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Original Research Article

A Sustainability Evaluation of the University of Tehran's Central Campus Development Plan Based on LEED-ND Rating System Criteria

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Abstract

Problem statement: Sustainability in the design and development of university campuses has become a significant and prominent issue. Today, universities seek development plans that not only meet the environmental and physical standards of green projects but also align with the long-term social sustainability agenda. The development plan of the University of Tehran's central campus has faced various changes and challenges in recent years, eliciting both supportive and critical opinions regarding sustainability issues, particularly social sustainability. Therefore, a systematic evaluation of the sustainability of this plan from multiple perspectives using a sustainability rating system appropriate to the plan's conditions and scope is essential.

Research objective: This study examines the components of sustainability, especially social sustainability, in the University of Tehran's central campus development plan.

Research method: To evaluate sustainability in this development plan, the LEED-ND rating system was applied. Additionally, necessary data for evaluating different components of this rating system was collected through library research and on-site local surveys. The data were then rated and evaluated through several urban design workshop sessions at the University of Tehran and subsequently by the authors using the specified criteria in LEED-ND. The findings from the various sections and components obtained from LEED-ND were discussed and analyzed in accordance with the needs and priorities of the project area, comparing them with other successful projects in this field.

Conclusion: The University of Tehran's central campus development plan has succeeded in certain components, such as those related to location and accessibility, while neglecting others, particularly social and environmental components. Overall, this plan has failed to achieve the minimum required points to obtain LEED-ND certification.

Keywords: *LEED-ND rating system, Sustainable urban design, Social sustainability, University of Tehran's campus development plan.*

Introduction

The plan for organizing the central campus of University of Tehran and Tehran University of Medical Sciences gained attention in the 1990s. After various stages, in 2007, the organization of the central campus was entrusted to the consulting engineers Safamanesh and Associates Consulting Engineers (2015), it received renewed approval from the Supreme Council of Architecture and Urbanism.

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The development plan encompasses a U-shaped area, including the current northern, eastern, and western boundaries, bordered by Enqelab Street to the south, Kargar Street to the west, Keshvarz Boulevard to the north, and Vesal Street to the east. In recent years, social sustainability issues related to this plan have emerged, leading to significant critiques from experts and academics in fields such as law, sociology, and urban planning, as well as protests from local residents and student organizations. Ultimately, this plan was reviewed by the Supreme Council of Urbanism and Architecture of Iran in 2015 and 2019 (Mirzadeh, 2021). Various specialists have differing views and opinions regarding this plan, highlighting the importance of examining its sustainability.

The issue of sustainability has long drawn the attention of governments, specialists, and various groups of people around the world (Winston, 2021). Sustainability means meeting present needs without compromising the ability of future generations to meet theirs. Cities are platforms of sustainability, as complex economic, social, and natural ecosystems that house a high-density of population (Wang et al., 2011; Munoz & Cohen, 2016). In these environments, factors such as public green spaces, cultural identity, planning, the environment, economy, social aspects, and health and education infrastructure are components of urban development aimed at enhancing the quality of life for urban residents (Fahy & Cinnéide, 2006; Fische & Amekudzi, 2011). Urban sustainability is built on economic, social, and environmental foundations that are entirely interconnected and must interact with one another (Elkington, 1994), as illustrated in Fig. 1.

Measuring and assessing sustainability at the urban scale is fundamental and requires indicators related to economic, social, and environmental issues (Mori & Christodoulou, 2012). Given that the University of Tehran's central campus development plan has been suspended due to social sustainability issues, evaluating various aspects of sustainability, particularly social sustainability, in this plan is of special importance. In this regard, various tools are available for assessing sustainability at the urban scale, including BREEAM, LEED-ND, CASBEE, and DGNB (Kaur & Garg, 2019). The Iran Green Building Rating System (IGBRS) was also reviewed and found to be designed for evaluating sustainability in buildings, making it unsuitable for assessing sustainability at the urban scale.

Given that the most important issue in the sustainability of Tehran pertains to social sustainability (Arabi et al., 2020) (Fig. 2), selecting an appropriate tool that fits the context is crucial. The LEED-ND rating system, developed by the USGBC[1] between 2005 and 2009, was an effort to extend the LEED green certification from the building scale to the neighborhood scale. This approach aims to achieve significant urban efficiency through proper land use, transportation, and infrastructure design in line with sustainability goals.

This rating system assesses important components of sustainability, including environmental, economic, and social aspects, through its main sections: Smart Location and Linkage (SLL), Neighborhood Pattern and Design (NPD), and Green Infrastructure and Buildings (GIB). It places greater emphasis on items related to social sustainability development, such

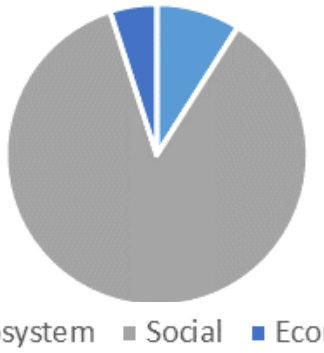

Fig. 1. Sustainability Priorities of Tehran City. Source: Arabi et al., 2020.

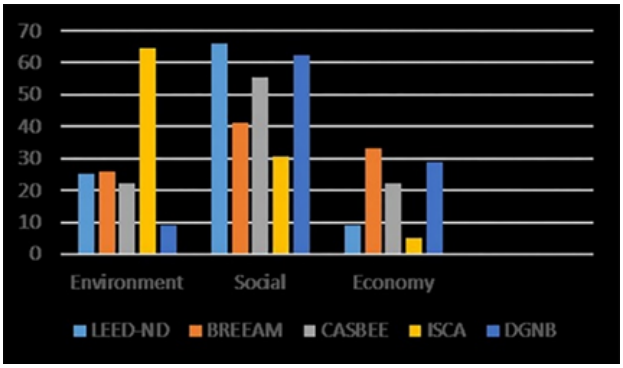

Fig. 2. Comparison of the Importance of Sustainability Components in Various Rating Systems. Source: Arabi et al., 2020.

as preserving and creating diverse land uses and residential types, which are essential for fostering an inclusive community suitable for all demographic groups, including variations in age, gender, and income (Bahale & Thorsten, 2023).

Therefore, since LEED-ND pays more attention to social sustainability issues compared to other rating systems, it is an appropriate tool for assessing sustainability in Tehran (Arabi et al., 2020).

Research Background

The LEED-ND rating system can be applied to assess sustainability in both ongoing and existing projects (Bahale & Thorsten, 2023). For example, Sadeghpour & Weshah (2012) examined the sustainability of two neighborhoods in Calgary, Canada, using the LEED-ND tool and found that LEED-ND is an appropriate tool for assessing existing neighborhoods.

In another study, LEED-ND was used to evaluate the Xuhui Runway Park, revealing strengths in social sustainability; this area was designed to enhance the quality of life for residents and includes extensive green spaces, walkways, and accessible recreational areas that encourage physical activity and interaction among residents. Furthermore, public involvement was incorporated into the planning process, fostering a sense of ownership and social cohesion. Environmentally, it performed well in water management and biodiversity enhancement through rainwater collection systems and the use of native plants (Lin et al., 2024).

Another study assessing a different urban area using LEED-ND criteria indicated that the evaluated region had strengths in various LEED-ND factors, such as compact development, access to public transportation, and mixed-use zoning, which positively affected the area's social sustainability and reduced reliance on cars. However, deficiencies were noted in areas such as the implementation of green infrastructure (Volpatti et al., 2023).

In Iranian studies, Pasian Khameri (2017) examined the sustainability of two neighborhoods in the city of Gorgan using the LEED-ND rating system, determining that neither neighborhood achieved the minimum required scores. It was also found that there was considerable potential for applying this assessment system to the targeted neighborhoods. Also, Darabi et al. (2022) assessed the sustainability of a neighborhood in Kermanshah with a focus on reducing energy consumption.

On an international scale, many universities today use the LEED-ND tool to ensure their sustainability. For instance, California State University is pursuing sustainable design for a faculty and staff housing project in Ramona, focusing on accessibility, affordable housing, the use of recycled materials, and energy efficiency through LEED-ND (Martins et al., 2013). Additionally, the Columbia University development plan employs LEED-ND to achieve urban sustainable design with elements of accessibility and walkability (Ried, 2008). Therefore, in this study, the LEED-ND tool is also utilized to evaluate the sustainability of the University of Tehran's central campus development plan.

The LEED-ND Rating System

The LEED-ND rating system consists of three main sections: Smart Location and Linkage (SLL), Neighborhood Pattern and Design (NPD), and Green Infrastructure and Buildings (GIB), along with two supplementary sections on Innovation and Design Process, and Regional Priority. This framework includes a total of 56 prerequisite items and scoring criteria. Each of these five main sections has its own prerequisites, which must be met for the evaluation and scoring to proceed (Bahale & Schuetze, 2023).

The Smart Location and Linkage (SLL) section includes 5 prerequisites and allows for 28 points to be earned. One of the critical prerequisites in this section is Smart Location itself. The Neighborhood Pattern and Design (NPD) section comprises 3 prerequisites and offers 41 points, while the Green Infrastructure and Buildings (GIB) section has 4 prerequisites and allows for 31 points.

LEED-ND evaluates various parameters, including accessibility, density, and land use diversity. A significant focus of LEED-ND is on accessibility and connectivity, as improved connections and a variety of pathways instead of dead-end routes lead to the creation

of central spaces where a range of social activities can occur (Carmona et al., 2003).

The primary outcome of LEED-ND is the reduction of energy consumption and greenhouse gas emissions. The system addresses energy consumption in transportation and buildings across 30 items, while also considering factors such as land use, water consumption, and surface water management (Talen et al., 2013). Density and land use diversity are also crucial factors in this rating system, as diverse land uses help reduce travel distances by transportation means, thereby leading to lower greenhouse gas emissions (Ewing & Cervero, 2010).

Research Methodology

In this study, the LEED-ND rating system was utilized to assess the sustainability of the University of Tehran's central campus development plan. The data collection process began with a literature review based on existing documents and the documentation of the Safa Manesh group. This was followed by field studies conducted during three urban design workshops by the energy group at the master's level. The collected data was then analyzed and scored by the authors according to the LEED-v4-ND rating system.

To ensure validity, the scoring process was conducted twice: once by the students during the urban design workshops and once by the authors. The results were compared, and in 79% of cases, the findings were consistent.

Data related to intersections and their distances, land use maps, and densities—both for the existing situation and the Safa Manesh plan—were gathered from the documentation provided in the Safa Manesh project report, based on the latest agreements from Tehran's Article 5 Commission. Additionally, information regarding public transportation and transportation rates within the project area was collected from both library resources and field surveys. Some necessary data was not available in the urban data system and was collected through field observations wherever possible. For certain data related to water and energy consumption in the buildings within the area, averages from central city districts were considered. Furthermore, some required data for specific items highlighted in the LEED-ND guidelines was not developed in the project documentation, indicating a lack of attention to these aspects within the plan.

Research Findings

• Smart location and linkage (SLL)

In the current situation and the development plan, all prerequisites for this section, including smart location, protection of endangered species and ecological communities, safeguarding water bodies and wetlands, protecting agricultural land, and avoiding flooding and flood hazards, have been met. One of the objectives of this section of the guidelines is to encourage development and construction near established communities. This is achieved through the improvement and redevelopment of cities, controlling and limiting travel distances by vehicles, and encouraging residents to engage in activities such as cycling, aiming to reduce pollutant production and

Table 1. Scores of the Development Plan in the Smart Location and Linkage (SLL) Section. Source: Authors.

Item in LEED-ND	Points Allocated in Guidelines	Current Situation	Development Plan
Preferred Location	10	6	6
Brownfield Remediation	2	0	0
Access to Quality Transit	7	5	2
Bicycle Facilities	2	0	0
Housing and Jobs Proximity	3	2	1
Steep Slope Protection	1	0	0
Site Design for Habitat or Wetland and Water Body Conversation	1	1	1
Restoration of Habitat or Wetlands and Water Bodies	1	1	1
Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1	0	0
Total	28	15	11

increase physical activity among residents to lower disease rates. The points awarded to the development plan on the ‘ Smart Location and Linkage’ are presented in Table 1.

Given that this site is located in a developed urban area where construction has previously occurred and has excellent connectivity with surrounding areas, situated in one of the main and historic parts of the city with numerous access points and intersections, it receives the highest score in the Smart Location section. However, regarding access to the public transportation system, the proposed changes to access routes in the development plan have led to traffic issues in the development area, and some of the proposed solutions are unfeasible. Unresolved issues in this regard include the inability to widen Taleghani Street after Kargar Street, the proximity of the intersection of Kargar and Taleghani Streets to Enqelab Square causing traffic congestion, and the inability to reduce or eliminate the role of 16 Azar Street due to the one-way nature of Kargar Street to the north and its return to the south via 16 Azar Street. Existing bike paths on the site are not part of a continuous network and intersect with car-oriented streets or sidewalks, compromising the safety of cyclists. Additionally, these paths are insufficient, and the development plan does not provide a specific design for bike routes, only offering suggestions for them.

The development plan aims to expand educational space and convert various land uses, including residential and vacant lands, into higher education use, which will reduce the residential fabric of the area. However, it should be noted that, given the existing facilities and proposed plans, the area in question is suitable for residence. Moreover, the connection of different social groups with the university’s cultural space enhances the community’s cultural level and should not be diminished.

- **Neighborhood pattern and design (NPD)**

In the current situation, prerequisites for compact development and connected and disconnected communities have been met, but the requirement for walkable pathways has not been fulfilled. In the development plan, all prerequisites have been satisfied. This section of the guidelines focuses on improving and increasing efficiency in the transportation system and reducing distances to enhance walkability and public health. Additionally, to reduce the use of transportation means, it emphasizes the need for diverse land uses within the development area and access for a wide range of the community to various uses and communal spaces. To achieve social equity, the presence of

Table 2. Scores of the Development Plan in the Neighborhood Pattern and Design (NPD) Section. Source: Authors.

Item in LEED-ND	Points Allocated in Guidelines	Current Situation	Development Plan
Walkable Streets	9	3	3
Compact Development	6	5	4
Mixed-Use Neighborhoods	4	1	0
Housing Types and Affordability	7	2	0
Reduced Parking Footprint	1	0	1
Connected and Open Community	2	0	1
Transit Facilities	1	1	1
Transportation Demand Management	2	2	2
Access to Public and Civic Spaces	1	0	0
Access to Recreation Facilities	1	0	1
Visibility and Universal Design	1	0	0
Community Outreach and Involvement	2	0	0
Local Food Production	1	0	0
Tree-Lined and Shaded Streets	2	0	2
Neighborhood Schools	1	0	0
Total	41	14	15

residential buildings of various sizes and ages is essential. The points awarded to the development plan from the perspective of the ‘ Neighborhood Pattern and Design ‘ are presented in Table 2.

The pedestrian pathways in the development plan have been prioritized, and to enhance walkability, most pathways feature two-way sidewalks. Additionally, as shown in Fig. 3, due to the reduction of on-street parking and the allocation of public uses to ground floors, along with tree planting along most streets, walkability in this area has increased. As shown in Fig. 4, in the development plan, the increase in educational and support service uses has led to the complete removal of residential use. Therefore, the plan has paid insufficient attention to sections of the guidelines that emphasize the adjacency of various uses to enhance walkability and reduce vehicular traffic, which has hindered public involvement and community engagement, as indicated in the guidelines. According to Fig. 5, the inclusion of gardens in the development plan and public access to them has improved access to active recreational spaces.

- **Green infrastructure and buildings (GIB)**

None of the prerequisites outlined in the guidelines, such as the presence of green-certified buildings, and reduction of energy and water consumption in buildings, have been met in the current situation or the development plan. The reduction and management of energy and water consumption in buildings are addressed through consumption patterns and green certifications in this section. Additionally, the management of surface water is considered to improve water quality and protect the existing ecosystem in the area. The points awarded to the development plan

Fig. 3. Location of Parking and Edge Parks in the Project Area. Right: Current Situation, Left: Proposed Plan.
Source: Safamanesh and Associates Consulting Engineers, 2015.

Fig. 4. Status of Land Uses in the Project Area. Right: Current Situation, Left: Proposed Plan.
Source: Safamanesh and Associates Consulting Engineers, 2015.

from the perspective of the ‘ Green Infrastructure and Buildings ‘ are presented in Table 3.

In terms of requirements related to reducing energy consumption in buildings and utilizing renewable energy sources, the development plan does not include practical measures. Furthermore, in light of the country’s water scarcity crisis, the development plan does not propose practical solutions for managing and reducing both indoor and outdoor water consumption in accordance with the guidelines.

Regarding rainwater management, which is a high-scoring section in the guidelines, while there are mentions of proposed plans for collecting existing surface water within the project area, and rainwater is identified as surface water, none of the suggested solutions are accessible. Given the lack of access to the main proposed solutions, the only visible recommendations in this report refer to improving open drainage networks and automatic irrigation systems, as well as having a septic tank for collecting surface water. However, there is no mention of the percentage of rainwater retention aimed for in the proposed solutions, which is a key criterion for scoring in this section.

Additionally, concerning the reduction of heat island effects—an important issue in this area due to air pollution—the development plan suggests strategies

Fig. 5. The status of green spaces and pedestrian pathways within the project area. Right: Proposed plan, Left: Existing condition. Source: Safamanesh and Associates Consulting Engineers, 2015.

Table 3. Scores of the Development Plan in the Green Infrastructure and Buildings (GIB) Section. Source: Authors.

Item in LEED-ND	Points Allocated in Guidelines	Current Situation	Proposed Plan
Certified Green Buildings	5	0	0
Optimize Building Energy Performance	2	0	0
Indoor Water Use Reduction	1	0	0
Outdoor Water Use Reduction	2	0	0
Building Reuse	1	0	0
Historic Resource Preservation and adaptive Reuse	2	0	1
Minimized Site Disturbance	1	0	1
Rainwater Management	4	0	0
Heat Island Reduction	1	0	0
Solar Orientation	1	0	0
Renewable Energy Production	3	0	0
District Heating and Cooling	2	0	1
Infrastructure Energy Efficiency	1	0	0
Wastewater Management	2	0	0
Recycled and Reused Infrastructure	1	0	0
Solid Waste Management	1	0	0
Light pollution Reduction	1	0	0
Total	31	0	3

such as creating gardens, preserving green spaces, and providing shade along access routes. Nonetheless, the minimum threshold required to earn points from the guidelines has not been achieved. The consideration of heating and cooling systems in the area and the provision of related solutions have resulted in scoring in this section. However, no points were earned from the Innovation (IN) section mentioned in the guidelines.

In the Regional Priorities (RP) section, based on the assessment conducted through the USGBC website and the location of the development plan, important components in this area include public outreach and involvement, rainwater management, optimization of building energy consumption, connected communities, remediation of contaminated soils, and long-term habitat and waterbody protection management. The analysis conducted in previous sections indicates that, aside from the component of connected communities, the remaining important components have been overlooked in the development plan.

Discussion

The findings of this study indicate that the development plan has received the highest scores in the Smart Location and Linkage (SLL) and Neighborhood Pattern and Design (NPD) sections, while it garnered the lowest scores in the Green Infrastructure and Buildings (GIB) sections. In the SLL section, which accounts for approximately 40% of the total score, the components related to site design for the conservation and restoration of biological habitat or wetlands received full points due to the absence of sensitive biological species in the project area, as defined by the LEED-ND guidelines. Conversely, components concerning the remediation of polluted sites and the protection of steep slopes did not earn any points, as the project area is not located in qualifying lands for scoring.

The highest score in this section came from the preferred location component, as the project is situated in a developed urban area. According to Table 4, this component is one of the significant factors from which most LEED-ND-certified projects have benefited. However, the proximity of housing and work, which is significant due to the unique location of this area in the city and has been emphasized in most certified projects, received a lower score in the development plan compared to the existing situation. This decline in points is attributed to the reduction of residential fabric and its conversion into educational and related spaces. In fact, this component is also considered relevant to social sustainability and has been overlooked.

Another component in this section that has gained more attention among certified projects is access to the transportation system, for which the proposed plan has only achieved approximately 30% of the points allocated in the guidelines. Additionally, the component related to cycling facilities and networks did not earn any points due to the absence of a continuous network, which contrasts with the status of half of the certified projects.

In the Neighborhood Pattern and Design (NPD) section, the development plan received approximately 41% of the total relevant points. The components related to transit facilities, transportation demand management, and access to active spaces received full scores. However, due to the increase in educational uses and their supporting spaces, the diversity of land uses has decreased, even though diversity is a crucial component among other projects. This reduction has also led to decreased public outreach and involvement. In today's context, the connection between universities and communities is a key factor for sustainability in university sites and is also a regional priority for this area of Tehran.

Grand Valley State University (GVSU) in Michigan serves as an excellent example of university-community collaboration. The university and the city engage in social partnerships to work together towards sustainability. In this initiative, various local components—including the city, the university, local schools, businesses, and other organizations—collaborate to achieve sustainable design goals. Similarly, Emory University in Atlanta maintains strong connections and partnerships with the community, which promotes sustainability through

Table 4. Review and Comparison of LEED ND Components in Certified Projects and the Development Plan (: >75%, : >50% and<75%, : >25% and <50%, : <25%). Source: Authors based on Sharifi & Murayama, 2014.

Criteria	Item	Percent of projects receiving points	Points Achieved by Project	Maximum possible points	Percent received points of total points
Smart Location and Linkage	Preferred Locations	97.9	6	10	60.0
	Reduced Automobile Dependence	90.7	2	7	28.6
	Housing & Jobs Proximity	84.5	1	3	33.3
	Steep Slope Protection	63.9	0	1	0.0
	Brownfields Redevelopment	58.8	0	2	0.0
	Bicycle Network	46.4	0	2	0.0
	Site Design for Habitat or Wetland Conservation	32	1	1	100.0
	Conservation Management of Habitat or Wetlands	14.4	0	1	0.0
	Restoration of Habitat or Wetlands	10.3	1	1	100.0
Neighborhood Pattern and Design	Compact Development	94.8	4	6	66.7
	Diversity of Uses	93.8	0	4	0.0
	Street Network	85.6	1	2	50.0
	Diversity of Housing Types	73.2	0	7	0.0
	Access to Active Spaces	72.2	1	1	100.0
	School Proximity	72.2	0	1	0.0
	Walkable Streets	71.1	3	9	33.3
	Reduced Parking Footprint	70.1	1	1	100.0
	Community Outreach & Involvement	70.1	0	2	0.0
	Access to Public Spaces	67	0	1	0.0
	Transit Facilities	48.5	1	1	100.0
	Universal Accessibility	34	0	1	0.0
	Transportation Demand Management	25.8	2	2	100.0
	Local Food Production	12.4	0	1	0.0
Green Construction and Technology	Minimize Site Disturbance through Site Design	86.6	1	1	100.0
	Construction Waste Management	77.3	0	1	0.0
	Reduced Water Use	71.1	0	2	0.0
	Heat Island Reduction	69.1	0	1	0.0
	Comprehensive Waste Management	69.1	0	1	0.0
	Storm Water Use	57.7	0	4	0.0
	Energy Efficiency in Buildings	47.4	0	2	0.0
	LEED Certified Green Building	44.3	0	5	0.0
	Infrastructure Energy Efficiency	42.3	0	1	0.0
	Recycled Content in Infrastructure	42.3	0	1	0.0
	Building Reuse & Adaptive Reuse	35.1	0	1	0.0
	Light Pollution Reduction	30.9	0	1	0.0
	Reuse of Historic Buildings	21.6	1	2	50.0
	On-Site Renewable Energy Source	16.5	0	3	0.0
	Solar Orientation	9.3	0	1	0.0
	Wastewater Management	7.2	0	2	0.0
	District Heating and Cooling	6.2	1	2	50.0

activities such as organizing green and sustainability exhibitions (Ried, 2008).

However, the proposed plan scores zero in components related to diverse-use neighborhoods, community outreach and involvement, and universal and public design. The plan has not sufficiently addressed the component of walkable streets, which is a crucial aspect of urban design and has been emphasized in most successful previous projects, earning only about 30% of the possible points.

The proposal does consider the compact development component to minimize land use and the connected and disconnected communities' component, which examines the connectivity of the street network—both of which are also prioritized in many certified projects.

The development plan has given the least attention to the Green Infrastructure and Buildings (GIB) section, securing only about 10% of the total points available in this area. This is concerning, as one of the most important sustainability components is environmental sustainability and energy consumption reduction.

The development plan received full points for minimizing site disruption, a significant component, due to its location in a previously developed urban area. It also earned about 50% of the points allocated for preserving and reusing historic buildings, which is particularly important given the valuable context of the project area. However, the proposed plan has neglected other necessary components in this section and received no points for them.

Notably, some of these components, such as water consumption reduction and energy consumption reduction, have been identified as regional priorities on the USGBC website. Unfortunately, these aspects have not been adequately addressed in the development plan.

Conclusion

This study has aimed to assess the sustainability of the University of Tehran's central campus development plan, particularly its social sustainability, using the LEED-ND rating system, given the importance and challenges involved. The results indicate that while the development plan has achieved acceptable scores in certain components related to smart location and accessibility, it faces shortcomings in other sustainability aspects, especially environmental and some social dimensions.

The findings suggest that the plan has not met the minimum score required for LEED certification and encounters issues regarding social sustainability due to a lack of attention to the connection between the university and the community. This connection is increasingly recognized as essential in the design of university complexes today. Furthermore, in terms of environmental sustainability (GIB), the plan has inadequately addressed components related to energy and water consumption management and the reduction of environmental impacts. For instance, aspects such as reducing indoor and outdoor water consumption, utilizing renewable energy, and managing stormwater—priorities in the region's environmental standards—have received insufficient attention in this plan.

It is worth noting that while the plan mentions various points related to environmental sustainability goals, it lacks detailed operational strategies to qualify for points in various components, including energy consumption reduction, water consumption reduction, stormwater management, and heat island effect mitigation. From a social sustainability perspective, the plan does not adequately respond to social needs or strengthen the connection between the university and the surrounding community. Notably, the neglect of components such as diverse-use neighborhoods, the proximity of jobs and housing, community outreach and involvement, and universal public design may weaken the bond between the university and the public.

Creating social spaces and establishing effective communication between the community and the university is a fundamental need in the design of educational complexes today. Moreover, the existing residential fabric and the social capital at the neighborhood scale have been overlooked in the development plan, which impacts the nighttime vitality of the area.

The limitations encountered in obtaining data related to energy and water consumption in buildings underscore the necessity for data collection in future research. Overall, addressing these topics is crucial for gathering the necessary data to evaluate university development plans in line with sustainability goals and green university initiatives. The results highlight the need to consider sustainable design parameters and components, especially social sustainability, during the design and redesign phases of universities and their associated complexes.

Conflict of Interest

The authors declare that there was no conflict for them in conducting this research.

Endnotes

1.The U.S. Green Building Council (USGBC) is the organization behind the development of the LEED rating system, which is designed to evaluate the environmental performance of buildings and measure their sustainability. Available in www.usgbc.org.

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