

**Investigating the role of lighting in increasing security and
developing tourism in new cities (the case of the new city of
Baharestan, Iran)**

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Abstract

Today, tourism has a significant effect on different economic, cultural and political dimensions of a country. Success in this field requires attention to providing facilities in tourism destinations. One of the most influential facilities in this connection is lighting. By creating value, urban lighting increases the capabilities of tourism attractions and results in increased sense of security among tourists and citizens and thus helps develop the tourism industry. This paper was an attempt to investigate the importance of city lighting as one of the most significant urban elements and to examine its impact on the security of tourists visiting the city of Baharestan. The study was a descriptive-analytical field inquiry. The data was collected using questionnaires. The population comprised all over-20-year-old citizens of the city of Baharestan in 2015 whose number was unknown. $n = \frac{Z^2 s^2}{D^2}$ formula was used to determine the sample size, which was finally determined to be 507 individuals. The study used purposive sampling. SPSS software and t-test were used to analyze the data. The findings revealed that over 80% of the population of the city of Baharestan believed in the importance of lighting in enhancing security and convenience at night and in further developing tourism and increasing the attractiveness of tourism spaces. Besides, they also expressed satisfaction with the city's lighting.

Keywords: lighting, security, tourism development, Baharestan city.

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Introduction

A city's lighting shows the identity and appearance of the city, and lack of light and domination of darkness leads to problems such as increased rate of accidents, car crashes, crimes and delinquencies, and decreased social security. After humans learned to better use natural light sources to illuminate their surroundings, light began to be deemed an integral part of the built environment [1]. Therefore, the first environmental factor which is essential for every activity is light. This factor has a stronger effect than other physical variables and is an essential environmental input for humans [2]. One of the important functions of lighting is establishment of security in urban spaces, which leads to the sense of security in the residents and tourists. Due to the fact that tourism is considered a smokeless industry which is both a cause and an effect in the process of globalization, many planner and policy makers regard this industry as the main element in sustainable development [3]. Hence, by creating value, increasing the attractiveness of tourist destinations, and creating a sense of security in residents and tourists, city lighting plays a significant part in the development of tourism [4]. Besides reviving urban environment in the city, and creating a memorable scene for the tourists, city lighting can serve as a tourist attraction by influencing the security and increasing the time of urban tourism if used properly. Therefore, today, it is universally acknowledged that lighting is an essential element in creating a built environment and influence people's experiences of the urban environment at night [5]. Lighting is the basic parameter in obtaining welfare and security in the city and increasing the beauty of its scenery at night. Therefore, the above criteria and rules must be taken into consideration in correctly designing city lighting equipment. Basically, the issue of city lighting and urban spaces must be designed in a comprehensively and all effective and functional parameters of lighting such as social security, traffic safety and night beauty and scenery must be taken into account [6]. In fact, city lighting is a blend of lighting of passages, building,

urban furniture and seasonal lighting, which, besides providing the opportunity for continuing the activities and urban functions at night, plays a significant part in establishing security and safety and increases the attractiveness of urban environment [7]. The problem is, due to the fact that although the function of lighting as one of the ways of forming urban spaces and making them suitable places at night has been taken into consideration, according to the evidence, its potentiality as an important factor in establishing security and discipline and improving tourism in some Iranian cities, especially in planning and design of newly built cities or cities under construction has received scant attention [8]. One of the new cities is Baharestan, located 15 kilometers from Isfahan, which is meant to host the surplus population of Isfahan metropolis. It has been fairly successful in its purpose. However, according to the observations and reports of the experts, the city is still faced with many problems with respect to planning and providing facilities in some urban spaces, particularly in tourist spaces. Therefore, it is necessary that the city's authorities make more efforts in their design, planning and decision-makings to tackle the problems and elevate the citizens' and tourists' sense of security in the streets and tourist spaces of the city. Hence, the present study was an attempt to investigate and analyze the effectiveness of lighting in improving the security of urban tourism and developing tourism in this city. The study aimed to answer the following questions: Does city lighting increase the security and convenience of tourists and residents of Baharestan city at night? Does city lighting helps to enhance tourism development in Baharestan city? Does urban lighting increase the attractiveness of tourist spaces of Baharestan city? Are Baharestan citizens satisfied with the quality of urban lighting in the city's tourist spaces?

Review of literature

Ben Boa (2007) in the book 'Beauty of Light' investigated the different aspects of the effect of light on human life and environment and highlighted the functions of light in different industries and arts [9]. Gary Sttefy (2010) in his book entitled *Architectural lighting design*, mentions the artistic and technical principles and aspects of architectural lighting with artificial light and investigates the whole

process of a lighting project from inception to the end in buildings [10].

Mitja Prelovsk (2012) in a project entitled *lighting of urban parks* investigated two parks in Slovenia and offered some guidelines for improving the nightlife quality of parks which can be generalized to other similar urban spaces [11]. David Hebert and Norman Davidson (2013) in their paper entitled "Modifying the built environment (the effect of improving street light), investigated the role of street lighting in decreasing crime, demonstrating that there was a significant correlation between street lighting and decreased crime [12]. Igor Knez (2015) in his paper entitled "Effects of indoor lighting on mood and cognition" investigated the effect of lighting on human moods and examined the effect of indoor lighting with different intensities and colors on human. He considered lighting one of the factors influencing human performance in the workplace and life, demonstrating that it has different effects on men and women [13]. In Iran, Taghvaei et al. (2011). In a paper entitled "Investigating the role of lighting in urban tourism development" concluded that if lighting is considered not as a luxury but an effective element in reconstruction of city night life, and if a scientific, planned approach is adopted, it can improve the quality of urban life and play an important role in increasing the attractiveness and the time of activity and urban security for citizen and, as a results, help further develop the tourism industry [14]. Adibi et al. (2013) in their paper studies the principles of lighting in city parks. Having investigated the general principles of lighting of city parks, they argue that the night appearance is an integral part in the design of parks and gardens and must be taken into consideration by designers simultaneously with other parts. The authors considered city lighting an important factor in finding turning points, signs, passage routes, providing facilities and security, and encouraging citizens to use the parks at night [15]. To date, various studies have been conducted in Iran and abroad in different fields such as sociology, architecture, etc. to investigate urban issues. However, few studies have adopted a specialized perspective toward these issues in the field of urban planning, especially with regard to the effect of lighting on security of development of urban tourism. Therefore, the present study attempted to serve as a new piece of research to investigate the role of lighting in

promoting the security of tourists and helping to develop the tourism industry.

Definitions, viewpoints, and theoretical framework

Lighting

Lighting is a blend of science and art. It is a subject regarding how people illuminate their environment, and how they perceive it and react to it [16].

City lighting

City lighting is, in fact, a blend of lighting of passages, building, urban furniture, traffic lights, urban screens, and seasonal lighting, which, besides providing the opportunities to continue the urban activities and functions at night, plays a significant role in providing security and convenience, and enhancing the attractiveness of urban environments [17].

Urban tourism

The tourist-host interaction and the production of tourist space by traveling to urban areas with different motivations, visiting attractions, and use of tourism facilities and services, which have different effects on urban space and economy [18].

Theoretical principles and viewpoints

City lighting and urban tourism

In his book *Urban Development: Myths and Realities*, Françoise considers one of the main reasons of lack of urban attractiveness to be lack of light and clarity of background and urban factors which do not appeal much to tourists particularly at night [19]. In this regard, Colin Lynch, the great theorist of urban issues maintains that a city with bright, visible symbol attracts their eyes and attention and appeals to people. Roger Narboni in his book *lighting the Landscape: Art, Design and Technologies* argues that the proper use of lighting in urban spaces and the use of planning to appropriately use lighting are a means for developing urban tourism.

Urban tourism and establishing security and peace in urban environments

Natalie Bill in her book *Lighting and Perception of Security* maintained that increases in lighting intensity leads to decrease in crimes. She emphasized that more lighting give a higher sense of security and enhances life quality [20]. Steiner in the book entitled

Security Threats in Tourism maintains that to improve the lighting of urban spaces has important effects on urban security and reduces fear of crimes and increases peace in public spaces [21].

City lighting and creating attractive urban environments

In the book *Professional Lighting Design* the author maintained that using studied and professional city lighting, it is possible to eliminate all inappropriate urban views lacking lighting and brighten up the strong points of the city's physical structure. The examples of this approach to city lighting can be seen in the port city of Hong Kong. To attract urban tourist whose number had been substantially reduced following the outbreak of RARS disease, the tourism commission of Hong Kong city developed a lighting and LASER performance plan based on which 18 prominent buildings of this city were selected as appropriate buildings for lighting after the conduction of a series of studies and processes. The attraction of LASER lighting of the selected buildings received so much attention that in the first year following the inauguration of the project the number of urban tourists increased by 31 percent. Urban symbols and monuments, too, have great potentiality for lighting and hence can conjure up shared memories for the city's residents and create good memories for tourists and passengers. It can also intensity such memories and help to increase urban legibility [22].

Method

This study is an applied piece of research falling into the category of descriptive-analytical studies. The study follows an inductive reasoning line of thinking. Data collection was conducted through library and field investigations. Considering the fact that the study sought to analyze the effect of city lighting on the security and development of tourism in Baharestan city based on the views of the residents using questionnaires, it was conducted as a descriptive survey. The population comprised all over-20-year-old residents of

Baharestan city in 2015 whose number is unknown. The $n = \frac{Z^2 S^2}{D^2}$ formula was used to determine the sample. Based on the calculations

($n = \frac{1.96^2 \times 0.33}{0.05^2} = 507$), 507 individuals were selected as sample.

Considering that the population was distributed in different urban areas, the method used for sampling was purposive random sampling.

The study was conducted in the first half of the year 2015 in Baharestan city. Researcher-made questionnaire was used for data collection. The queries had been drafted based on the four elements of increased convenience and security, tourism development, attractiveness of tourism spaces, and satisfaction with urban and tourism spaces. The questionnaire included 6 queries with a five-item spectrum answer (very high- high- average – low – very low). The scores for the responses ranged from 1 to 5. To determine the validity of questionnaires, first, using the references, early investigations and expert judgment, 10 questions was drafted. Afterwards, in order to determine the reliability of the questionnaires, 7 professors were asked to rank the question is a spectrum ranging from *very weak* to *very strong* whereby 4 questions were categorized as *very weak*. The mean score of the professors' assessment of the 6 remaining questions was 3.95 (in the five-point scale Likert), which was indicative of optimal reliability of the questionnaire. Afterwards, in order to increase the reliability, the questionnaire was reviewed and the final draft of the questionnaire was designed in 6 queries and, based on Kendall coefficient, the reliability of the questionnaire was determined to be 0.73, which is appropriate. After conducting an early study and determining the variance of the questions, using Cronbach's Alfa, the reliability of the questionnaire was determined to be 0.82. In order to conduct inferential analysis, the data were processed using SPSS software and one-variable t-test.

Analytical research model

The present research was conducted based on the following model according to which the effect of lighting on three factors influencing tourism (i.e. security, attractiveness and increased tourism time) was investigated.

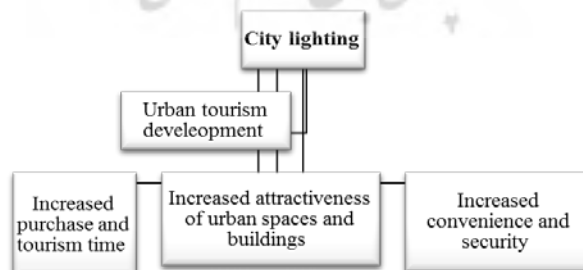


Figure 1. Analytical research model Source: Authors

The study area and tourism spaces of Baharestan city

Baharestan city is located 15 km south of Isfahan city at the foot of Lashtar Mountain. A beautiful, low mount named Miankoo has created an attractive wall in the south of the city and the farmlands are connected to the green Zayanderood plain with a mild slope. Baharestan is the result of studies and predictions of the comprehensive regional plan of Isfahan which was passed in 1986 by Iran's Supreme Council of Architecture and Urban Planning. The plan started in 1988. In this plan, the city's area was determined to be 2,500 to 3,000 hectare and the population between 320,000 and 350,000.

In the first stage, the city was constructed with an area of 3,000 hectare including Phases 1, 2 and 3 in order to accommodate a hundred thousand people [23]. According to the latest census, the population of the city is 64,000 people [24]. Tourist spaces of the city include: shopping malls (e.g. Ashkan shopping mall, etc.), Behesht recreational complex (including green space, playgrounds, etc.), Zeitoon artificial lake (Zeitoon park), Koohestna Park, National Park and Kollah Ghazi wild life refuge, Eram Park, Pardis Park, Golestan Grand Park, historical monuments from the Safavid and Qajar dynasties (Shah Abbasi Caravansari, Baharestan Garden, The shrine of Baba Pir Mahmud Ibn Jaber Abdullah, as well as the beautiful Lashtar mountains surrounding the city [25].

Findings

Tests of the hypotheses

In this section, the findings related to the hypotheses are displayed in figures 1 to 4.

Hypothesis 1: City lighting is effective in increasing the convenience and security of tourists and residents of Baharestan city at night.

Table 1. Results of one sample t-test for comparing the mean of effect of city lighting on increased convenience and security for tourists and citizens of Baharestan city at night with the hypothetical mean 3

Significance level	T	Standard deviation	Mean	Variable
0.0001	36.54	0.78	4.26	Effect of city lighting on increased convenience and security for tourists and residents of Baharestan city at night

Source: authors

Hypothesis 2: City lighting is effective in developing tourism in Baharestan city.

Table 2. Results of one sample t-test for comparing the mean of effect of city lighting on the development of tourism in Baharestan city with the hypothetical mean 3

Significance level	T	Standard deviation	Mean	Variable
0.85	16.03	1.03	3.73	Effect of city lighting on the development of Tourism in Baharestan city

Source: authors

Hypothesis 3: City lighting increases the attractiveness of tourism spaces in Baharestan city.

Table 3. Results of one sample t-test for comparing the effect of city lighting on the attractiveness of the tourist spaces of Baharestan city with the hypothetical mean 3

Significance level	t	Standard deviation	Mean	Variable
0.85	32.81	0.81	4.17	The effect of city lighting on the attractiveness of tourist spaces of Baharestan city

Source: authors

In the referential analysis, in order to examine the significance level, the t-test was conducted at $\alpha = 0.05$ level. Considering that the resulting mean (3.73) is higher than the hypothetical mean (3) and the resulting t is significant and higher than the critical value in the table (1.95), it can be concluded that city lighting has a significant effect on the development of tourism in Baharestan city.

In the referential analysis, in order to examine the significance level, the t-test was conducted at level. Considering that the resulting mean (3.26) is higher than the hypothetical mean (3) and the resulting t is significant and higher than the critical value in the table (1.95), it can be concluded that city lighting is significantly effective in increasing convenience and security of tourists and residents of Baharestan city.

In the referential analysis, in order to examine the significance level, the t-test was conducted at level. Considering that the resulting mean (4.17) is higher than the hypothetical mean (3) and the resulting t is significant and higher than the critical value in the table (1.95), it can be concluded that city lighting is significantly effective in increasing the attractiveness of tourist spaces of Baharestan city.

Hypothesis 4: Residents of Baharestan city are satisfied with city lighting in the city's tourist spaces.

Table 4. Results of one sample t-test for comparing the degree of Baharestan residents' satisfaction with city lighting in the tourist spaces of Baharestan city with the hypothetical mean (3)

Significance level	t	Standard deviation	Mean	Variable
0.001	3.46	1.11	3.17	Baharestan residents' degree of satisfaction of city lighting in tourist spaces of Baharestan city

Source: authors

In the referential analysis, in order to examine the significance level, the t-test was conducted at level. Considering that the resulting mean (3.17) is higher than the hypothetical mean (3) and the resulting t is significant and higher than the critical value in the table (1.95), it can be concluded that the residents of Baharestan city are satisfied with city lighting in the city's tourist spaces.

Discussion and conclusion

Today, tourism has become a very important activity which makes great spatial changes in cities and serves as one of the effective strategies in urban development, cultural interchange, mutual interaction among nations, and respectful presentation of cultural heritage among the world's countries. However, due to the complexity of the nature of cities and wide economic, social and political networks governing them, urban tourism is facing important challenges. By adopting strategies of growth, improving of urban tourists' mental image of the city, and by increasing the city's beauty, the number of citizens can be increased which further develops urban tourism in the city. Paying attention to the optimal utilization of space and use of appropriate processes to create value and attractiveness in order to enhance urban attractions and the important issue of tourist security are important factors in the development of urban tourism. Therefore, the present study attempted to analyze the role of lighting as an important factor in creating value and attractiveness in urban tourist attractions and as an important factor in enhancing urban security. The findings revealed that appropriate city lighting plays an important role in increasing security and convenience for tourists, such that 86.4% of the respondents mentioned the significant role of lighting in increasing security of convenience of residents and tourist, particularly at night. The findings are also indicative of the important role of lighting in enhancing tourism in Baharestan, and 87.3% of the respondents mentioned the effectiveness of lighting in improving tourism in the city. In addition, the findings demonstrated that lighting can add to the attractiveness of tourist spaces. About 86% of the respondents mentioned the effective role of lighting in increasing the attractiveness of tourist spaces in Baharestan city. The results also showed that, contrary to the researcher's assumption of the dissatisfaction among the people and tourists with city lighting in

Baharestan, 82% of the respondents expressed satisfaction with lighting in the tourist spaces of the city. Therefore, in general, it can be argued that if a planned scientific approach is adopted toward lighting not as a secondary and costly luxury but as an effective strategy in re-architecting of cities at night, it can improve the quality of urban life and develop urban tourism. For this purpose, the main strategy for achieving lighting objectives is changes the attitudes of authorities and related institutions towards the role of lighting in urban issues and tourism. Therefore, in order to further improve the condition of city lighting of Baharestan, the following strategies are recommended:

- Attention should be paid to the increase of the quantity and quality of lighting in passages, tourist spaces, and city squares especial central city squares.
- Special care should be taken to illuminate all areas of the cities.
- Modern technology should be used in lighting in order to increase productivity and reduce costs.
- Specialized lighting centers must be established in the municipalities or its affiliate offices.
- Crime-prone and dangerous places during the night should be identified and studies and an investigated lighting system which can effectively reduce accidents, crime, and delinquency must be placed at the top of the agenda of the related organ of the city.

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