MANZAR, 10 (42): 34-39 / June 2018
DOI: 10.22034/manzar.2018.63128

Research

The Sustainability of Residential Neighborhoods

Sustainability Assessment of Faraz Neighborhood Based on LEED-ND evaluation system

Reyhane Aghamolaei* [1]
1. Shahid Beheshti University, Tehran, Iran

Abstract | Sustainability is a concept that become remarkable due to the environmental restrictions and problems. Sustainability analysis in all its three aspects (economic, social and environmental) and criterion codification has been subjected for many researches in architecture and urbanism. The decisions of the architects and urban designers have been known as important parts of promoting sustainability around the world. Different institutes and people have defined the parameters that have been involved in sustainability. Many theories have benefited the principles of sustainability as an approach to improving the quality of the environment and communities. The concept of sustainability and environmental assessment models have also been provided by formal and informal organizations that will be discussed in the research. Leadership in Energy & Environmental Design (LEED) organization is one of the recognized institutes that has provided a check list for quality evaluation in the scale of neighborhoods, building and indoor spaces. The scores for energy saving, easy access to public transportation, collecting wasting water and water saving are the aspects that have been considered by this institute. In Iran country growing urbanization and the expansion of communities is happening so fast but studying the quality of this development is something that has been received less attention. In this research explains a short review of history and experts' opinions about sustainability concept. In addition, selects, the LEED-ND (the LEED scale for neighborhood) evaluating system to assess the quality of life in the case study. This system is based on five main parts which each one has consists of subcategories that are used as measures to check the neighborhood's points. "Faraz" neighborhood is used as a contemporary typical Iranian neighborhood and checked with the parameters of LEED evaluation system to indicate the adaptation of a new residential neighborhood with environmental sustainability factors. This result will confirm the success of such neighborhoods to create high quality environment for their residents.

Keywords | Sustainability, residential neighborhoods, quality of life, evaluation.

Inroduction | Cities as social context provide opportunities for people's needs to improve welfare, comfort and social behaviors. However, fast and heterogeneous growth with population incensement have led to critical issues for our cities (Azar, 2009). Architecture and urban design as responsible disciplines for shaping the urban environment, have had significant roles toward restoration of environmental aspects or mutually for destruction and irreversible damage to the natural environment. Consequently, it seems necessary to analyze these potential effects on human life and the natural environment (Shieh, 2013). In this regard, a short summary about sustainability issue is presented in this paper and then the common assessment methods have been introduced. One of these methods is developed by "Leadership in Energy & Environmental Design" –LEED- which has been chosen as the base tool for the case study. LEED principles and criteria are considered as based approach to define general understanding and measure the level of compliance of our case with sustainability.

Corresponding Author: r.aghamolaei@ut.ac.ir
+980912

Literature review

Sustainability

The modern environmental movement has started by "Silent Spring" book in environmental science field by Rachel Carson (Moughtin, 1996). The other famous reference is "Small Is Beautiful: A Study of Economics As If People Mattered" is a collection of essays by British economist Ernst Friedrich Schumacher. Sustainable development originates from Brutland report in 1987 which is also known as" Our Common Future" (Golkar, 2000). This report was published in 1987 by the United Nations World Commission on Environment and Development (WCED,1987). Its targets were multilateralism and interdependence of nations toward finding solutions for the sustainable development. The United Nations Conference on Environment and Development (UNCED), also known as the "Rio de Janeiro Earth Summit" was a major United Nations conference held in Rio de Janeiro from 3rd to 14th of June 1992. This conference had important consequences to shape the future of world as "21st agenda". Agenda 21st is a non-binding, voluntarily implemented action plan of the United Nations with regard to sustainable development. According to this document, urban planning an efficient mechanism should be introduced in order to catch sustainable development goal. In this regard, different groups of architects and planner have followed principles toward sustainable architecture in their cities (Mohammadzadeh, 2004). Although, a wide variety of definitions have been provided for sustainability, there are different definition for specialized literature. The most common definition is what has been written in Brundtland agenda: Sustainable development is the kind of development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs (Fig. 1).

Fig 1: Sustainable development model. Source: Barton 2003.

Sustainability and Quality of neighborhood

There are different studies with mainstream on sustainability concept. Patrick Geddes is one of the most famous pioneers in 20th century in England. Sustainability involved other concepts including Millennium Villages and sustainable neighborhood through this century. Later, other approaches based on Perry's neighborhood unit were discussed which usually includes, traditional neighborhood model, TOD and TND approaches by new urbanisms and Pedestrian Pocket method. In order to make these theories and definitions more applicable, assessment and quality control methods were developed in a lot of different countries including united kingdom and England as London Strengthening Neighborhoods Strategy and Leadership in Energy and Environmental Design (LEED).

LEED

Leadership in Energy and Environmental Design (LEED) is one of the most popular green building certification programs used worldwide. Developed by the non-profit U.S. Green Building Council (USGBC), it includes a set of rating systems for the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods that aims to help building owners and operators to be environmentally responsible and use resources efficiently. The system is credit-based, allowing projects to earn points for environmentally friendly actions taken during construction and use of a building. LEED was launched in an effort to develop a "consensus-based, market-driven rating system to accelerate the development and implementation of green building practices. From 2006, LEED grew from one standard for new construction to a comprehensive system of six standards covering all aspects of the development and construction process which led a broad-based consensus process which included non-profit organizations, government agencies, architects, engineers, developers, builders, product manufacturers and other industry leaders. Today, LEED consists of a suite of nine rating systems for the design, construction and operation of buildings, homes and neighborhoods. Five overarching categories correspond to the specialties available under the LEED Accredited Professional program includes Green Building Design & Construction, Green Interior Design & Construction, Green Building Operations & Maintenance, Green Neighborhood Development and Green Home Design and Construction. Points are distributed across credits seven credit categories. Prerequisites in each category receive no points and are mandatory for all projects. The LEED 2009 Rating System for New Construction and Major Renovations includes Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation in Design and Regional Priority. The LEED assessment method has been applied in 205 projects in 39 states of United States of America.

Table 1: LEED-ND evaluation system. Source: Author.

Themes		Credit name	Reference Credit	Faraz Credit
Smart Location and Linkage	Required	Smart Location	-	×
		Imperiled Species and Ecological Communities Conservation	-	×
		Wetland and Water Body Conservation	-	×
		Agricultural Land Conservation	-	×
		Floodplain Avoidance	-	×
	Indicator	Preferred Locations	10	2
		Brownfield Remediation	2	1
		Access to Quality Transit	7	×
		Bicycle Facilities	1	×
		Housing and Jobs Proximity	3	×
		Steep Slope Protection	1	×
		Site Design for Habitat or Wetland and Water Body Conservation	1	×
		Restoration of Habitat or Wetlands and Water Bodies	1	×
		Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1	×
	Credits		27	3
Neighborhood Pattern and Design	Required	Walkable Streets	12	3
		Compact Development	6	2
		Connected and Open Community	-	×
	Indicator	Walkable Streets	4	×
		Compact Development	7	3
		Mixed-Use Neighborhoods	1	×
		Housing Types and Affordability	2	1
		Reduced Parking Footprint	2	1
		Connected and Open Community	2	×
		Community Outreach and Involvement	1	1
		Access to Civic and Public Space	1	1
		Universal Design	1	×
		Community Outreach and Involvement	2	×
		Local Food Production	1	×
		Tree-Lined and Shaded Streetscapes	2	1
		Neighborhood Schools	1	×
	Credits		26	6
Green Infrastructure and Buildings	Required	Certified Green Building	5	×
		Minimum Building Energy Performance	2	×
		Indoor Water Use Reduction	1	×
		Construction Activity Pollution Prevention	-	×
	Indicator	Indoor/ Outdoor Water Use Reduction	1	×
		Building Reuse	1	×
		Historic Resource Preservation and Adaptive Reuse	1	×
		Minimized Site Disturbance	1	×
		Wastewater Management	4	1
		Heat Island Reduction	1	×
		Solar Orientation	1	×
		Renewable Energy Production	3	×
		District Heating and Cooling	2	1
		Infrastructure Energy Efficiency	1	×
		Wastewater Management	2	1
		Recycled and Reused Infrastructure	1	×
		Solid Waste Management	1	×
		Light Pollution Reduction	1	×
	Credits		21	2

Innovation	Indicator	Innovation	5	1
		Special points LEED	1	×
	Credits		6	1
Regional Priority	Indicator	Regional Priority	4	×
Credits			4	0
Total credits			84	13

Case study

Faraz neighborhood is located in northwest of Tehran in district 2. Wide variety of under-construction buildings is one of most important physical feature of this part. Expensive prices for lands with high number of construction and modern fabric are the other significant characteristics of this neighborhood (Figs. 2 & 3).

Results

Smart location and linkage

Faraz neighbourhood is growing in peripheral part of the Tehran which has been green and unconstructed for years without construction there while now are going under construction at very fast speed due to the economic aspects. In this community, route type and distribution of land uses make walking impossible. The absence of specific pathways for walking has reduced the level of safety and security. Marginalization of the region, dusty trails, abandoned lands and large-scale and inappropriate spaces are also strongly effective in feeling unsafe in this neighbourhood. In Faraz neighbourhood, the public transportation is not provided which leads people to use their personal cars. Bicycle opportunities can be beneficial for easier traffic and environmental pollution. The land use is dedicated to residential parts especially in big blocks which makes people go out of neighbourhood for their daily needs. Additionally, this factor leads the neighbourhood to be quite with no any viability and more pollution and traffic jam in especial hours in working days. The environmental conservation is a crucial point which is neglected here since natural and green fields are going under construction. The proximity of the natural slopes and foothills with Faraz creates a particular area requiring especial regulations and policies according to these features.

Neighbourhood pattern and design

Transportation planning as one the key issues in this sector should be considered to provide more walkable streets and public transportation systems with reducing bad effects of parking lots. Based on the community concept, people are involved in their destiny through participation in different groups and NGOs. In such neighbourhoods, people have the opportunity to develop more social relationships and interactions. The perquisite for such context is a physical environment which supports the social interactions through mixed used places which people can gather to each other and spend time for leisure and different socio-cultural activities. Presence of street networks around the neighbourhood facilitates the connectivity and permeability and provides access to other parts and entertainment hubs in city. One of

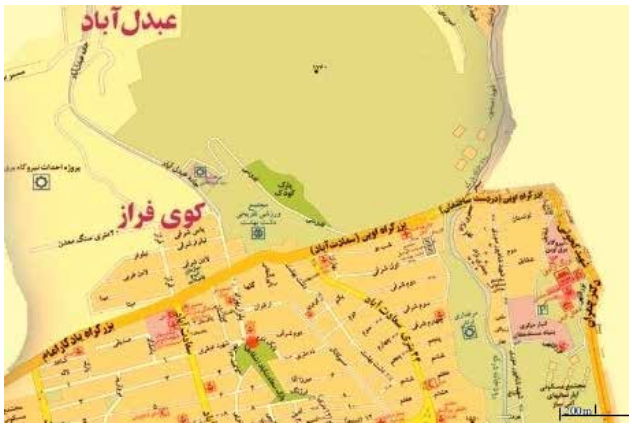

Fig 2: Regional location of Faraz. Source: Tehran region2 master plan, 2003.

the most routes is Yadegar E Emam highway which is the entrance for all the other highways in Tehran .
The important parameters of life quality including security, safety, public transportation and rout design is neglected in Faraz. People with disabilities cannot move through neighbourhood due to less facilities for their needs. The space is not attractive for children since there is no enough and dedicated space for their playing and entertainment.

Green infrastructures and buildings

The most important factor in this regard is energy efficacy of buildings which is completely neglected in Faraz neighbourhood. The environmental theory for development in brown fields is not implemented due to the price and economical reasons. The price of fields before construction is cheaper and then it is sold for higher prices. The morphological parameters affect the energy efficacy of buildings and the possibility for utilizing solar energy. However, buildings have ignored orientation for thermal comfort through passive design. While the marginal fabric along the foothills and green landscape can be used as an opportunity to create the healthy environment as a pilot for all other districts of Tehran. However, there is no especial plan for waste water management and recycling sewage
Innovation
In the design process of Faraz neighbourhood, there is no sign of novelty and innovation which means the construction is based on usual patterns without contextualized plans.
Table 1-LEED-ND evaluation system

Discussion

In LEED assessment system, there are some required points which should be taken then the assessment is applied on the neighborhood. However, this step is ignored due to the failure to obtain the required goals. The grade "13" of Faraz represents its existing problems. The improper position of neighborhoods in natural context really reflects the most destructive and damage to environment. The layout of elements in the neighborhood has led to less walkability and more dependence on cars duo to the great distance of the hubs and high slope passages. In the second category, the weakness of design patterns including improper details in the street design, lack of continuity for network and parking lots area has created different kinds of traffic problems. Additionally, this lack of attention to public transportation and allocation of the necessary available funds have fueled the traffic issue. Mixed use centers will support the viable character via facilitating the presence of different groups of people, however, this opportunity is completely neglected. Utilizing high tech infrastructures, passive and active methods are considered beneficial solutions for more access to renewable energies and reduction the improper climate effects. Figure 4 represents the results of the analysis (Fig. 4).

Iranian cities have always represented development patterns during centuries which can be useful for today designer efforts. While, unfortunately, these facts have been neglected with imbalanced construction patterns and Overuse of resources which have led to destruction of environment. This paper proposes an introduction to sustainability and

Fig 3: Regional location of Faraz. Source: www.googleearth.com, 2014.

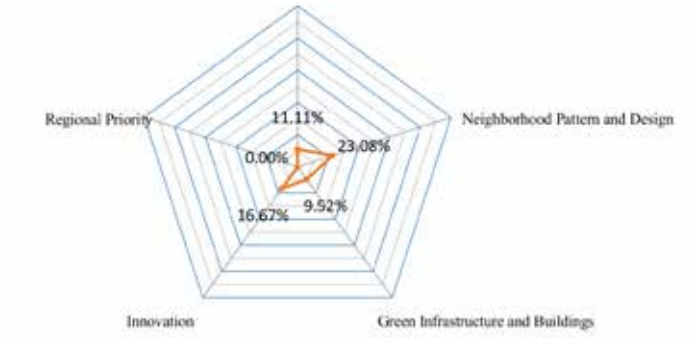

Fig 4: Final Score of Faraz Neighborhood. Source: Author.

its different assessment tools including LEED. In this regard, at the first step, the most effective parameters have been identified (Table 1) and then the point suitable for each factor has been dedicated based on the analysis of neighborhood.

Weak score in all aspects reveals the deep problems in this neighborhoods although it is new and modern. They not only have damaged their context but also not fulfilled their resident's social needs. In such context, people lose their interaction and relationships with each other. Faraz district is not sustainable from environmental angel too and has made a lot of pressure on the environment. Another fact is that design method of this neighborhood has increased the level of energy consumption with neglecting the potentials for renewable energies.

According to importance of sustainability issue, it is necessary for architects and planners to localize this criteria accordance to their socio-economic context to improve the life quality and save natural resources. Therefore, approaching a framework to apply these indicators is mandatory toward developing models to promote current state of architecture and urban planning in our cities.

Reference list

- Azar, A., Hoseinzadeh Dalir, K. (2009). Samandehi va behsazi e mahallat e sonnati ba estefade az ruykarde shahrsazi e jadid, nemune ye moredi Sorkhabe e jaded [Using new urbanism to improve traditional regions and areas case study: Sorkhab region of Tabriz]. *Journal of geography and regional development*, 11:1-17.
- Barton, H., Grant, M. & Guise, R. (2003). *Shaping Neighborhoods: A Guide for Health, Sustainability and Vitality*. London: Spon Press.
- Golkar, K. (2000). Tarahi shahri dar hashiyeye kavir [Urban design in dessert]. *Journal of Honarhayeziaba,* 8 (0): 43-52.
- Mohammadzadeh, M. (2004).Olguye nazari ye jahane paydar [Theoretical framework for sustainable world]. *Memar magazine*, 26: 153.
- Moughtin, C. (1996). *Urban Design: Green Dimensions*. Oxford: Butterworth Architecture.
- Shieh, E., Yazdanpanahi, Z.& Zarabadi, S. (2013). Barrasi va tabyine mafhume mahalleye salem dar mahallate sonatiye Iran, nemune moredi: Emamzadeh Yahya Tehran [Reviewing the concept of healthy communities in traditional neighborhoods of Iran (Case study: Imamzadeh Yahya neighborhood of Tehran)]. *Urban regional studies and research*, 17 (5):1-20.
- Tehran region 2 master plan. (2003). Saravand consulting company.
- World Commission on Environment and Development (WCED). 1987. WCED: Our Common Future.

HOW TO CITE THIS ARTICLE
Aghamolaei, R. (2018).The sustainability of residential neighborhoods. Journal of MANZAR, 10 (42):34-39.
DOI: 10.22034/manzar.2018.63128
URL: http://www.manzar-sj.com/article_63128.html