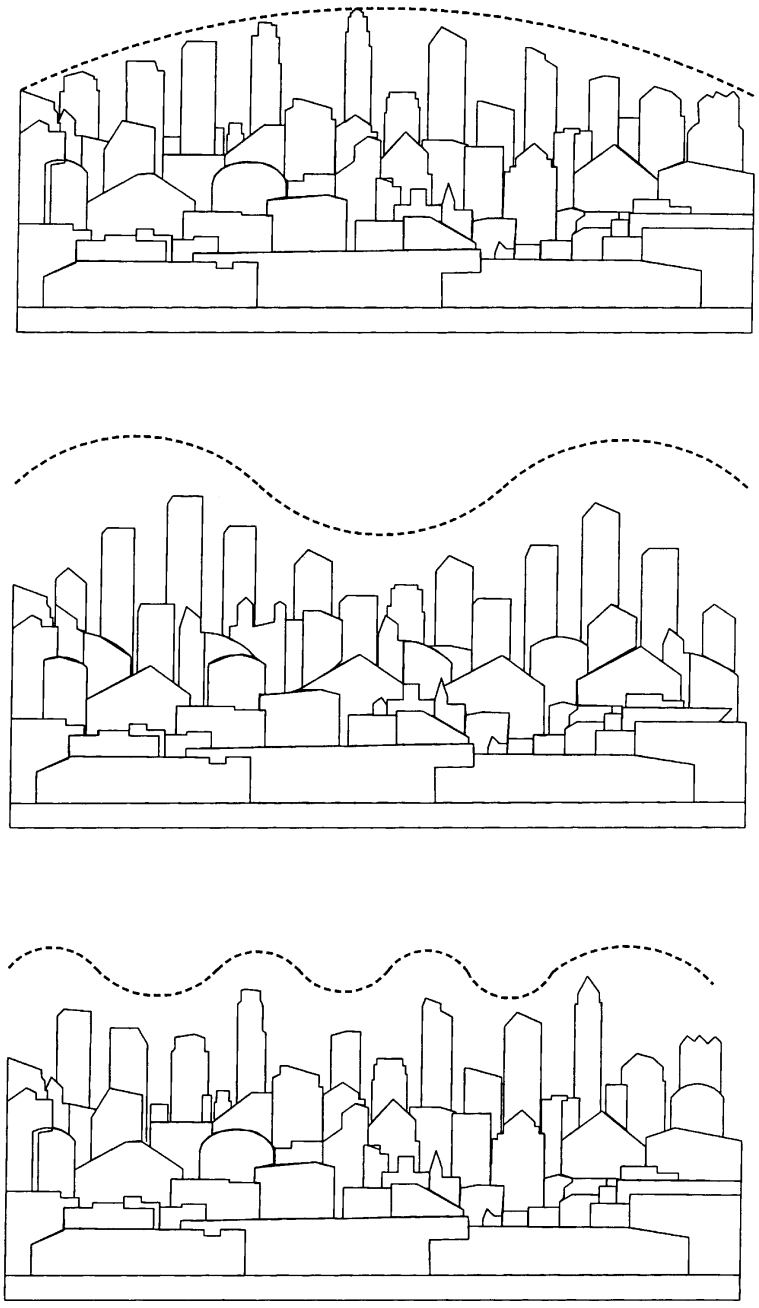

Figure 3. Skylines with different number of convex mounds in the silhouette (source: Stamps, 2002)

Stamps (2002) tested the theory of contextual fractal fit, a theory of skyline design, by creating scenes in which the fractal dimension (height, width, depth, and setback) of the skylines did or did not match the fractal dimension of mountains in the background. The stimuli were created in three stages: (a) mathematical structures, (b) mapping the mathematical structures to physical features, and (c) assembling the renderings. The mathematical structures were: constant, normal and fractal distributions. Results showed that contextual fractal fit had a very small effect on preferences. Also, there was a large visual difference between the uniform distribution and the random normal or fractal distribution, but far less of a visual difference between the normal and fractal distributions (Fig. 4). He also found that fractal structure had more influence on preference in building features.

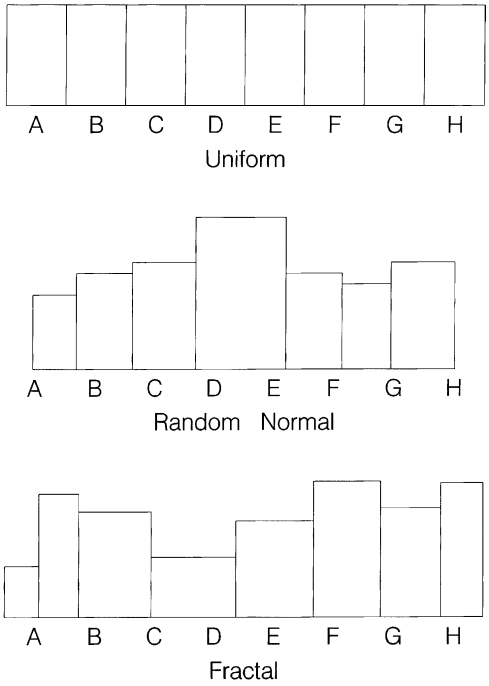

Figure 4. Images corresponding to fractally-distributed numbers obtained by Stamps (2002) for heights and widths of tall buildings

CONCLUSIONS

Considering the aim of this study which was to study aesthetics of tall buildings in the city landscape, scenic aesthetics was discussed. In scenic beauty, in addition to physical attractiveness of tall buildings, the position of beholder should also be specified. In fact, scenic beauty makes sense in the presence of beholder in the city. In reviewing tall buildings, it was found that the top is the most important component of the tall building in terms of its impression in the city silhouette. Moreover, based on studied conducted on the aesthetic effects of tall buildings in the city context, we found out that factors, such as the degree of silhouette complexity, shape and number of view corridors, the height of tall building against the natural backdrops including mountains in the urban landscape, and skyline are determinants in the aesthetics of tall buildings in the city context. Silhouette complexity of tall building leads to preference, pleasure, and arousal. About the skyline, according to evidences, it was found that a simple shape with fewer number of convexity receive preference. In relation to the height of tall building against natural backdrops, it was found that lower height of tall buildings is preferred compared to background scenery providing that this difference is not great. The mix proportion of the composite materials used for the block production was 1: 6 (i.e. one part of cement to six parts of sand) and was by volume batching.

References

Akbar, K., Hale, W. H. G. And Headley, A. D. (2003). Assessment of Scenic Beauty of the Roadside Vegetation in Northern England. *Landscape and Urban Planning*, 63 (3), 139-144.

Ali, M.M, and Armstrong, P.J. (1995). *Architecture of Tall Buildings*. McGraw-Hill, New York. Pp.227-284.

Appleyard, D. (1969). Why Buildings Are Known. *Environment and Behavior*, 1, 131-156.

Appleyard, D., and Fishman, L. (1977). High Rise Buildings versus San Francisco: Measuring Visual and Symbolic Impacts. In D. Conway (Ed), *Human Response to Tall Buildings*, Stroudsburg, PA: Dowden Hutchinson Ross, Pp. 81-100.

Appleton J. (1994). Running Before We Can Walk: Are We Ready To Map Beauty. *Landscape Research*, 19, 112–119.

Arriaza, M., Cañas-Ortega, J. F., Cañas-Madueño, J.A., and Ruiz- Aviles P. (2004). Assessing the Visual Quality of Rural Landscapes. *Landscape and Urban Planning*, 69(1), 115-125.

Arthur, L.M., Daniel, T.C., and Boster, R.S. (1977). Landscape Assessment: A Critical Review of Research and Methods. *Landscape Management*, 4, 109-129.

Arthur, L.M., Daniel T.C., and Boster R.S. (1977). Scenic Assessment: An Overview. *Landscape Planning*, 4, 109–129.

Briggs, D.J., and France, J. (1980). Landscape Evaluation: A Comparative Study. *Journal of Environmental Management*, 10, 263–275.

Chen, B., Adimo C.A., and Bao, Z. (2009). Assessment of Aesthetic Quality and Multiple Functions of Urban Green Space from the User's Perspective: The Case of Hangzhou Flower Garden, China. *Landscape and Urban Planning*, 93(1), 76-82.

Crofts, R.S. (1975). The Landscape Component Approach to Landscape Evaluation. *Transactions of the Institute of British Geographers*, 66, 124–129.

Daniel, T.C. and Vining, J. (1983). Methodological Issues in the Assessment of Landscape Quality. In: Altman, I., Wohlwill, J. (Eds.), *Human Behavior and Environment*, Plenum Press, New York. Pp.39-84.

Daniel, T. C. (2001). Wither Scenic Beauty? Visual Landscape Quality Assessment in the 21st Century. *Landscape and Urban Planning*, 54(1-4), 267- 281.
Delafons, J. (1990). Aesthetic Control: A Report On Methods Used In The USA To Control The Design Of Buildings, Berkeley: Institute Of Urban And Regional Development, University Of California At Berkeley.
Dornbusch, D. & Gelb, P (1997). High Rise Visual Impact. In D. Conway (Ed.), *Human Response to Tall Buildings*, Dowden Hutchinson Ross, Stroudsburg, PA. Pp. 101-111.
Fechner, G. (1876). *Vorschule Der Aesthetik*. Breitkopf Und Hartel, Leipzig.
Garcia, J.M., and Cañas, I. (2001). La Valoración Del Paisaje. In: Ayuga, F. (Ed.), *Gestión Sostenible De Paisajes Rurales*. Técnicas E Ingenier. Mundi-Prensa, Madrid.
Gifford, R. (2007). The Consequences of Living in High-Rise Buildings. *Architectural Science Review*, 50(1), 1-16.
Gobster, P.H. (1999). An Ecological Aesthetic for Forest Landscape Management. *Landscape Journal*, 18(1), 54–64.
Gonçalves, J. C.S. (2010). *The Environmental Performance of Tall Buildings*. Earthscan, London.
Greater London Authority (2009). Draft Revised Supplementary Planning Guidance: London View Management Framework SPG: The London Plan (Spatial Development Strategy for Greater London). Greater London Authority, UK.
Gregoletto, D., and Reis, A. T. (2012). High-Rise Buildings in the Perception of the Users of the Urban Space. *PROARQ*, 19, 89-110. Available At: Http://Hdl.Handle.Net/10183/72132
Habe, R. (1989). Public Design Controls in American Communities. *The Town Planning Review*, 60, 195-219.
Heath, T. Sandy G. Smith, Lim B. (2000). Tall Buildings and the Urban Skyline: The Effect of Visual Complexity on Preferences. *Environment and Behavior*, 32, 541-556.
Holm, I. (2006). Ideas and Beliefs in Architecture and Industrial Design: How Attitudes, Orientations, and Underlying Assumptions Shape the Built Environment. Oslo School of Architecture and Design.
Junker, B. and Bucheker M. (2008). Aesthetic Preferences versus Ecological Objectives in River Restorations. *Landscape and Urban Planning*, 85(3-4), 141-154.
Laurie, I.C., (1975). Aesthetic Factors in Visual Evaluation. In: Zube, E.N., Brush, R.O., Fabos, J.G. (Eds.), *Landscape Assessment: Values, Perceptions and Resources*. Dowden Hutchinson and Ross, Stroudsburg. Pp. 102–117.
Lim, B., and Heath, T. (1993). What Is A Skyline: A Quantitative Approach. In J. Hayman (Ed.), *Architectural Science: Past, Present And Future. Proceedings of the Conference of the Australian and New Zealand Architectural Science Association*. Department Of Architecture, University Of Sydney, Sydney. Pp. 22-32.
Lothian, A., (1999). Landscape and the Philosophy of Aesthetics: Is Landscape Duality Inherent in the Landscape or in the Eye of Beholder? *Landscape and Urban Planning*, 44, 177-198.
Nasar, J. (Ed.). (1988). *Environmental Aesthetics*. Cambridge University Press, Cambridge, UK.
Nasar, J.L., Imeokparia, T., and Tiwari, R. (2001). Skyline Entropy, Order and Preference (Working Paper). Ohio State University, Department Of City and Regional Planning, Columbus, OH.
Nohl, W. (2001). Sustainable Landscape Use and Aesthetic Perception—Preliminary Reflections on Future Landscape Aesthetics. *Landscape and Urban Planning*, 54(1-4), 223-227.
Oppenheim, A.N. (1992). *Questionnaire Design, Interviewing And Attitude Measurement*. 2nd Ed. Printer, London.
Parsons, R., and Daniel, T. (2002). Good Looking: In Defense of Scenic Landscape Aesthetics. *Landscape and Urban Planning*, 60(1), 43-56.
Prieser, W., and Rohane, K. (1988). A Survey of Aesthetic Controls in English Speaking Countries. In J. Naser (Ed.), *Environmental Aesthetics*. Cambridge University Press, Cambridge, UK. Pp. 422-433.
Real, E., Arce C., and Sabucedo, J. (2000). Classification of Landscapes Using Quantitative and Categorical Data, And Prediction of Their Scenic Beauty in North-Western Spain. *Journal of Environmental Psychology*, 20, 355–373.
Sev, A. (2009). Typology for the Aesthetics and Top Design of Tall Buildings, G.U. *Journal of Science*, 22(4): 371-381.
Shafer, E.L., Hamilton, J.F., and Schmidt, E.A. (1969). Natural Landscape Preferences: A Predictive Model. Journal of Leisure Research, 1, 1–19.
Shuttleworth, S. (1980). The Evaluation of Landscape Quality. *Landscape Research*, 5, 14–20.
Smith, S. G., Heath, T., and Lim, B. (1995). The Influence of Building Height and Spacing on the Evaluation of City Skylines: A Comparison between Architects and Non-Architects. In Nasar J., Grannis P., & Hanyu K. (Eds.), *Environmental Design Research: Proceedings of the Twenty-Sixth Annual Conference of the Environmental Design Research Association*. Oklahoma City: Environmental Design Research Association. Pp. 65-69.
Stamps, A. (1991). Public Preference for High Rise Buildings: Stylistic and Demographic Effects. *Perceptual and Motors Skills*, 72, 839-844.Stamps, A.E. (2002). Fractals, Skylines, Nature and Beauty. *Landscape and Urban Planning*, 60(15), 163-184.
Thorne, J.F. and Haung, C. S. (1991). Toward a Landscape Ecological Aesthetic: Methodologies for Designers and Planners. *Landscape and Urban Planning*, 21(1-2), 61-79.
Tuan, Y.F. (1979). Thought and Landscape. In: Meining, D.W. (Ed.), The Interpretation Of Ordinary Landscapes. Oxford University Press, Cambridge, UK.
Wang, M., and Yu, B. (2012). Landscape Characteristic Aesthetic Structure: Construction of Urban Landscape Characteristic Time-Spatial Pattern Based On Aesthetic Subjects. *Frontiers of Architectural Research,* 1(3), 305–315.
Wherrett, J.R. (2000). Creating Landscape Preference Models Using the Internet as a Medium for Surveys. *Landscape Research*, 25, 79–96.
Zacharias, J. (1999). Preferences for View Corridors through the Urban Environment. *Landscape and Urban Planning*, 43(4), 217-225.