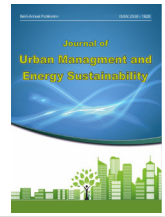
Journal of Urban Management and Energy Sustainability (JUMES)

Homepage: http://www.ijumes.com



ORGINAL RESEARCH PAPER

Prioritizing Effective Criteria in University Design to Promote the Presence of Women: A Study in Urban Design

Sahar Jalalian[1], Pooyan Shahabian[1*] Azadeh Lak[2], Atoosa Modiri[1]

1 Department of Urban Planning, Central Tehran Branch, Islamic Azad University, Tehran, Iran*
2 Department of Urban and Regional Planning and Design, Shahid Beheshti University, Tehran, Iran

ARTICLE INFO

Article History:
Received 2024-01-01
Revised 2024-04-08
Accepted 2024-05-20

Keywords:
Gender-oriented educational space; Iran; Performance-importance analysis; University design; Women

DOI: 10.22034/ijumes.2024.2025934.1207

ABSTRACT

Several of Iran's historic universities were established during a period when women either had limited access to or were not allowed to pursue higher education. Consequently, these institutions were originally designed with men in mind. According to recent data from the Ministry of Science, there has been a significant 56-fold increase in the number of women attending universities in the last five decades. Despite this, the physical layout of these universities has not been updated to accommodate the needs of women, who now make up half of the student population. The primary goal of this research is to identify effective criteria for university design and prioritize them to promote the comfort of these spaces for women. This research centers on the field of urban design. In this research, a combined method has been used. First, utilizing the qualitative method of "thematic analysis," the environmental inclinations of women in university spaces were explored. Then, using the quantitative method of "performance-importance analysis," the criteria extracted from the qualitative stage were prioritized. According to the results, certain criteria such as easy accessibility, integration with the surroundings, women's right, on-campus access, environmental safety, health and hygiene, and comfort considerations of the university hold greater significance compared to other identified criteria in shaping women's positive experiences within university spaces. Designers and planners should prioritize incorporating these criteria to adapt spaces for women during renovations and constructions of existing universities or design new ones.

Running Title: Prioritizing Criteria for Women-Friendly University Design

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
40	08	04

*Corresponding Author:
Email: *shahabian@iauctb.ac.ir*
Phone: +989121035008
ORCID: https://orcid.org/0000-0003-2778-6982

INTRODUCTION

In contemporary society, there has been a notable rise in the participation of women across diverse sectors, including academia. Recent data released by the Ministry of Science indicates a significant surge in the women student demographic within universities, with a growth rate exceeding 56-fold over the past five decades (Saeedi, 2021). This trend underscores the undeniable reality of escalating women representation in higher education institutions. However, the oldest universities in the country were established at a time when women did not have access to higher education. Therefore, it is expected that these spaces, which are designed based on the presence of men, are not suitable for women and do not meet their spatial needs. Considering that the level of women's participation in higher education is an indicator of each country's development and the strategies to achieve sustainable development, it is crucial to adapt these spaces to enhance their presence. Recent studies (Azadkhani, 2022; Beykaei, et al., 2022; Ghanbarpour, et al., 2022; Jalalian et al., 2023; Ranjbar, et al., 2022) have shown that, the design of university spaces impacts students' learning, graduation rates, retention rates, career prospects, the economy, and the reputation of the university. For this reason, the design of universities is considered an important quality criterion for the academic community and higher education institutions. In Iran, the rapid growth of the student population has led to a focus on the quantitative development of educational institutions to accommodate the learning needs of students. Now that the basic needs for educational spaces have been addressed, it is time to evaluate the design patterns of these spaces according to effective design qualities. Due to the significance of this issue, no studies have been conducted on designing university environments according to women's spatial needs. The research conducted in the past in the field of urban design knowledge and women's discourse has mainly focused on non-academic spaces (such as Bidar et al., 2022; Khorrami rouz et al., 2020; Partovi and Farash khiabani, 2018; Mohammadi, 2019; Rafieian and Jafari, 2020). Several studies have explored the topic of women in university settings, primarily focusing on the social aspects and addressing women's safety in these environments (such as: Borker, 2021; Fisher and Sloan, 2022; Hall, 2023; Roberts et al., 2022; Senn et al., 2018; Somers et al., 2023). Also, the studies conducted on the design of universities have explored the general criteria for designing these spaces (such as: Darwish, 2022; Agrawal and Yadav, 2021; Zhang et al., 2023; Beheiry et al., 2023). However, the specific criteria for the presence of women in these spaces have not been thoroughly examined. Considering that education enhances self-confidence, expands social connections, and leads to better job opportunities for women, it is crucial to adapt these environments to accommodate their increased presence. Therefore, it is necessary for the designers of university environments to be familiar with the criteria that influence the presence of women in these spaces and to either renovate existing universities or design new ones in accordance with these criteria.

In this regard, this research has been conducted in the field of urban design knowledge with the aim of identifying and prioritizing university design criteria to adapt these spaces for the presence of women. In order to explain these criteria, two universities in Tehran, namely Tehran University and Shahid Beheshti University, have been selected as the examples for the study. The results of this study can serve as a suitable model for renovating or reconstructing old universities, or for designing new spaces.

Gender-Oriented Educational Space

In educational spaces, it is crucial to pay attention to both genders. However, sometimes the gender power relations and norms governing society cause gender inequality and male dominance in these spaces. This issue impacts women's experiences in educational space and hinders their effectiveness in these spaces (Chapin and Warne, 2020). In this regard, Lever

points out the unbalanced university spaces and believes that gender inequalities have a greater negative impact on women. She argues that the presence of distinct rules and norms for women and men in educational spaces to create an imbalanced gender space (Lever, 2020). Somers et al., (2023) investigated the sense of insecurity caused by carrying weapons at the University of Texas. According to their results, women professors feel more insecure and anxious in the university environment, which hinders their ability to perform their jobs effectively compared to their male counterparts. They are marginalized and become victims of university regulations. Therefore, they have found it effective to review the policies on carrying guns to protect students, staff, and faculty, and to prevent gun violence and suicides on campus. Since this issue is known in the field of "gender-oriented educational space," the related concepts have been examined as follows.

In elucidating the concept of gender and space, it is imperative to differentiate between the terms "sex" and "gender." The term "sex" pertains to the inherent biological and anatomical distinctions between male and female bodies, which are typically innate variances and stem from the differing capacities of the two sexes in sensing, perceiving, and understanding the environment (Rendell et al., 2000; Pakzad and Bozorg, 2012). Conversely, "gender" represents a social construct and category shaped by the cultural norms and conventions prevailing in a given society. This distinction is crucial as it diverges from the term "sex," which commonly denotes the same category solely from a biological perspective (Narcissians, 2005). Consequently, gender can be characterized as the culturally acquired disparities between men and women, as these distinctions vary across cultures and serve as the basis for delineating distinct societal roles for individuals based on their gender (Lawanga, 2001).

Therefore, the experience of space differs based on gender. Women have different expectations of spaces, perceiving them in their own way and having a different environmental experience than men. In the perception of the environment, women tend to be more partial while men tend to be more holistic. In other words, most women have a perception process from part to whole, while men go from whole to part. Women tend to consider the bigger picture and pay closer attention to details. The field of vision of women is wider than that of men, but the depth of vision of men is greater than that of women. Women have a stronger sense of perception and reception than men; however, they are weaker than men in orientation and wayfinding (Shahcheraghi and Bandarabad, 2015). Therefore, because women perceive and recognize the environment differently, they express their behaviors uniquely within a space, ultimately deriving distinct meanings and experiences from it.

The understanding and utilization of space in this research is primarily influenced by social theories of space, particularly the social construction of space and Lefebvre's spatial trilogy. French Marxist philosopher and intellectual Henri Lefebvre believes in the "social production of space." In his opinion, every human being needs space to live, flourish, and die within themselves, and every society needs space to exist. Space provides an environment for our socio-spatial actions and spatial experiences. In his groundbreaking book "Production of Space," Lefebvre (1991) considers space as a social structure that is formed in the course of people's social life and is a manifestation of social relations within itself.

In this book, he argues that spatial patterns are not fixed but are shaped by dominant socio-economic systems and ruling political power (Doan, 2010). He believes that, in addition to material formation, space is also conceptually produced. As Marxist geographers, David Harvey and Edward Soja also believe that space is a product of social relations, and simultaneously, space is a necessary social product (Rendell et al., 2000).

In the research of spatial experiences, experience is crucial for transforming "mere space" into "human place" or "living spaces". Also, considering that spatial actions occur in space, the concept of space is crucial for our experiences. In this regard, the Lefebvre trilogy provides a comprehensive insight into the spatial experience. Lefebvre considers space as something more than a static environment or a mental construct. He believes that the social space is formed over time through the interaction of three dimensions: spatial practice (material and functional space that is related to the physical production of space), representations of space (a conceptual and coded space that represents the mental space and is related to the designer, planner, and expert space), and representational space (the inhabited space, which is related to the residents and users of the space, is understood non-verbally, and the experience of daily life takes place within it) (Rendell et al., 2000; Lefebvre, 1991).

Based on this perspective, urban space can be described as the product of the interaction between the experiences of environment users, the mental space of experts, and the physical environment. The lived space produces a spatial experience influenced by the perception of the perceived space. Thus, lived space plays a prominent role, representing social space as the result of spatial practice (spatial performance) and space representation (mental). This includes forms of metaphor or other metaphors and serves as the site of spatial experiences. It should be noted that the upcoming research specifically focuses on the spatial layer experienced by women students in their daily lives, which Lefebvre refers to as the represented space.

In relation to women's experience of patriarchal public spaces shaped by male perspectives and actions, feminist geographers have developed theories to explain these dynamics. One of these individuals is Dorothy Smith, who has proposed the "disjuncture" perspective in this context. Accordingly, when a woman enters a predominantly masculine environment, she may sometimes experience an unpleasant feeling of being out of place (Smith, 1987). According to his belief, there is a separation between what is scientifically and expertly discussed about space and what is experienced by women in the life of Romse (which Lefebvre calls the represented space). He refers to this separation, which originates from the patriarchal structure, as "bifurcation of consciousness". The concept of "gendered space" also refers to this issue.

The root of the formation of separate, dual, and conflicting spheres that separate the city from the home, the public from the private, the man from the woman, and the production from reproduction has been patriarchy and capitalism. As Cuthbert believes, the entire structure of the city was shaped by patriarchal capitalism. The zoning model of land use, public open space, transportation networks, and the relationship between work and home all stemmed from patriarchal needs and values (Cuthbert, 2008). Accordingly, the public domain (city) is associated with masculine traits such as dominance and production, while the private territory (home) is linked to feminine qualities like subordination and reproduction. Therefore, the urban space dominated by one gender is known as a gendered urban space. The gendering of urban spaces can be observed in the way these spaces are designed to restrict the activities and movements of women by encouraging specific behavioral patterns and fostering a feeling of insecurity among them (Madanipour, 1996).

The genderization of space is raised as an issue when it is deemed suitable for a specific gender (male or female), leading to limitations in presence, marginalization, and ultimately causing the other gender to leave the space. While the possibility of optimal and free use of urban spaces is considered one of the basic rights of citizens.

University Design

Designing university environments is crucial for fostering a culture of learning and academic success. The physical space of a university plays

a significant role in shaping the learning experience, influencing student engagement, and fostering a sense of community among students and faculty. A well-designed university environment can enhance the overall quality of education, improve student outcomes, and contribute to the development of a more inclusive and diverse academic community. By incorporating elements such as natural light, comfortable seating, and accessible technology, universities can create spaces that support the diverse needs of students and promote a culture of collaboration and innovation. Ultimately, designing university environments that are both functional and aesthetically pleasing is essential for creating a positive and productive learning environment that supports the academic and personal growth of students. Given the limited research on the qualities of university design specifically from a gender perspective, several studies have also investigated the overall spatial qualities of university campuses, which is outlined below.

Hajrasouliha (2015) focused on the concept of a "well-designed campus" and identified seven dimensions of physical form. These dimensions include land use organization (the integration of sports, research, accommodation, and various university facilities), compactness (density of the area and proximity of buildings), connections (linkages within the university campus and with the surrounding area), configuration (the coherence of the campus spatial structure), campus life (the vibrancy of university activities), green spaces (the presence of natural elements), and context (the level of urbanization in the vicinity). These dimensions are crucial for optimizing the design of university campuses. According to Agrawal (2021), the campus design process of universities can be described as an integration of four key topics that contribute to an overall plan: land use and site planning, built form and design, campus sustainability, and university objectives.

Dalton et al., (2018) have identified five key factors - land use, design, sustainability, economic development, and collaboration as significant considerations in the context of college campuses. Land use is highlighted as a fundamental element in shaping the overall campus environment, emphasizing the creation of a comprehensive space that supports various activities such as living, learning, working, and socializing. This aspect is closely linked to enhancing community cohesion, vibrancy, safety, pedestrian accessibility within the campus, as well as the campus's connection with the surrounding community and broader region. Additionally, campus design is viewed as an artistic endeavor aimed at creating a cohesive and visually appealing campus that enhances legibility, creativity, and a distinct sense of campus identity. The concept of sustainability, or the notion of a green campus, involves viewing the university campus and its surroundings as an interconnected ecosystem.

Based on studies conducted by the CMBA group of architects (2022) on design elements attractive to women in university design, creating spaces with interesting factors to make a memorable impact at the very first contact, integrating designs that encourage collaboration through spaces such as wide corridors with technological inspiration. The department encourages ensuring flexibility in classroom spaces for various learning activities, providing favorable spaces for work and study such as cafes and semi-private study rooms, and suggesting the presence of rest areas like cafes, halls, and courtyards.

Hall (2023) has emphasized safety, sociability, and accessibility criteria in the design of university spaces for women. To help increase women's sense of safety on campus, she has suggested considerations such as well-lit pathways, central safe study areas, and gender-specific facilities like gender-specific sports clubs. Similarly, Zang et al., (2023) also believe that challenges related to academic culture, urban environment, and societal culture can impact students' experiences at the university. They emphasize the importance of creating inclusive and diverse environments that cater to the needs of all students.

Roberts et al., (2022) conducted a study on male and female university students in the North of England to examine the target group's perceptions of safety and experiences of interpersonal violence over time, both as students in and out of university. The aim of this research was to increase the quality of life for women in the university and its surrounding public spaces at night. This research demonstrates that women experience increasingly unsafe cityscapes compared to male students when it gets dark and they move away from the university and into the city. Based on this, they believe that security is strongly influenced by spatial and temporal contexts. The findings of this research have identified six interconnected themes: darkness, drunkenness, being alone, deserted places and spaces, strangers, and experiences of sexual assault to create a sense of insecurity in women. This research has proposed measures to increase the security of women while they are on university campuses or using public spaces at night. In this regard, a strategy to overcome the gendering of nightlife spaces involves changing the design of the physical environment. This can be achieved by increasing visibility through reducing walls and bushes, opening up enclosed spaces, improving lighting in the campus parking lot and surrounding areas, enhancing the illumination of the university campus and train station, bus stop areas, as well as improving security services such as suggesting increased night patrols. The general qualities suggested by prominent theorists can pave the way for future research to meet the specific criteria of university design from a women's perspective.

MATERIALS AND METHODS

In line with the aim of the present research, a mixed research method has been used. Initially, the environmental inclinations of women university students regarding university spaces were elucidated using the qualitative method of "thematic analysis". Then, with the assistance of the quantitative method of "performance-importance analysis," design principles extracted from the qualitative stage were prioritized.

In the present study, two universities, Shahid Beheshti University and Tehran University, in the city of Tehran were selected. The selection of samples was based on their differences and similarities. Having diverse academic fields in different educational levels, being established for a long time, being located in specific urban areas, having university design, and along with the high rate of women students were among the reasons for choosing these two universities. In addition to common characteristics, these two universities had different urban locations. Shahid Beheshti University is situated in the northern outskirts of the city, while Tehran University is located in the city center.

Samples were purposefully selected (not randomly) and in a snowball manner (through successive introductions) based on the specified criteria. The interviewees were women undergraduate students at two chosen universities. Considering that a significant portion of women in the university environment are students, this study selected "women university students" as the statistical population. In the following text, whenever women are mentioned, it refers to women students.

Research data collection tools in the qualitative stage have included interviews, photography, and observation of women's behavior in selected universities. Since the examination of women's perception is a qualitative issue, the interviews have been semi-structured and in-depth, continuing until theoretical saturation is reached. Therefore, in each selected university, 20 interviews have been conducted separately.

Considering the exploratory nature of the present research, it is worth mentioning that the interview questions were general and open-ended. They were formulated by reviewing similar qualitative studies related to the research. The questions pertained to the aspects of the university that they like or dislike.

The raw data analysis of the interviews was also conducted based on the systematic approach of Strauss and Corbin (2008) through the coding process. Coding is the process of analyzing and breaking down data. During this process, concepts and themes are extracted. It also involves decoding and interpreting data, including naming concepts and creating themes in an inductive manner. In order to understand the meaning of university spaces in the women experience, all interviews were recorded and then transcribed verbatim onto paper.

During the coding phase, important excerpts from participants' descriptive feedback were identified through line-by-line and paragraph analysis. Analytical notes were then created to identify and label concepts. Key statements about the meaning of selected passages were converted into concepts and appropriately labeled. By comparing these concepts, those that appeared most frequently across interviews were grouped together based on similarities and differences in content. For each group, a specific concept was designated under the title of "theme." These themes are positioned at a higher level and possess a more abstract nature compared to the other concepts. The creation of entities continues until each of them represents an independent and distinct meaning. For example, common concepts such as lighting and brightness of spaces, appropriate views, high ceilings in academic spaces, and the spaciousness of areas derived from interviewees' responses have been categorized as openness and expansiveness based on semantic similarity. In this way, all concepts derived from the narratives were examined to extract concepts and themes for discussion, ultimately identifying the meaning of each of the selected universities around the main components. Then, the meaning of selected universities in the experience of women was explained in terms of design principles.

In the next step, research findings were prioritized by 36 women students. This stage, which is the quantitative part of the current research, aims to prioritize and weigh the design principles extracted from the interviews. The group selected for weighting the criteria consisted of women students in Tehran. They were chosen based on age range and educational level similar to the group selected for interviews. A questionnaire for prioritizing design principles, extracted from the interviews, was completed by the participants. Then, with the assistance of "Performance-Importance Analysis" (IPA), the design principles of university spaces extracted from the current research were weighted and prioritized.

Performance-importance analysis is an effective tool for evaluating the organization's situation and providing suggestions and strategies for its success. This analysis was conducted by creating a two-dimensional matrix for performance-importance analysis. The horizontal axis represents the organization's performance for each criterion, while the vertical axis indicates the importance of each criterion as perceived by decision-makers (Fig. 1).

In the current study, the concept of organization refers to selected universities and the Quarter Performance Analysis Model - Importance based on the fourfold classification of the quality dimensions of the Carmona spatial qualities (2021) is divided into four quarters: First quarter; pay attention to these cases (aspire), second quarter; requirement, third quarter; be cautious in these cases (beware), fourth quarter; avoid these cases.

The IPA method is based on five steps. step one: The degree of importance of the effective factors extracted from the qualitative stage of the research and the performance of these factors in the selected universities was determined. Bjp and cjp (p= 1, 2, ..., n and j= 1, 2, ..., m) represent the importance value and performance value, respectively. These values are determined for the jth attribute and by the pth respondent. These values can be characterized by a Likert scale. In this research, a 5-point Likert scale was used, so it is clear that $1 \leq bjp, cjp \leq 5$. In the second

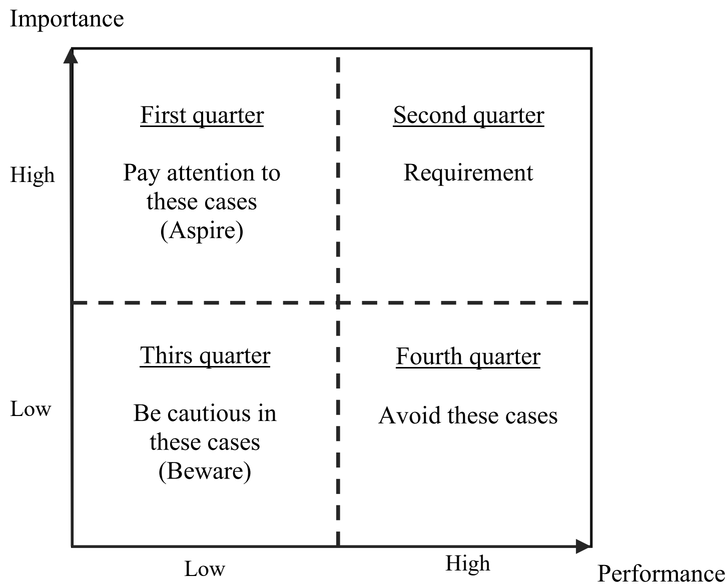


Fig. 1: Quadratic model of performance-importance analysis

step, the geometric mean was used to combine the opinions of all respondents. Thus, based on relations 1 and 2 , bjp, is referred to as the final importance value, and , and cj is referred to as the final value of the (j)th characteristic function, representing the collective opinion of (p) respondents.

$$b_j = \left(\prod_{i=1}^{n} b_{jp}\right)^{\frac{1}{n}} \text{ The final value of importance } (1)$$

$$c_j = \left(\prod_{i=1}^{n} c_{jp}\right)^{\frac{1}{n}} \text{ The final value of performance } (2)$$

Step three: In this section, the threshold value is determined based on equations 3 and 4. In these relationships, "m" represents the number of research criteria. The importance threshold value and the performance threshold value are represented by μb and μc, respectively.

$$\mu_b = \frac{\sum_{j=1}^{m} b_j}{m} \quad (3)$$

$$\mu_c = \frac{\sum_{j=1}^{m} c_j}{m} \quad (4)$$

Step four: the relative position of each characteristic on IPA matrix is specified (Fig. 2). μb and μc will not necessarily be placed in the center of the axes.

Step Five: In this section, the weight and rank of research criteria are determined. In the IPA method, the criteria in the first quadrant (items to pay attention to) are weighted. Because the remaining quadrants of the model are either of low priority and should be approached with caution, or they are resource-intensive and should be avoided, or they are crucial and require immediate attention. The weight of the jth criterion is indicated by OWj, which is calculated based on Equation 5. Additionally, the weights have been normalized according to Equation 6.

$$OW_j = \left|\left(b_j - c_j\right) \times b_j\right| \quad (5)$$

$$SW_j = \frac{OW_j}{\sum_{j=1}^{m} OW_j} \;,\; 0\,''\, SW_j \,''\, 1 \;,\; \sum_{j=1}^{m} SW_j = 1 \quad (6)$$

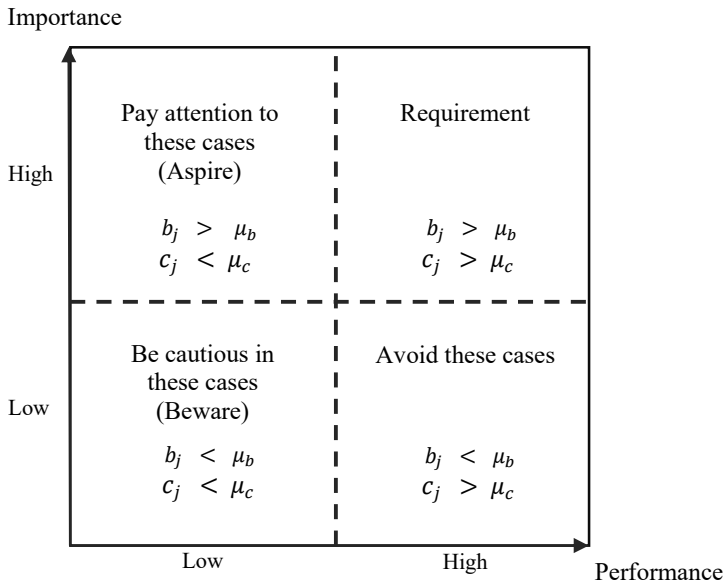


Fig. 2: IPA matrix

DISCUSSION AND FINDINGS

According to the coding stages described in the methodology of the present study, the meanings of women students from Shahid Beheshti and Tehran universities were categorized in Figures 3 and 4. The meanings of university spaces refer to the emotions and perceptions that have been formed in the minds of person after experiencing the space multiple times (Lak and Jalalian, 2018). When talking about the university where a person studies, those meanings unconsciously come to mind.

As is evident in the two figures below, the meaning of each of the two chosen universities in the experiences of women across nine main themes has been elucidated. The theme of a "maturing context" is related to the field in which the university is located. The themes of "Campus Layout," "Faculty Architecture," and "Pleasant Environment" are related to the physical factors of the university. Additionally, the themes of "Appealing Programs," "Women's Right to Choose," "University's Reputation," "Social Relationships," and "Economic Considerations" as non-physical factors have been identified in the experiences of women from the University of Tehran (Fig. 3).

The themes extracted from the experiences of women at Shahid Beheshti University were similarly identified by the university itself. However, a notable difference was that in their experiences at Shahid Beheshti University, they highlighted the theme of the "university as a non-university" (Fig. 4).

Then, based on the meanings extracted from two chosen universities, the research findings formulated the "Influential Criteria in Designing University Spaces for Effective Women's Presence." This formulation identified nine key recurring themes across the selected university spaces, including " The University's Position in the City,""Campus Layout," "Faculty Architecture," "Pleasant Environment," "Social Relationships," "Women's Right to Choose," "Universit's Reputation," "Appealing Programs," and "Economic Aspects" (Fig. 5).

Fig. 3: The meaning of Tehran University in Women's Experiences

Fig. 4: The meaning of Shahid Beheshti University in Women's Experiences

After extracting the themes to weigh and prioritize the research findings, a questionnaire consisting of 9 criteria and 26 sub-criteria was completed by 22 women from selected universities. The Importance-Performance Analysis (IPA) method was used to analyze the importance and performance of the factors influencing the promotion of women's presence in these universities. Finally, the prioritization of the key criteria for designing university spaces to enhance women's presence was discussed. Based on this, 26 influential factors extracted from qualitative analysis were provided to the respondents at Tehran University and Shahid Beheshti University. The respondents in these two universities are undergraduate students from various fields who have experience attending the selected universities.

Out of 22 respondents, 12 were students of Tehran University, and 10 were students of Shahid Beheshti University. First, the participants were asked to assess the importance of each criterion at their university, followed by rating the university's current performance in each criterion on a range of one to five. By utilizing relations 1 and 2, the geometric mean of comments was calculated, and relations 3 and 4 were used to determine the importance threshold and performance threshold values (Tab. 1). Based on the values in Table 1, the IPA matrix was constructed, with the thresholds delineating the levels. The results are presented below based on the selected universities (Fig. 6 and 7).

Fig. 5: Effective criteria in university design to promote the presence of women

Table 1: Average importance and performance of factors

		Tehran University		Shahid Beheshti University	
Code	criteria	Perfor-mance	Importance	Performance	Importance
C1	Campus layout	4/472	3/548	3/887	3/270
C2	Hierarchical structure of campus	4/286	3/548	4/249	3/464
C3	Nearness	4/532	3/702	2/132	3/862
C4	On-campus access	4/908	4/556	1/888	4/782
C5	Appropriate orientation	4/366	3/936	3/752	3/366
C6	Faculty architecture	3/702	2/942	3/752	3/088
C7	Flexibility of spaces	3/683	2/449	3/837	2/048
C8	Hierarchical structure of faculty	3/615	3/192	3/949	3/270
C9	Type of architecture	4/729	3/043	3/669	2/656
C10	Perspective	3/752	4/556	4/890	4/573
C11	Greenness	4/817	4/642	4/890	4/573
C12	Open-hearted spaces	3/299	4/010	4/676	4/249
C13	Urban art	3/863	2/942	3/752	2/656
C14	Comfort considerations	3/331	4/286	3/140	4/573
C15	Maintenance	2/534	3/382	3/464	3/565
C16	Environmental safety	4/107	4/642	3/016	5
C17	Integration with the surrounding	4/817	4/642	1/231	4/890
C18	Geolocation	4/448	4/642	3/140	4/676
C19	Easy accessibility	5/000	4/729	1/149	5
C20	Educational performance	4/472	4/532	4/373	4/373
C21	Atmosphere of space	4/729	3/634	4/472	3/366
C22	Right to choose	3/464	4/729	2/625	4/782
C23	Health and hygiene	1/991	3/772	2/930	3/837
C24	Social relationships	4/642	3/615	4/373	3/140
C25	Multiple behaviors	4/472	2/368	3/366	2/259
C26	Cost-effective environment	4/642	2/777	1/414	2/965
Thresholds		$\mu_c = 4.103$	$\mu_b = 3.801$	$\mu_c = 3.385$	$\mu_b = 3.78$

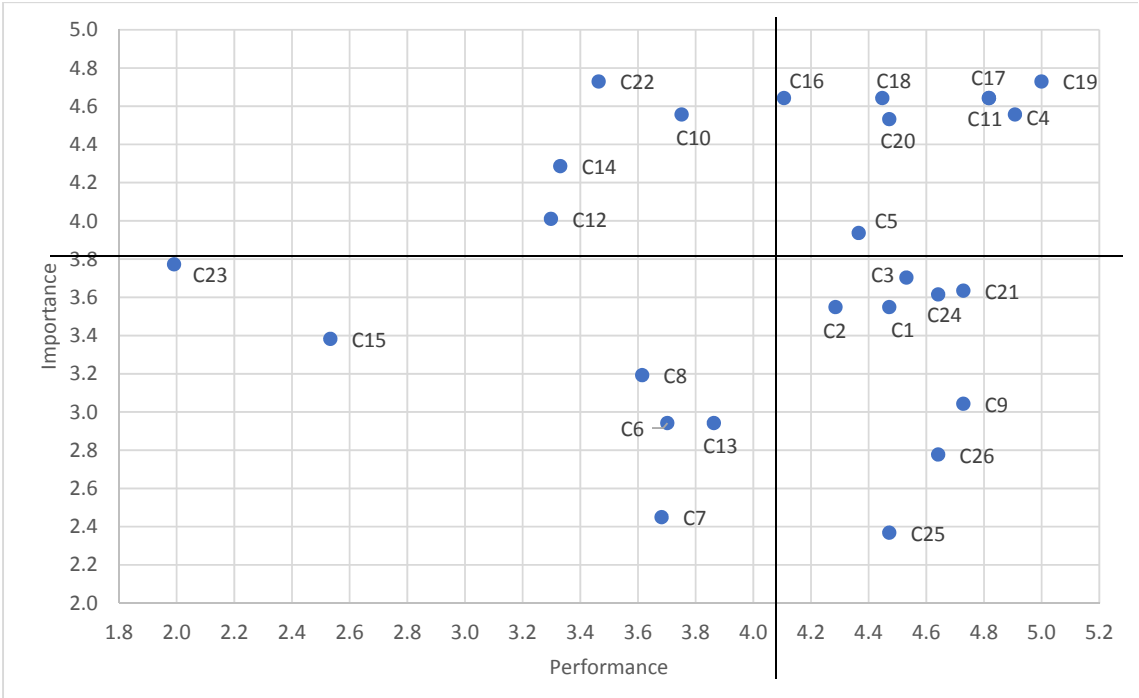


Fig. 6: Performance analysis matrix - importance of University of Tehran

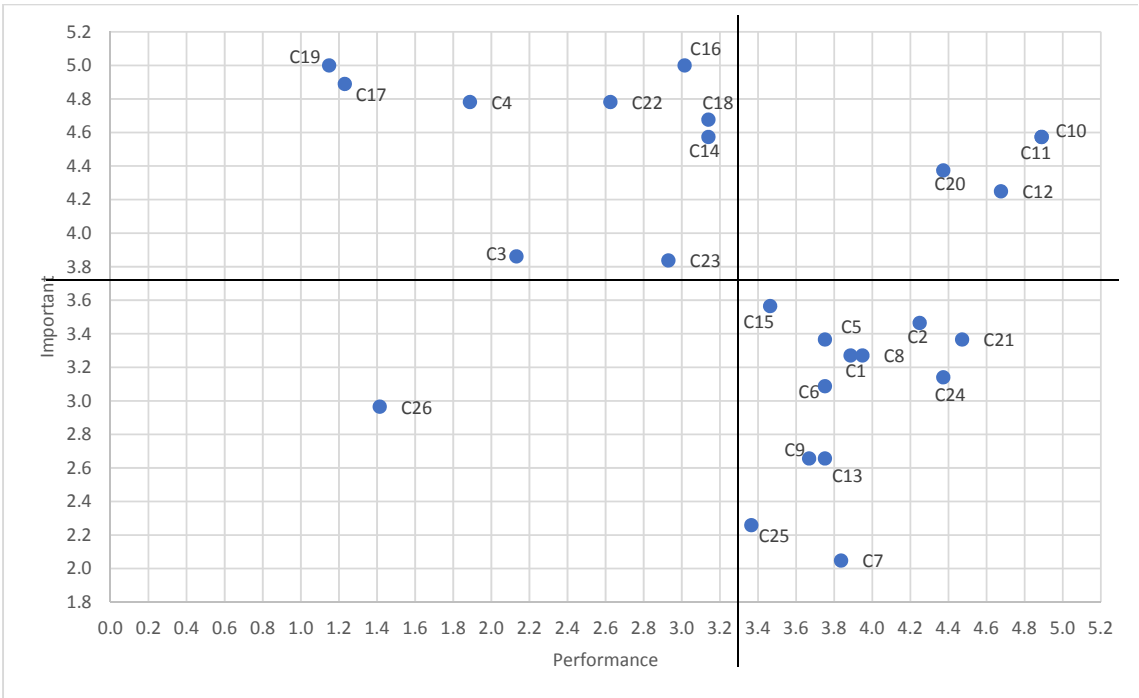


Fig. 7: Performance analysis matrix - importance of Shahid Beheshti University

First quarter (pay attention to these cases): The criteria in this quadrant are very important to respondents, but the university's performance level is relatively low in these areas. This quadrant has the most influential and least influenced, so it requires immediate attention for improvement. In fact, efforts to improve this sector should be given the highest priority because the main weakness of selected universities is in this area. In other words, designers and planners of university spaces should pay more attention to the criteria of this quarter in order to achieve the goal of enhancing university spaces for women.

For example, at Tehran University, the criteria of perspective (10C), open-hearted spaces (12C), comfort considerations (14C), and right to choose (C22) are in the first quarter. Therefore, double efforts should be made to enhance these criteria. In Shahid Beheshti University, 9 criteria (3C), (4C), (14C), (16C), (17C), (18C), (19C), (22C), and (23C) are in this quadrant.

Second quarter (Requirements): The criteria in this quadrant appear to be very important to the respondents. At the same time, the performance of the selected universities is also at the highest level according to these criteria. Therefore, in this situation, the essentials and necessary items should be preserved. This quarter is considered the main strength of the selected universities and should be continued. For the University of Tehran, there are 8 criteria for on-campus access (4C), appropriate orientation (C5), greenness (11C), environmental safety (16C), integration with the surrounding (17C), geolocation (18C), easy accessibility (19C), and educational performance (20C). For Shahid Beheshti University, four criteria of perspective (10C), greenness (11C), open-hearted spaces (12C), and educational performance (20C) are in this quadrant.

Third quarter (be cautious in these cases): Criteria in this quadrant are rated low in importance and performance, making them a low priority. Although the performance level of the selected universities is low in these cases, the designers of university spaces should not focus too much on this aspect. The criteria in this quadrant are not very important, and these cases should be approached with caution. In this quarter, the limited resources should be spent on six criteria for Tehran University: faculty architecture (6C), flexibility of spaces (7C), hierarchical structure of faculty (8C), urban art (13C), maintenance (15C), and health and hygiene (23C). For Shahid Beheshti University, a criterion of cost-effective environment (26C) is situated in this area.

Fourth quarter (Avoid these cases): This quadrant contains criteria that are of low importance, but their performance is relatively high. The respondents are satisfied with the university's performance. However, designers and planners of university spaces should take note that the current emphasis on the criteria in this quadrant is unnecessary, redundant, and leads to a waste of resources.

In other words, the resources allocated to these criteria are more than necessary and should be spent elsewhere. For the University of Tehran, there are 8 criteria for campus layout (1C), hierarchical structure of campus (2C), nearness (3C), type of architecture (9C), atmosphere of space (21C), social relationships (24C), multiple behaviors (25C), and cost-effective environment (26C). For Shahid Beheshti University, 12 criteria of campus layout (1C), hierarchical structure of campus (2C), appropriate orientation (5C), faculty architecture (6C), flexibility of spaces (7C), hierarchical structure of faculty (8C), type of architecture (9C), urban art (13C), maintenance (15C), atmosphere of space (21C), social relationships (24C), and multiple behaviors (25C) are considered in this area.

In the following, the determination of the weight and rank of the criteria in the first quarter has been addressed because it is only in the first quarter that improvements in the criteria need to be achieved. The other quarters either have resource wastage or necessities, so they do not need to be examined. The results are pre-

sented separately for selected universities (Tab. 2 and 3), indicating that at the University of Tehran, improvements in right to choose should be prioritized, leading to an increase in the university's performance in this area. Then, the criteria of comfort considerations, perspective, and open-hearted spaces, will be considered.

For Shahid Beheshti University, it is essential to prioritize the enhancement of easy accessbility criteria and integration with the surrounding. The university should focus on improving its performance in these areas. Then the criteria of on-campus access, right to choose, environmental safety, geolocation, nearness, comfort considerations, and health and hygiene should be considered.

After weighting the criteria separately for the two selected universities, the results of the two universities were summarized (Tab. 4). Based on this, in order of priority, the designers and planners of university spaces should pay more attention to the criteria of on-campus access (4C), comfort considerations (14C), environmental safety (16C), integration with the surrounding (17C), easy accessbility (19C), right to choose (22C), and health and hygiene (23C). Also, the criteria of perspective (10C), greenness (11C), open-hearted spaces (12C), geolocation (18C), and educational performance (20C) are essential in the second quarter. These are the criteria that need to be considered in the design to enhance women's experience. Third quarter; it is a place where its criteria should be treated with caution. The criteria of nearness (3C), maintenance (15C), and cost-effective environment (26C) placed in this quadrant have low im-

Table 2: Weight and priority of criteria for Tehran University

Code	Criteria	Overall Weight (OW)	Score Weight (SW) (Percent)	Rank
C10	Perspective	3/665	22/09%	3
C12	Open-hearted spaces	2/852	17/19%	4
C14	Comfort considerations	4/092	24/67%	2
C22	Right to choose	5/980	36/05%	1

Table 3: Weight and priority of criteria for Shahid Beheshti University

Code	Criteria	Overall Weight (OW)	Score Weight (SW) (Percent)	Rank
C3	Nearness	6/677	7/02%	7
C4	On-campus access	13/836	14/55%	3
C14	Comfort considerations	6/551	6/89%	8
C16	Environmental safety	9/922	10/43%	5
C17	Integration with the surrounding	17/889	18/81%	2
C18	Geolocation	7/182	7/55%	6
C19	Easy accessbility	19/257	20/25%	1
C22	Right to choose	10/312	10/84%	4
C23	Health and hygiene	3/478	3/66%	9

portance, performance, and priority. Therefore, the designers of academic spaces should not focus much on these three criteria because the criteria in this quarter are not very important. Finally, the criteria of the fourth quarter, which are placed in the lower category, lead to a waste of resources due to their low importance and should be the lowest priority for attention.These criteria include campus layout (1C), hierarchical structure of campus (2C), appropriate orientation (5C), faculty architecture (6C), flexibility of spaces (7C), hierarchical structure of faculty (8C), type of architecture (9C), urban art (13C), atmosphere of space (21C), social relationships (24C), and multiple behaviors (25C) (Fig. 8).

Table 4: Weight and priority of criteria for both selected universities

Code	Criteria	Overall Weight (OW)	Score Weight (SW)(Percent)	Rank
C4	On-campus access	6/884	13/03%	4
C14	Comfort considerations	5/169	9/78%	7
C16	Environmental safety	5/916	11/20%	5
C17	Integration with the surrounding	10/273	19/44%	2
C19	Easy accessbility	11/097	21/00%	1
C22	Right to choose	8/074	15/28%	3
C23	Health and hygiene	5/427	10/27%	6

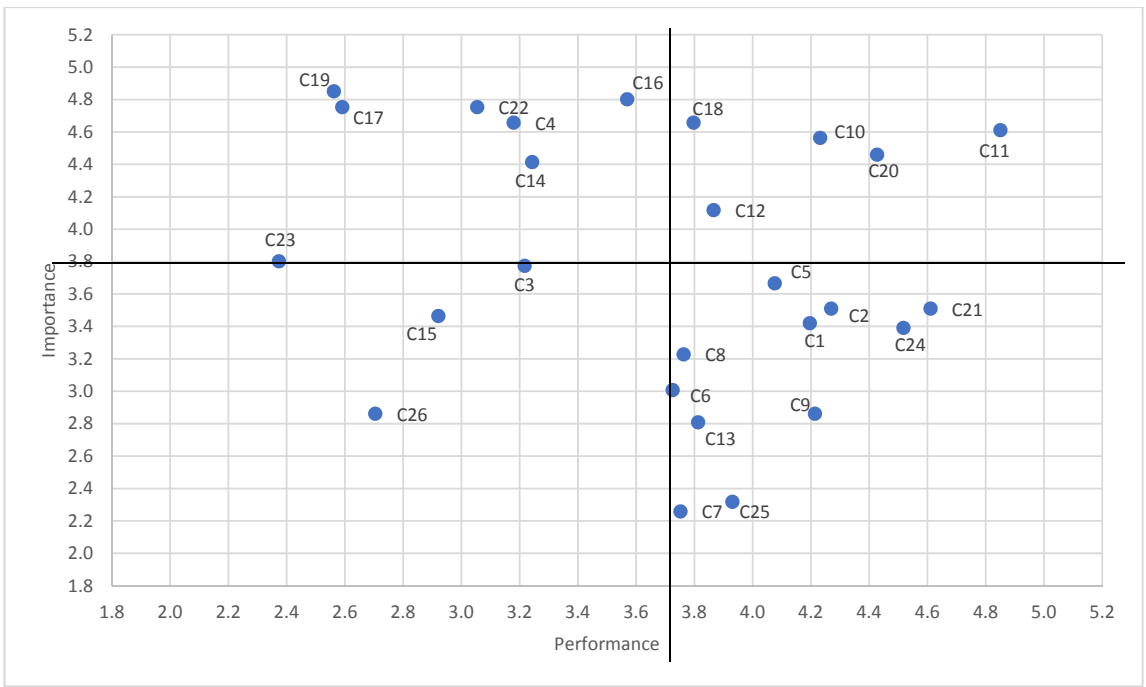


Fig. 8: Performance-Importance Analysis Matrix for both selected universities

According to the findings of the present research, the most effective criteria in designing universities to enhance the presence of women in the context of Iran, with specific cultural-religious patterns, are in the following order of priority: easy access to university campuses, integration with the surrounding, women's right to choose, on-campus access, environmental safety, health and hygiene, and comfort considerations. The study's findings have been compared to other relevant previous research.

Research conducted by Somers et al., (2023), Fisher and Sloan (2022), Roberts et al., (2022), Senn et al., (2018) and Larsen and Austin (2020) has primarily focused on addressing women's safety and crimes committed against them in university settings. As a result, social solutions have been proposed. This new study considers various factors beyond safety concerns, such as the, events, university and faculty design, integration with the surrounding, and women's right to choose. All of these factors are considered significant in shaping women's perceptions of university spaces.

In the investigation carried out by Hajrasouliha (2015) to meet the standards of a well-planned campus, seven criteria were identified. By juxtaposing the outcomes of prior studies, which encompass nine criteria categorized as physical and non-physical, with the results of Hajrasouli's research, it can be inferred that the criteria for a well-designed campus align with the physical aspects of the present study. Consequently, the attributes of connectivity and setting in his investigation correspond to the urban positioning of the campus; the integration of functions, density, and layout align with the effective design of the campus; while campus vitality and environmental sustainability were deemed to correspond to the relevance of the current research. The emphasis of his inquiry is on the physical aspects of university campuses, and the non-physical elements that contribute to the creation of an appealing campus, aside from the economic considerations mentioned, were not explored in his study.

The studies conducted by Zeng et al., (2023) have emphasized the factors of university culture, urban environment, and community culture, which can be considered equivalent to the criteria of the urban location in the present study. Therefore, Zeng et al. have overlooked other physical criteria derived from recent research, such as the appeal of the university environment, the layout of the university campus, the architectural design of the faculty, and non-physical criteria including cost-effective environment, women's right to choose, hangout spots, university reputation, and appealing programs.

Hall (2023) emphasized the importance of safety, security, sociability, and accessibility of university spaces for women. These factors can be considered when formulating criteria for the university's position within the city in the current study. Therefore, the present research has expanded on his findings by including criteria such as the pleasantness of the environment, campus layout, the architectural design of the faculty, cost-effective environment, women's right to choose, hangout spots, the university's reputation, and the appeal of programs.

Comparing the design principles identified by the CMBA group of architects (2022) with the results of the present study, it is possible to formulate the qualities of flexibility in classroom spaces, the presence of conducive spaces for work, study, and relaxation, which contribute to the overall appeal of the university environment. Therefore, the criteria for the university's position within the city, campus layout, faculty architecture, cost-effective environment, women's right to choose, hangout spots, university reputation, and appeal of programs have been integrated into their work.

By comparing the research findings with those of Agrawal (2021), it is possible to equate the campus layout with campus sustainability, the land use and site planning with the faculty architecture, and the campus reputations with the university objectives. The current research has incorporated economic factors, appealing

programs, social relationships, women's right to choose, pleasant environment and the university's position in the city into his findings.

Dalton et al., (2018) introduced a framework outlining the relationship between universities and communities based on five key factors: land use, design, sustainability, economic development, and collaboration between the university and the community. A comparison of the nine themes identified in the current study with the five themes proposed by Dalton et al. reveals that the theme of land use aligns with urban location considerations, while the theme of design pertains to the architectural aesthetics of the university campus and research faculty. Notably, the theme of sustainability, emphasized in Dalton et al.'s study, is not among the themes explored in the present research. Additionally, the upcoming research has introduced new themes such as emotional attachment, university branding, activity appeal, student rights and dignity, socializing opportunities, and economic influences to further enrich the existing framework.

RESULT AND CONCLUSION

According to the findings of the current research, easy access to the university, integration with the surrounding, women's right to choose, on-campus accessibility, environmental safety, health and hygiene, and comfort considerations carry significant weight and importance in adapting university spaces for the presence of women compared to other criteria. Therefore, it is suggested that the designers and policymakers of university spaces pay more attention and focus on these design principles because they play a significant role in women's favorable experience of the aforementioned spaces. After that, the criteria of perspective, greenness, open-hearted spaces, geolocation, and educational performance of the university environment are placed in the second priority. These factors are effective in shaping women's experience of these spaces, but their impact is less significant than the principles of the first priority. In the third priority, the criteria of nearness, maintenance, and cost-effective environment have been identified as having less weight and importance compared to the criteria of the previous two categories. Finally, campus layout, hierarchical structure of campus, appropriate orientation, faculty architecture, flexibility of spaces, hierarchical structure of faculty, type of architecture, urban art, atmosphere of space, social relationships, and multiple behaviors are perceived with less weight and importance by women.

The importance of considering the environmental inclinations of women in university spaces cannot be overstated. As women make up half of the student population, it is crucial that designers of university spaces take into account the specific spatial needs of women. By incorporating influential design criteria that cater to women's sensibilities, university spaces can better accommodate and support the effective presence of women. This is not only essential for ensuring equal opportunities and experiences for women but also for fostering a more inclusive and diverse academic environment that benefits all students. Ultimately, the findings of this research emphasize the need for designers and policymakers of university spaces to prioritize the needs and preferences of women in their design decisions. By doing so, they can create spaces that are not only functional but also welcoming and inclusive for all students, regardless of gender. This is critical for promoting a positive and supportive learning environment that allows students to thrive and reach their full potential. To confirm the results of the present study, forthcoming research endeavors should investigate the spatial encounters of women university staff and faculty members within academic contexts. It is advisable for subsequent studies to also concentrate on women graduate students at the master's and doctoral levels, and to explore women's encounters within academic settings across diverse cultural, geographical, and national contexts.

REFRENCES

Agrawal, P.; Yadav, M., (2021). Campus design of universities: An overview. Journal of Design and Built Environment, 21(3), 37-51.

Azadkhani, P., (2022). The impact of modern construction technology in improving the quality of the architectural environment of sustainable educational buildings. International Journal of Urban Management and Energy Sustainability, 3(4): 11-27. https://doi.org/10.22034/jumes.2022.1986028.1109

Beheiry, D. A.; Shafik, Z.; Aboubakr, D., (2023). A relational model of university's identity and architectural design pre-and post-pandemic. Archnet-IJAR: International Journal of Architectural Research, 17(2), 301-322. https://doi.org/10.1108/ARCH-03-2022-0075

Beykaei, S. T.; Mozaffari Ghadikolaei, F.; Ebrahimi, A., (2022). Evaluation of natural lighting in the architecture of educational spaces in temperate and humid districts with emphasis on the efficiency of light shelf. International Journal of Urban Management and Energy Sustainability, 4(2): 74-88. https://doi.org/10.22034/jumes.2023.2003009.1143

Bidar, M.; Pakzad, J.; Kazemi, A. V., (2022). Gendered space: Women's presence and use of space in Sabzeh-meydan of Tehran Bazaar. Cities, 126, 103673.

Borker, G., (2021). Safety first: Perceived risk of street harassment and educational choices of women.

Carmona, M., (2021). Public places urban spaces: The dimensions of urban design (3rd ed.). Routledge. https://doi.org/10.4324/9781315158457

Chapin, J.; Warne, V., (2020). Gender responsive pedagogy in higher education: A framework. London: International Network for International Network for Advancing Science and Policy (INASP).

CMBA Architecture (2022). Top design elements that attract modern students. https://blog.cmbaarchitects.com/top-design-elements-that-attract-modern-students-0

Corbin, J.; Strauss, A., (2008). Basics of qualitative research (3rd ed.): Techniques and procedures for developing grounded theory. SAGE Publications, Inc., 1-18. https://doi.org/10.4135/9781452230153

Cuthbert, A. R., (2008). The form of cities: Political economy and urban design. John Wiley & Sons.

Dalton, L. C.; Hajrasouliha, A. H.; Riggs, W. W., (2018). State of the art in planning for college and university campuses: site planning and beyond. Journal of the American Planning Association, 84(2), 145-161. https://doi.org/10.1080/01944363.2018.1435300

Doan, P., (2010). Gendered Space. R. Hutchison (Eds.), Encyclopedia of Urban Studies. SAGE Publications, Inc. 298-302.

El-Darwish, I. I., (2022). Enhancing outdoor campus design by utilizing space syntax theory for social interaction locations. Ain Shams Engineering Journal, 13(1), 101524.

Fisher, B. S.; Sloan III, J. J., (2022). Campus Crime: Legal, Social. Charles C Thomas Publisher.

Ghanbarpour, M.; Soroush, M. M.; jahanbakh, H.; Foroutan, M. (2022). Explaining the main role of behavioral setting in improving the sense of place in academic spaces. International Journal of Urban Management and Energy Sustainability, 3(2): 47-56. https://doi.org/10.22034/jumes.2022.1982927.1100

Hajrasouliha, A. H., (2015). The morphology of the" well-designed campus": Campus design for a sustainable and livable learning environment. The University of Utah.

Hall, S., (2023). How Can Campus Design Help Women Feel Safer?. https://futurecampus.com.au/2023/11/08/how-can-campus-design-help-women-feel-safer/

Jalalian, S.; Shahabian, P., Lak, A., Modiri, A., (2023). Environmental preferences of female students from the space of university campuses based on qualitative study. Urban Design Discourse a Review of Contemporary Litreatures and Theories, 4 (3) :16-32.

Khorrami Rouz, R.; Flamaki, M. M.; Norouz Borazjani, V., (2020). Reading gender components in shopping centers design in Tehran)Case studies: Palladium, Koroush, Tirageh-2 shopping center, and kuwatihaie Reza passage(. Hoviat Shahr, 14(43): 61-74. https://doi.org/10.30495/hoviatshahr.2020.14218

Lak, A., Jalalian, S., (2018). 'The experience of the meaning of place in urban spaces: Using qualitative content analysis to define the meaning of Bagh-e Ferdows', Journal of Iranian Architecture Studies, 7(13): 71-87. https://doi.org/10.22052/1.13.71

Lawanga, M., (2001). Gender, Environment and Sustainable Development. Paper presented at Sustainable Development, Governance and Globalization Meeting: An African Forum for Strategic thinking Towards the Earth Summit 2002 and beyond, Nairobi, Kenya, Vol. 2.

Lefebvre, H., (1991). The production of space. Blackwell.

Madanipour, A., (1996). Design of urban space: An inquiry into a socio-spatial process. John Wiley & Son Ltd.

Mohammadi, M., (2019). Redefining the binary oppositions of gendered urban space based on semeiotics approach-an analysis to the public space of traditional neighborhood. Iranian Architecture and Urbanism, 9 (16): 33-51. https://doi.org/10.30475/isau.2019.87932

Narcissians, A., (2005). Anthropology of Gender, Publication of the Thoughts of the Cultural Heritage Organization, first edition.

Pakzad, J.; Bozorg, H., (2012). Alphabet of environmental psychology for designers. Tehran: Arman-Shahr.

Partovi, P.; Farash Khiabani, M., (2018). Women and the third space: Rereading the public realm concept in the central district of the city of Tehran. Women's Studies Sociological and Psychological, 16(3): 107-138. https://doi.org/10.22051/jwsps.2019.17306.1569

Rafieian, M.; Jafari, S., (2020). Evaluating women's satisfaction of exclusive public spaces quality with emphasis on sense of safety; case study: Boostan-e Madaran park, Andisheh new town–Tehran. Strategic Research on Social Problems, 9(1): 133-158. https://doi.org/10.22108/srspi.2020.112335.1283

Ranjbar, A.; Shabak, M.; Norouzi, N.; Nayyeri Fallah, S., (2022). Explaining the role of urban furniture on attendance based on the behavioral pattern of architecture students (Case example: Open space of Islamic Azad University complex of Sari). International Journal of Urban Management and Energy Sustainability, 3(3): 57-70. https://doi.org/10.22034/jumes.2022.1985827.1108

Rendell, J.; Penner, B.; Borden, I., (2000). Gender, Space and Architecture: An interdisciplinary introduction. London and New York, Routledge.

Roberts, N.; Donovan, C.; Durey, M., (2022). Gendered landscapes of safety: How women construct and navigate the urban landscape to avoid sexual violence. Criminology & Criminal Justice, 22(2): 287-303. https://doi.org/10.1177/1748895820963208

Saidi, Ahmed., (2021). Women in Iran's higher education: from exclusion to advancement. Institute for Research & Planning in Higher Education. From the Jahad Tabeen series of reports, 103.

Senn, C. Y.; Hollander, J. A.; Gidycz, C. A., (2018). What works? Critical components of effective sexual violence interventions for women on college and university campuses. In Sexual assault risk reduction and resistance. Academic Press. 245-289.

Shahcheraghi, A.; Bandarabad, A., (2015). Environed in Environment: Application of environmental psychology in architecture and urban design. Tehran: jahad daneshgahi publication.

Smith, D. E., (1987). The everyday world as problematic: A feminist sociology. University of Toronto Press.

Somers, P.; Gao, H.; Taylor, Z. W., (2023). I do not speak as freely: Gendered views on campus carry at a research university. Education and Urban Society, 55(4): 488–510. https://doi.org/10.1177/00131245211047207

Villa Lever, L., (2020). University spaces, gender and position of social origin: intersection of inequalities. Gender and Education, 32(4), 518-536. https://doi.org/10.1080/09540253.2018.1501004

Zeng, W.; Wu, S.; Chen, W., (2023). Studying at a new remote university campus: Challenges and strategies in students' sustainable self-development. Sustainability. 15(4): 3857. https://doi.org/10.3390/su15043857

Zhang, Z.; Fisher, T.; Wang, H., (2023). Walk Score, Environmental Quality and Walking in a Campus Setting. Land, 12(4), 732. https://doi.org/10.3390/land12040732

HOW TO CITE THIS ARTICLE
Jalalian, S., Shahabian, P., Lak, A., & Modiri, A. (2024). Prioritizing Effective Criteria in University Design to Promote the Presence of Women: A Study in Urban Design. International Journal of Urban Management and Energy Sustainability, (), -.
DOI: 10.22034/ijumes.2024.2025934.1207