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Application of Green School Site Selection Criteria to Increase Environmental Sustainability; Case Study: Fahadan Neighborhood of Yazd

Hajar Asadpour[a]- Behnaz Taherian[b]- Ali Asadpour[c*]

[a] Ph.D. Candidate of Urban Planning, Faculty of Architecture and Urban Planning, Art University of Isfahan, Isfahan, Iran.

[b] M.A. of Urban Design, Faculty of Art and Architecture, Yazd University, Yazd, Iran.

[c] Associate Professor of Interior Architecture, Faculty of Architecture and Urban Planning, Shiraz University of Arts, Fars, Iran (Corresponding Author).

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ABSTRACT

The site selection process is influenced by compatibility, comfort, desirability, and safety factors. But, these criteria lack some of the green school indicators. The historical texture of Yazd is an example in which many sustainability principles can be seen. However, green school site selection as the first step in achieving environmental sustainability in land use planning has been less considered by urban planners, the key subject of the current study. Consequently, in the current study, by matching the criteria for school site selection and green school indicators, a theoretical framework and a model for green school site selection have been offered to evaluate the schools in the historical neighborhood of Fahadan, Yazd. With the case study strategy, data collection was done using library studies. Next, the current locations of the schools in the area studied have been assessed in terms of each of the effective sub-criteria in the green school site selection and the places suitable for the establishment of green schools have been introduced using the GIS software and AHP technique in the Expert Choice software. Results indicate that sub-criteria such as "use of abandoned land," "use of lots in need of renovation," "orientation of the building towards the desired light," "use of the desired wind to adjust the ambient temperature," "preventing the surrounding buildings from overlooking the school," as well as "having maximum open space" and "land slope of 0-10 percent" can be added to current site selection models. In general, based on the proposed site selection model, it is observed that the sites selected for primary schools in the Fahadan neighborhood of Yazd are not in accordance with the green school site selection criteria. Generally, it can be said that the criteria of comfort and safety have received less attention in the primary school site selection in this neighborhood. The proposed sites for the construction of green schools in this neighborhood can also be effective in promoting environmental sustainability.

Keywords: Fahadan Neighborhood, Site Selection, Green Schools, AHP Technique, GIS.

* E_mail: asadpour@shirazartu.ac.ir

1. INTRODUCTION

Society and the economy were the basis of global development until 1987, and then the environment was added to them (Edwards, 2014, p. 33). Climate change is a challenge facing today, with buildings playing a key role in achieving sustainability in cities. The "green architecture" movement appeared in the 1990s to promote building design practices with fewer environmental impacts (National Research Council, 2007). Therefore, green architecture must be considered a sustainable component of the urban environment. Generally, green (sustainable) building refers to the structure and processes of using building, which are environmentally more efficient in the life cycle of the building, from design to construction, use, protection, and demolition (Mahdavinejad et al., 2014, p. 235). Green buildings protect their resources more efficiently throughout the life cycle of the building, including the initial construction phase by properly using energy, water and materials (LOHAS Dictionary, 2010 Cited in Mahdavinejad et al., 2014). According to Tilbury, there is no single definition of the concept of green schools worldwide (Tilbury, 2008). "A school building or facility that creates a healthy environment that is conductive to learning while saving energy, resources, and money" is considered a green school (Douglas & Gordon, 2010, p. 1).

The research problem is defined at two levels. At the first (macro) level, the nature of green school design is addressed. In the design of green schools, attention to the significant reduction of waste in them or components such as the optimal use of non-renewable energy are items that considered by planners and green architects. Nonetheless, the lesser-known component is proper site for building green schools. This issue is particularly significant and less addressed in historical textures that have found greater adaptation to natural and climatic conditions throughout history. At the second level (micro), urban land use planning in historical textures is addressed. In land-use planning, often without considering the green school site selection criteria and only in the most optimistic case, a suitable site is chosen for the construction of new schools in the texture considering the criteria for school site selection which are in consistent with the principles of sustainability and green school site selection criteria. Such a consistency, in addition to reducing the efficiency of schools, also disrupts the environmental sustainability of the area.

Accordingly, the research hypothesis is based on the fact that the school site selection in the historical texture of the Fahadan neighborhood in Yazd city not only does not meet the criteria for green school site selection but also the historical experience of sustainability in a valuable texture will not lead to the creation of green schools. Consequently, this study aims to develop a model for green school site selection and to test it in the Fahadan neighborhood of Yazd as an example of the historical texture in a hot and dry zone. To this end, the current locations of primary schools as basic schools in the structure of urban neighborhoods have been examined. Since the historical texture of Yazd has been registered worldwide, it is very significant to address green school site selection to protect the texture and enhance its sustainability. The research questions are as follows: 1.What criteria and indicators does the green school site selection model include? 2. To what extent do the locations of primary schools in the historical neighborhood of Fahadan in Yazd meet the criteria for green school site selection? 3. What other sites in the neighborhood are suitable for establishing green schools (elementary school)?

2. RESEARCH BACKGROUND

In urbanism, numerous researches have been done on school site selection. National researches have examined the locations of educational centers in different cities of Tehran, Isfahan, Tabriz, Ahvaz, Bandar Abbas, Dehdasht, etc. They have found that in most cases, the schools were not properly located and distributed (Farhady Googueh and Parhizkar, 2002; Sattarpour, 2014; Maleki et al., 2016). To investigate the locations of schools, criteria of compatibility, desirability, distance from other uses, capacity and radius of access, being away from terrains have been considered. Most of the researches have also introduced and located the proposed sites, because the places of schools don't significantly meet some criteria (Taghvaei and Rakhshaninasab, 2010; Varesi and Rezaei, 2012; Firoozi et al., 2016). To evaluate the current situation and present the proposed sites, GIS (Valizadeh, 2007; Amanpour et al., 2015), Analytic Hierarchy Process (AHP) (Movahed et al., 2011), Boolean and fuzzy logic (Expert choice) (Kavousy et al., 2011; Parvizian et al., 2018; Firoozi et al., 2016), and one-way analysis of variance (Namdari Darehdang, 2015) have been used.

In international studies, in addition to the mentioned criteria, the distance from the fault, the land slope, the distribution of current schools, and their physical characteristics have been weighed, and sites suitable for school construction have been suggested 2012 (Okan, 2012; Pizzolato et al., 2004). Among the mentioned criteria, "access" is very effective in walking from school to home by students (Giles-Corti et al., 2011). Along with the tools used in national research, multi-criteria decision-making has also been considered (Zubaidah et al., 2012). Generally, more research has considered the criteria of compatibility, proximity, and desirability and often applied the GIS software, and analytic hierarchy process (AHP) to assess the locations of schools. At large, the issue of school site selection has been not addressed according to the criteria for green school site selection and these criteria have been less considered.

3. THEORETICAL FOUNDATIONS

In the following, the researchers will indicate the theoretical foundations related to research.

3.1. Concept of Green Architecture

The American Green Building Congress was held in 1993. But literally, the construction environment has changed in the United States and around the world in 2000 with the Leadership in Energy and Environmental Design (LEED). (LPA, 2009). In this rating system, there are seven main indicators, each including several subsets: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation in design process and regional priority (Soltandoost, 2015, p. 13). A green building is the building that has the least incompatibility and contradiction with the surrounding natural environment (Peymani, Sarparast, 2017, p. 36). According to Ken Ying, a successful green building is integrated with biosphere systems and is associated with minimal destructive effects and maximum positive effects on this system (Edwards, 2014, p. 62). Consequently, green architecture combines several dimensions of aesthetics, environment, community, politics, and environmentally sustainable design (Karami, 2010, p. 138).

The Office of the Federal Environmental Executive also defines green building as the practice of 1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and 2) reducing the effects of buildings on human health and the environment through better siting, design, construction, renovation, operation, maintenance and demolition in the building life cycle (OFEE, 2003 Cited in National Research Council, 2007). The priority is assuring that the land is suitable for design and it is crucial in siting for buildings designed for sustainability (Peymani and Sarparast, 2017, p. 19).

3.2. Green School

According to most experts, the key strategy for attaining environmental education is the construction of green schools. Eco schools, as a European initiative, has launched in 1994 as a pilot project in the UK, Denmark, Germany, France, and Portugal. Presently forty-one European, African, and Asian countries participate in the Green Schools Program (Tilbury, 2008). The Massachusetts Renewable Energy Trust launched the Green Schools Initiative in 2001 as a pilot project with the Department of Education to improve school construction and performance (Farmihani Farahani et al., 2017, p. 55; Massachusetts Renewable Energy Trust, 2009). Figure 1 shows the position of green schools in the context of the sustainability movement. In Iran, comparing the architecture of old and contemporary schools shows that design patterns such as nested yards, centrality, reflection, vegetation, and various decorated ceilings have been used in old schools (Saeidikia, 2018). The "yard" element in the Safavid schools with green trees and water had produced a pleasant and calm atmosphere. In Seljuk times, there were two models of schools: with and without a yard. However, the Safavid schools are qualitatively and quantitatively in a higher position than the Seljuk schools with courtyards (Vasiq and Ghadrdan Gharamaleki, 2016, p. 53). From the middle of the Qajar period forwards, the role of courtyard is declined from the communication heart of the complex and the central space to an open space (Alaghmand and Hosseini, 2015, p. 9). The prominence of green space in the architecture of Iranian historic schools is not restricted to the past. The pattern of the adjacency of primary schools and local parks in the field of school site selection has been projected to synergize each of them and it suggests that some spaces adjacent to primary schools be changed to parks (Khaki Qasr, 2018).

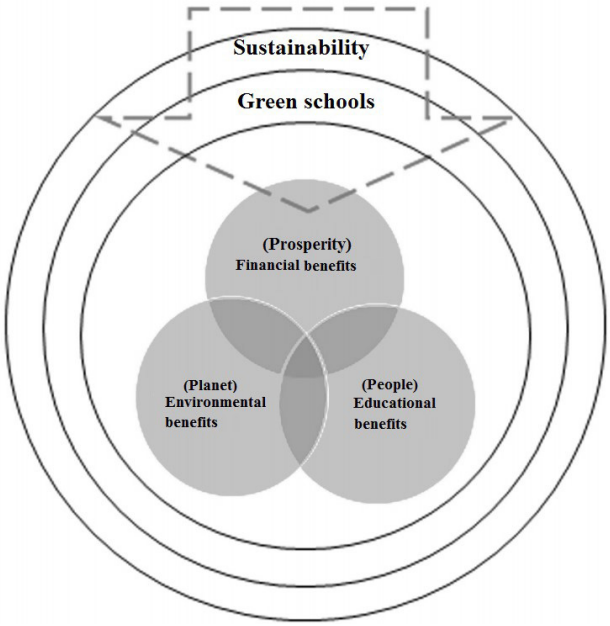

Fig. 1. Green Schools in the Context of the Sustainability Movement
(Veronese et al., 2013, p. 3)

Table 1. Research Conducted in the Field of Green Schools in Iran

Title	Summary of Results	References
Green school, a sustainable approach to design of educational centers	Observance of the principles of green schools has led to energy savings, improved student performance, and the basis of basic training in the field of Green buildings design is developed.	(Safari & Malik Mahmoudi, 2011)
Locating sustainable residential complex in the central zone of Yazd City using the ANP method	From 18 suitable sites for constructing sustainable complexes, abandoned land in Tal neighborhood in the central zone of Yazd city was selected based on the ANP method.	(Arasteh & Azizi 2012)
Setting standards for green schools in Iran	Setting standards for green schools in Iran using fuzzy multi-criteria decision-making approaches. The most important sub-criterion is air quality, followed by appropriate temperature.	(Meybodi et al., 2016)
A framework for planning green schools in Iran	Each school can tailor the green school program to its needs. Green flags will be awarded to schools that have completed all the essential elements of the green school program.	(Farmihani Farahani et al., 2017)
Dilemma of green and pseudo green architecture based on LEED norms in case of developing countries	Three buildings are sustainable: 1) green, 2) pseudo-green, and 3) energy-monger. Studies have shown that some of the projects have displayed sustainable architecture concepts in appearance. In order to evaluate them, LEED rating system and SPSS software were used.	(Mahdavinejad et al., 2014)

3.3. Green Schools Assessment Indicators

Although the criteria for green schools in each province, region, and district are different, the five elements of management, teaching and learning, social actions and performance, reconstruction of the spaces in the school, and environmental achievements form the core of the selection process (Farmihani Farahani et al., 2017, p. 55). A green school with features such as comfort, good indoor air quality, appropriate temperature, well-maintained systems, and cleanliness supports students' and teachers' health and learning (National Research Council, 2007). The four main areas of site development, the selection of materials and their minimization, energy efficiency, and indoor air quality, should also be considered (Ragheb, 2016, p. 780). Green architecture criteria are presented in Table 2.

Table 2. Criteria of Green Architecture

Green Architectural Indicators	References
Use of abandoned lot in need for renovation and restoration and reduction of land damage	(Dashti Shafiei, 2013; Karami, 2010; Peymani, Sarparast, 2017; Soltandoost 2015, Ragheb et al., 2016, p. 779)
Use of plants in the plot in order to develop the natural environment	(Dashti Shafiei, 2013; Karami, 2010; Soltandoost, 2015; Rahmanpour, 2010)
North-south orientation of buildings (south-facing windows)	(Dashti Shafiee, 2013; Farhady Googueh, Parhizkar, 2002; Meyboodi et al., 2016 Environmental Protection Organization; 2016, and National Research Council, 2007; 2013 Ragheb et al., 2016, p. 779)
land slope of 1-0-10%	(Zubaidah et al., 2012)
Use of favorable wind to moderate the ambient temperature/ Attention to the climatic properties of the neighborhood	(Peymani and Sarparast, 2017; Farhady Googueh and Parhizkar, 2002 Ragheb et al., 2016, 779)
Site suitable for having maximum open space and longitudinal orientation of the site	(Farhady Googueh and Parhizkar, 2002; Soltandoost, 2015; CHPS, 2005, Cited in National Research Council, 2007)
Proximity to public transportation	(Soltandoost, 2015; Kavousy et al., 2011; National Research Council, 2007)
Being away from the incompatible uses	(Taghvaei and Rakhshaninasab, 2010; Ziari, 2002; Kavousy et al., 2011; School Renovation, Development and Equipment Organization 2006, pp. 13-13; Zubaidah et al., 2012)

Green Architectural Indicators	References
The current distribution of schools	(Namdar Darehdang, 2015)
Being away at least 100 m from the main streets	(School Renovation, Development and Equipment Organization, 2006, pp. 15-13)
Overlooking of the neighboring buildings (number of building floors 1-2)	(Namdari Darehdang, 2015)
The vehicle traffic around the site and the reduction of noise pollution	(Soltandoost, 2015; Rahmanpour, 2010; Meyboudi et al., 2016)

3.4. Criteria for Green School Site Selection

Generally, there are no well-defined criteria for green school site selection in research. For this reason, it is essential to use the general criteria for selecting the school site as a basis and then add special indicators in accordance with the definition of green schools mentioned earlier. The main criteria are adaptability, comfort, efficiency, desirability, health, and safety. From a security point of view, school site selection includes infrastructure, environmental, and physical components. Furthermore, the appropriate radius of influence and school capacity and infrastructure components (distance from compatible and incompatible uses) are also considered in siting green schools (Zubaidah et al., 2012, p. 8; Rahmanpour, 2010, p. 24). In the following, the criteria for siting green schools are described in four groups of compatibility, desirability, comfort, and safety in detail.

- Compatibility: Coordination is a key priority in site selection. Spaces must be compatible with other urban uses within the same functioning radius (Matisen, 2000, p. 24). Having a suitable distance from incompatible uses is essential (Ziari, 2002, p. 21). Schools and educational centers need a quiet, calm, and safe environment and should be away from pollution (Taghvaei, Rakhshaninasab, 2010, p. 75). Proximity of educational uses to cultural uses, green space, religious places is appropriate, and it is recommended that schools and training centers be not sited near or adjacent to major urban arteries, crowded commercial uses, gas stations, and transmission lines (Kavousy et al., 2011, p. 155). In siting schools, it is necessary to site schools at a distance of 500 m from industrial uses and 250 m from gas stations. Concerning commercial, bus terminals, educational, medical, administrative, and military uses, the schools should be sited at a distance of at least 150 m from them (School Renovation, Development and Equipment Organization, 2006, pp. 13-15).
- Desirability: Desirability should be considered in terms of landscape, natural factors, etc. (Rahmanpour, 2010, p. 26). The slope of the Fahadan neighborhood is 0.832 (Mahdavieh and Soleimanzadeh, 2017, p. 289) which is in the range of 0-10 percent and suitable for school site selection (Zubaidah et al., 2012, p. 7). According to the size of the land, school capacity, and age group characteristics, the overlooking of the facing buildings, the building orientation, soil resistivity, wind direction, and sunlight (Farhady googueh, Parhizkar, 2002, p. 102) are also important in the site selection stage. The dominant wind in Yazd province is generally northwest wind. To determine the functioning radius, a distance of 500 meters is considered in the existing primary school network (School Renovation, Development, and Equipment Organization, 2006, pp. 13-15). In siting primary schools, it is required to consider 25 meters of open space per person (Namdari Darehdang , 2015, p. 120). The school building cab be constructed in 1 to 2 floors.
- Comfort and safety: Measures of distance and time play a role in measuring the comfort of people. Because by providing them, easy access to municipal services will be possible (Pourmohammadi, 2002, p. 93). Consequently, the 100-meter distance from the main street must be observed (School Renovation, Development and Equipment Organization, 2006, p. 4). Density, per capita, historical monuments, lack of pollution, and safety against natural disasters should be considered (Rahmanpour, 2010, p. 26). Sustainability indicators in the design of green schools include construction with no harm to the environment, land selection, the density of buildings and their proximity and communication, restoration of damaged land, access to the public transport network, location of bicycle parking, the capacity of parking, protection, and restoration of natural conditions and having the maximum open space (Soltandoost, 2015, p. 21). Based on the mentioned criteria (Table 3) and the above explanations, the sub-criteria for green school site selection are presented under the four criteria of compatibility, comfort, desirability, and safety in the form of a green school site selection model.

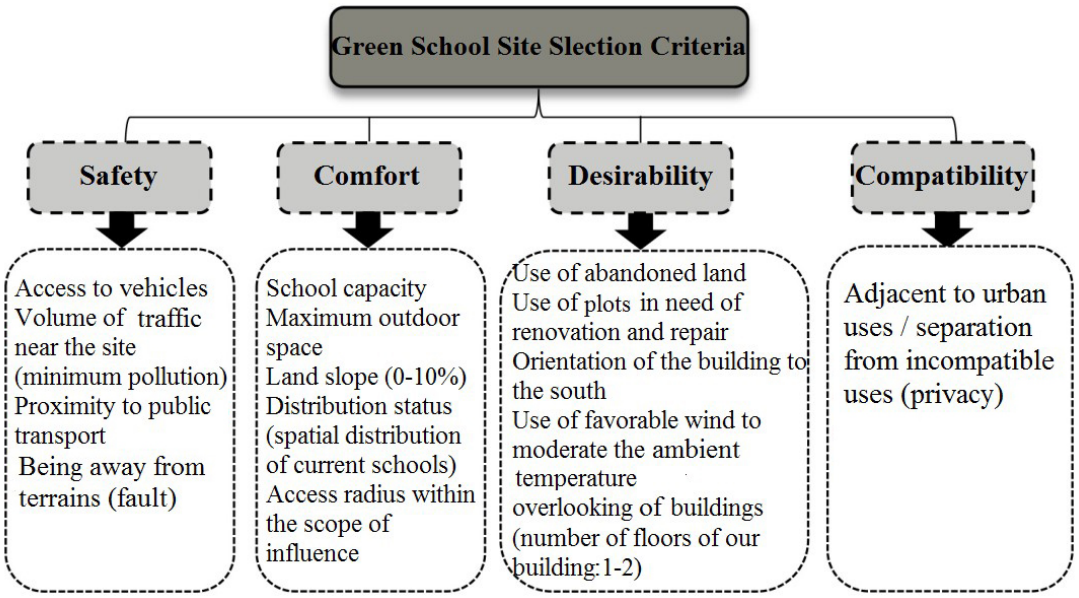

Fig. 2. Green School Site Selection Model

4. METHOD

The current study is applied research carried out using a case study. To this end, the status quo of the case study was described and the findings were analyzed. The required data were collected using library studies. The general criteria considered for site selection in an urban environment, were including compatibility, comfort, efficiency, desirability, health, and safety. Consequently, the green schools site selection indicators were placed under these general criteria and have formed a theoretical framework. First, the current locations of primary schools in the Fahadan neighborhood of Yazd were evaluated by considering the criteria for siting green schools. Then, in order to identify suitable sites for the construction of green schools (elementary school) in the historical texture of Yazd city (Fahadan neighborhood), the GIS software was used. Lastly, the selected sites for constructing green schools (primary school) in the Fahadan neighborhood of Yazd were analyzed and prioritized using the AHP technique in the Expert choice software. Figure 3 shows the research process.

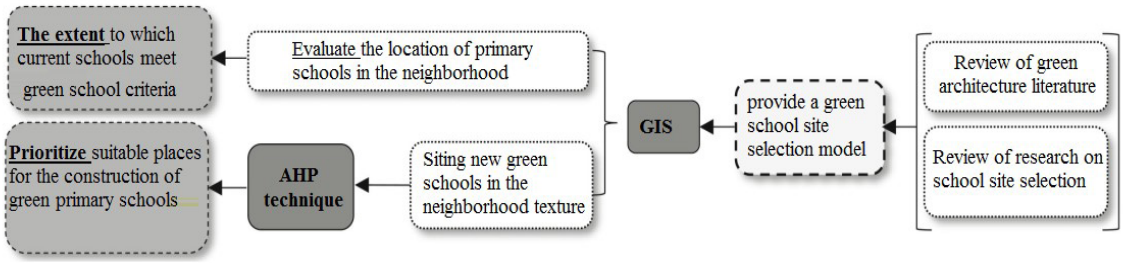

Fig. 3. Research Process

5. CASE STUDY

Yazd city, with an area of 2397 km2, is located in the valley between Shirkuh and Kharānaq mountains. The most recognized faults are North Yazd-South Ardakan and Dehshir-Baft faults (Khalilabad et al., 2007, pp. 34-49). The historical texture of Yazd city covers several old neighborhoods. The Fahadan neighborhood (the main old neighborhood of Yazd) has been selected as the case study. Its boundary is determined by Imam Khomeini, Qiyam, Seyyed Gole Sorkh, and North Fahadan streets. With an area of 114.3 hectares, this neighborhood accounts for 16.67% of the total texture of the area, and in 2006, it had a population of 6918 people (Sahraeian & Movahed, 2017, 1; SCI, 2008). Figure 4 shows the spatial location of the Fahadan neighborhood in the historical texture of Yazd city.

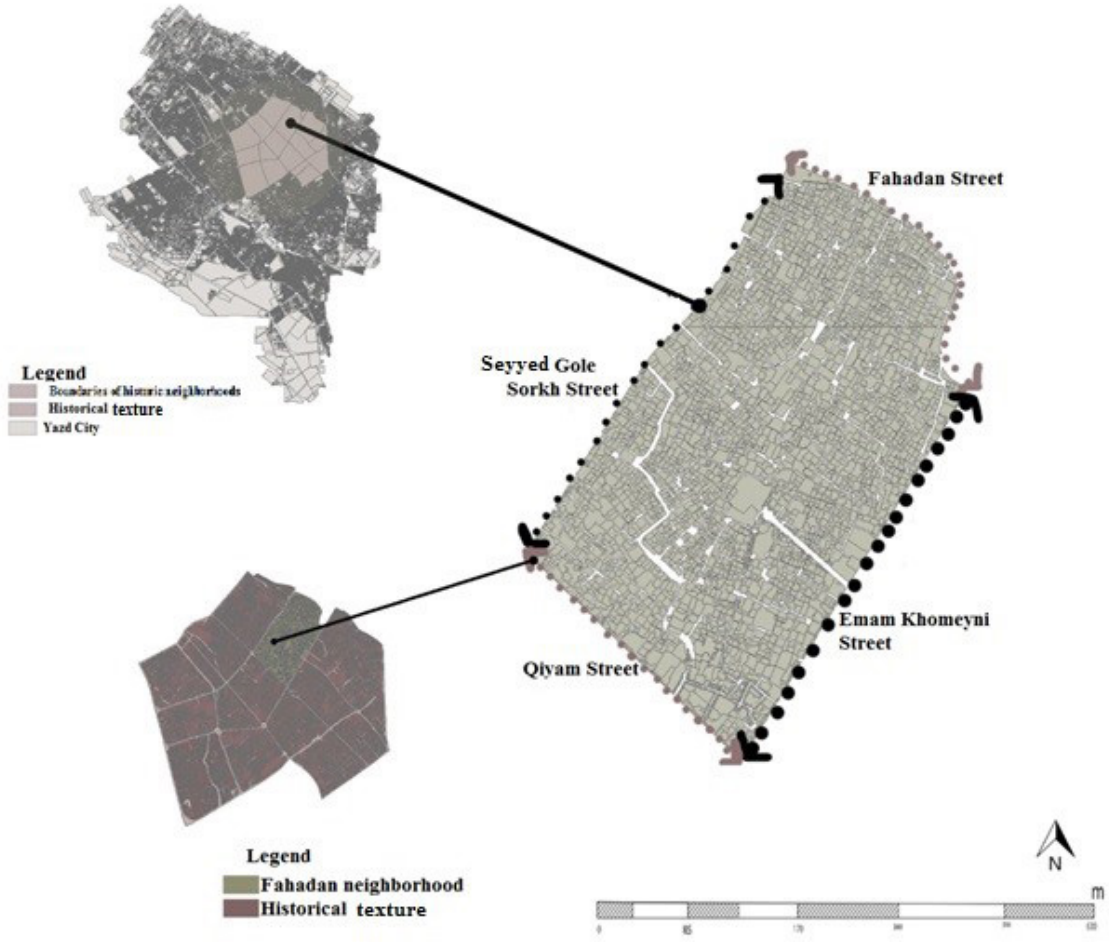

Fig. 4. Spatial Location of Fahadan Neighborhood in the Historical Texture of Yazd

6. DISCUSSION AND ANALYSIS OF FINDINGS

6.1. The Current Locations of Primary Schools in the Fahadan Neighborhood

There are currently two primary schools in the Fahadan neighborhood. Figure 5 shows their distribution at the neighborhood level as well as the compatible and incompatible uses with educational activities. The locations of these two schools are revealed in the figure. According to this map, it can be seen that School No. 1 is in relatively good condition in terms of its proximity to compatible land uses and is most in line with green school site selection criteria. However, School No. 2 is not located at suitable distances from compatible uses. For instance, a distance of 150 m from medical and administrative uses is not considered in its location. School No. 1 is in more favorable place than School No. 2 in terms of observing a required distance from the incompatible use of transportation and warehouses. The same situation is also observed in terms of being at a required distance from commercial uses. Medical centers, warehouses, industrial, workshops, commercial uses, etc., are incompatible with educational centers, and considering the pollution created by them and their accumulation, it is necessary to observe the maximum distance from these uses.

If commercial uses are placed next to educational centers, due to the increased presence of vehicles, the safety of children will decrease. In terms of observing a 100–meter distance from the main road, School No. 1 does not have a favorable location and experiences noise pollution.

School No. 2 outperforms in the desirability criterion, and the orientation of its site to the south can provide the possibility of using the desired light. On the other hand, the elongation of the site in the direction of the favorable northwest wind will also provide the ground for creating micro-climates for the greater comfort of children. Normally, considering the score of each green locating school site selection criterion (according to Table 2) as well as the analyses done by the GIS software, it can be concluded that School No. 1 and No.2 are evaluated as follows: compatibil-

ity (moderate, good), desirability (very good, poor), comfort (very good, very good), and safety (good, good), respectively Based on the evaluations made, school No.1, in the compatibility criterion, is the most consistent with the criteria for the green school site selection, and in general, the locations of primary schools in the neighborhood are far from the criteria for green school site selection.

Fig. 5. Map of the Distribution of Current Primary Schools in the Fahadan Neighborhood According to the Criteria for Green School Site Selection

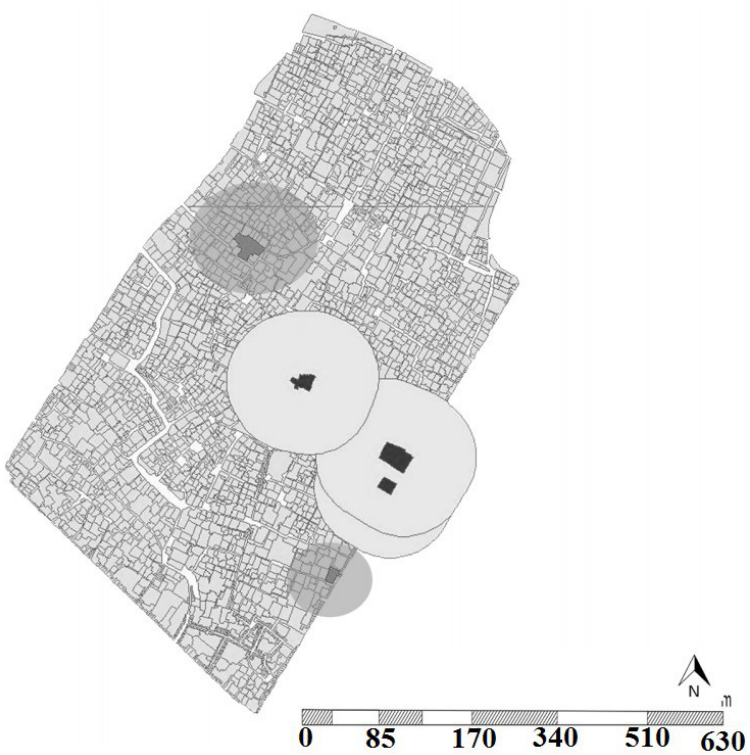

Fig. 6. Position of Current Primary Schools in Relation to Office Uses

6.2 Evaluation of Existing Schools According to the Green School site Selection Criteria

To evaluate the current locating of primary schools in the Fahadan neighborhood, the four criteria of compatibility, desirability, comfort, and safety and relevant sub-criteria were considered. It must be mentioned that the criteria were weighed according to Table 2, the research literature, and the importance of each of them from the perspective of researchers. If the specified location receives the highest score, i.e. 3, has the highest compliance with the green school site selection criteria, and if it has the lowest compliance, its score is 1, and the score of 2 represents moderate compliance. Then, with the help of Expert Choice software and the AHP technique, the weights of each green school site selection criteria were determined using their incidence matrix according to Table 3.

Table 3. The Incidence Matrix of the Four Green Primary School Site Selection Criteria

Incidence Matrix	Compatibility	Desirability	Comfort	Safety
Compatibility	-	7	5	2
Desirability	-	-	6	4
Comfort	-	-	-	5
Safety	-	-	-	-

According to the criteria and the general situation, efficiency sensitivity analysis shows how the criteria are weighted relative to each other. Figure 7 reveals that school No.1 is in a better situation in all criteria except the criterion of desirability than school No. 2, and both schools are in the same and unfavorable situation in the criterion of desirability. Table 4 also shows the extent to which the existing primary schools meet the green school site selection criteria. In the ideal mode, School No.1 meets the criteria as much as 74.6%, and this value is 25.4% for School No.2.

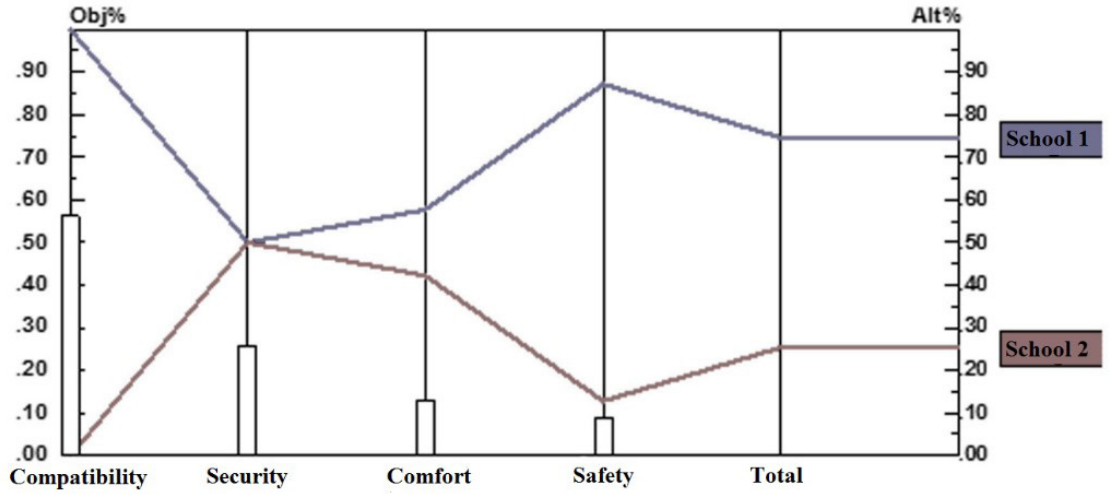

Fig. 7. Efficiency Sensitivity Analysis (the Extent to Which Primary Schools in Fahadan Neighborhood Meet the Green School Site Selection Criteria)

Table 4. The Extent to Which Primary Schools Meeting Green School Site Selection Criteria in Ideal Mode

School No.	Weight of Green School Site Selection Criteria				
	Compatibility	Desirability	Comfort	Safety	Total
School No. 1	%42.6	%19.2	%7.3	%5.4	%74.6
School No. 2	%0.0	%19.2	%5.4	%0.8	%25.4

6.3. Green School Site Selection in Fahadan Neighborhood

The first step in siting green schools is to choose the optimal location for construction. Considering four criteria of compatibility, desirability, comfort, and safety, and their indicators in GIS software, suitable sites for green schools were introduced step by step. regarding the avoidance of pollution, polluting industries are of great importance that fortunately do not exist in the neighborhood. Figure 8 reveals the suitable lots for establishing primary schools considering various indicators of using abandoned lands and those lots in need for renovation, restoration, north-south orientation, etc. The land slope in the Fahadan neighborhood is favorable, and there is no fault.

Consequently, the three sites identified in Figure 9 are suitable. These three lands were in a favorable position in terms of proximity to compatible uses and being away from incompatible uses. For instance, Figure 10 indicates the area of medical land uses in the neighborhood and their distance from the proposed site. To attain green school and environmental sustainability goals, respect for the site and considering its conditions are one of the factors followed in the criteria of compatibility and desirability. According to Figure 8, the selected sites all have north-south elongation.

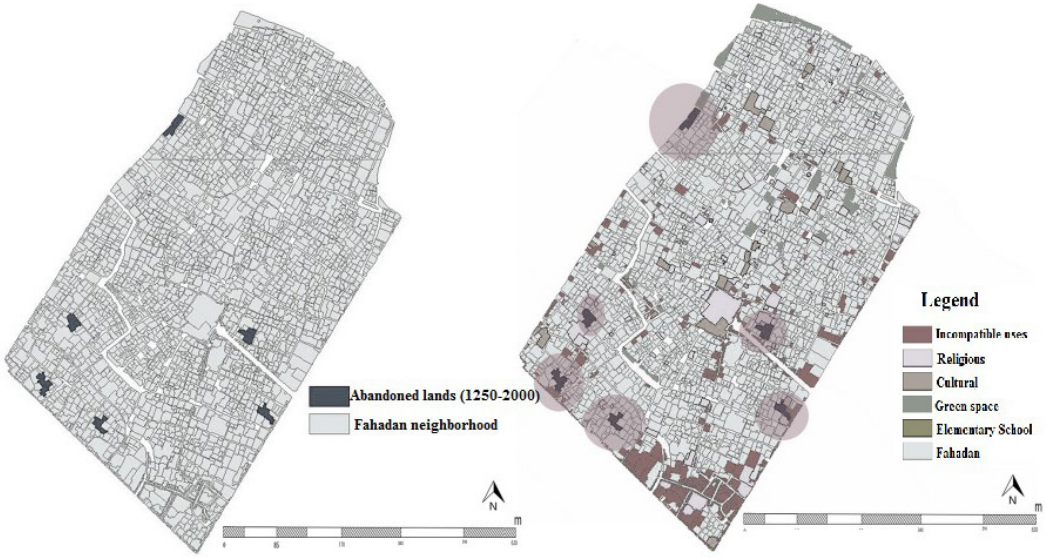

Fig. 8. Right: Location of the Proposed Sites for the Construction of Primary Schools; Left: Location of Usable Abandoned Lands in Fahadan Neighborhood with an Area of 250-20001 m2

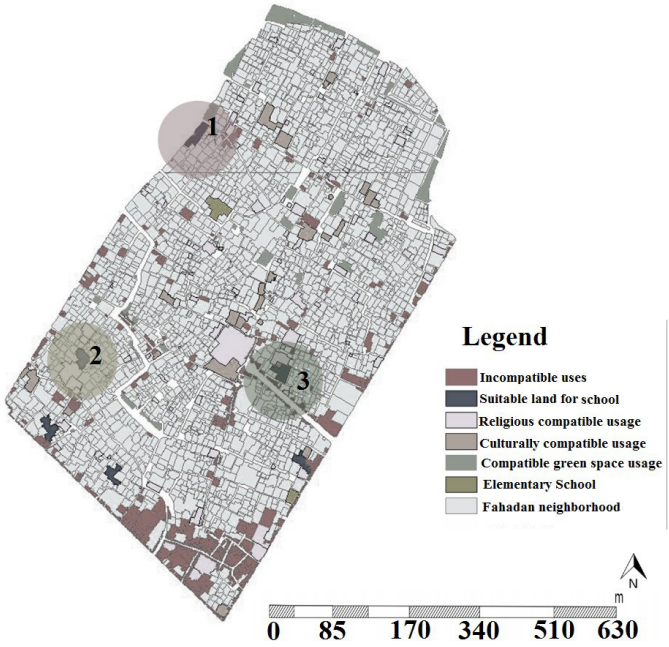

Fig. 9. Sites Selected for Green Elementary School by GIS

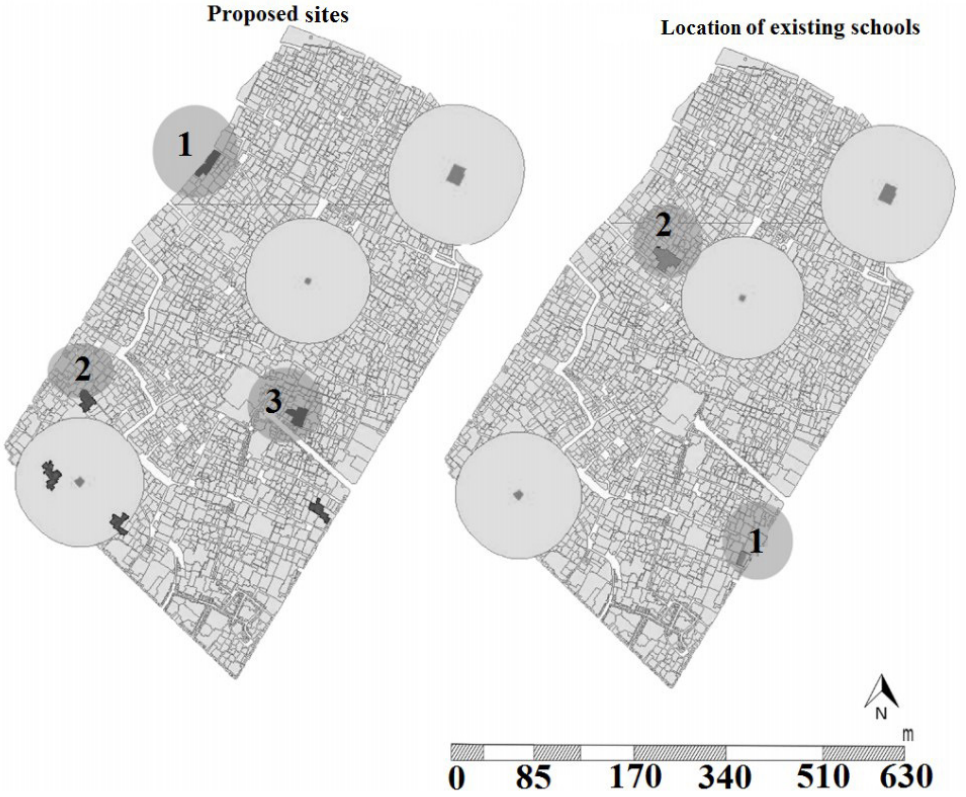

Fig. 10. Locations of Existing Primary Schools and Proposed Sites Concerning the Medical Use

6.4. Prioritization of the Selected Sites for the Construction of Green Schools (AHP Technique in Expert Choice Software)

After determining the effect of each criterion with the help of their incidence matrix and specifying the score of each criterion in the Choice Expert software, the selected sites for constructing primary schools in the Fahadan neighborhood can be discussed as follows. As Figure 11 shows, all green school site selection criteria have the highest value in Site No.2, followed by Site No. 1 and 3 with a negligible difference. Site No. 2, in terms of comfort and safety, which are often neglected in school site selection, has the highest score and will increase the sustainability of the neighborhood. Based on the creative development zones identified in the texture of the Fahadan neighborhood (Sahraeian, Movahed, 2017, p.44), only Site No. 2 is located in one of these zones. Consequently, Site No. 2 in Figure 11 is the best option to change the location of School No. 1 to create green schools in the neighborhood and promote environmental sustainability.

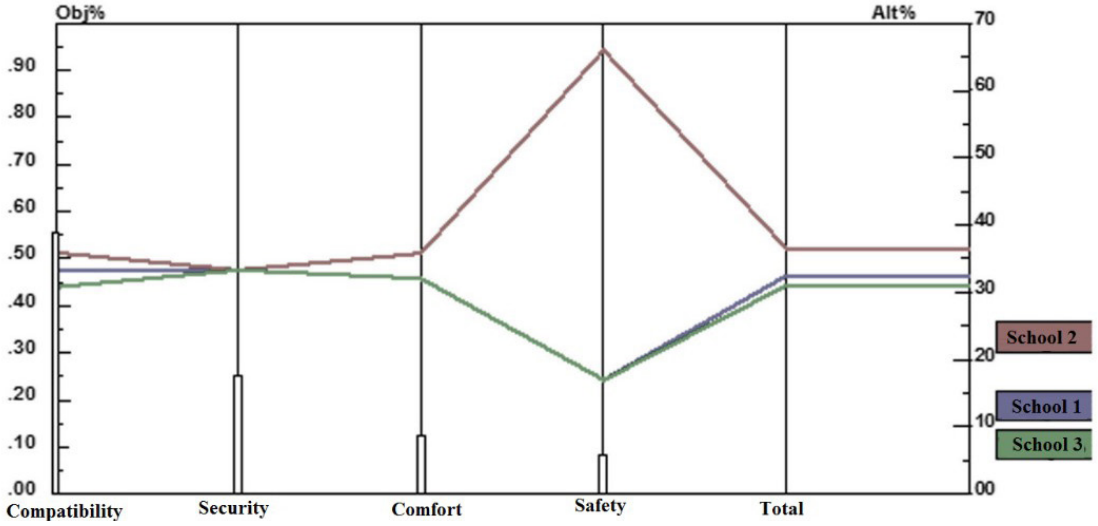

Fig. 11. Efficiency Sensitivity Analysis (the Extent to which the Selected Sites for Primary Schools in Fahadan Neighborhood Meet the Green School Site Selection Criteria)

7. CONCLUSION

Climate change, in the present age, is a challenge facing the world and is very effective on cities and their development process. Optimal use of wind and solar energy or fewer carbon emissions lead to the establishment of sustainable buildings. The optimal site selection could be a way to improve their green performance. From an environmental point of view, the location of the green building plays an important role in its use in the life cycle of the building. On the other hand, the main strategy for achieving public sensitivity to the environment is green school, and it is necessary to pay attention to its educational use and green site selection. Consequently, choosing a proper site to establish a green school will be the first important step towards increasing environmental sustainability. To upsurge environmental sustainability in the historical texture of Yazd and prevent destructive measures of sustainability in it, a green school site selection model with four criteria of compatibility, desirability, comfort, and safety is developed and suggested.

As well as proximity to compatible urban uses as a general criterion in school site selection, which is discussed in the compatibility criterion, sub-criteria such as "use of abandoned land," "use of lots in need of renovation," "orientation of the building to the desired light," "use of favorable wind to moderate the ambient temperature," "preventing the overlooking of the surrounding buildings" can be considered in the criterion of desirability to attain green school site selection. "Access to street," "traffic volume of vehicles adjacent to the site (minimum pollution)," at large, "proximity to public transport," and "avoidance of natural terrains (faults)" are also included in the group of safety criterion. Paying attention to the comfort criterion by considering "school capacity," "spatial distribution of current schools," and "their access radius," as well as "having maximum open space" and "land slope (0-10 %") contributes to the environmental sustainability of the school site. Using this model to determine the appropriate place to organize the present spaces, especially in the historical textures as the heritage of a city, can play a significant role in reducing vulnerability and conserving its energy and natural resources. The application of this model in the Fahadan neighborhood as one of the important historical neighborhoods of Yazd revealed a gap between the current locations of primary schools and the green school site selection criteria.

Evaluations showed that only one of the two existing schools satisfactorily met the criteria of the proposed site selection model. Both schools have a weakness in the criteria of comfort and safety, which are often ignored in school site selection. The new proposed site can also contribute to the sustainability of the neighborhood, as it is located in the creative development zones identified in the texture of the Fahadan neighborhood, meaning that although the green school site selection pays more attention to the climatic aspect of sustainability, the economic and social effects of the proper site of schools can also environmentally have indirect effects on the climatic aspects. For example, the use of abandoned land or renovation instead of demolishing existing buildings are important criteria in siting green schools in historic neighborhoods and have economic and social effects. Future studies can address the green site selection of other uses by adding or adjusting the sub-criteria of the proposed model. For example, cultural or commercial uses can be evaluated in the same general framework by modifying the details of sub-criteria, such as the amount of overlooking of the surrounding buildings and the number of floors. Further studies in this field can also consider social and economic sub-criteria and thus pay attention to other dimensions of sustainability. This will turn the green school site selection model into a sustainable school site selection model.

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