**Int. j. adv. multidisc. res. stud.** 2023; 3(6):1567-1572

**Received:** 10-11-2023
**Accepted:** 20-12-2023

International Journal of Advanced Multidisciplinary Research and Studies

**ISSN: 2583-049X**

# Increasing Energy Efficiency During Design Case Study: Building and Green Space of the Museum of Visual Arts

**[1] Mahmoud Zahiri, [2] Seyyed Arash Sohrabi, [3] Samad Dehghan**

[1] Eram Ashkoob Construction Company, CEO of., Hamedan, Iran

[2, 3] Department of Education, Construction Engineering Organization of East, Azarbaijan Province, Iran

**DOI:** https://doi.org/10.62225/2583049X.2023.3.6.3917

Corresponding Author: **Seyyed Arash Sohrabi**

**Abstract**

In the current situation, the recreational role of museums is gradually transforming into an educational and scientific role .Museums have realized that they are not only responsible for collecting, recording, and preserving antiques and exquisite properties but also for introducing them. In addition, since they are responsible for attracting and engaging people, they must provide various educational programs appropriate to the age and awareness of visitors (using all educational services). One of the most important goals of the project is to respond to the above-mentioned needs. But another goal is to use modern energy-saving technologies in the design and construction of this museum. In our country, due to the existence of a huge source of solar energy, maximum utilization of this energy is essential. The use of this renewable energy is very reasonable and it is possible to exploit it in most parts of Iran. The need for such a museum (which, in addition to the museum's function of preserving and preserving the works of great architects, including architectural sheets, initial sketches, volumetric models, Figures, and videos, in addition to that, it also deals with the function of education, which is one of the important goals of modern museums,): Is very much felt. Among the spaces of this museum, we can mention a specialized library, an architectural research institute, an amphitheater, multi-purpose halls for holding specialized architectural conferences and meetings, galleries, an educational section, and a section for preserving and preserving the works of architects. Given that all the walls and ceilings of the complex will be double-layered and insulation with at least heat exchange will be placed between these two layers, the insulation of all structures must be such that the losses caused by heat exchange are minimized as much as possible. In the heating and cooling system of all museum spaces, an attempt will be made to use hot and cold air. Horizontal and vertical channels in special places while construction and building work are carried out. They will be replaced based on the design specifications. The alternative is to design and install all the heat transfer channels in an exposed and surface-mounted manner, which is a decorative element and also completely accessible for inspection and maintenance.

**Keywords:** Energy, Museum, Design, Green Space, Museum, Design

## 1. Introduction

Collecting is innate in humans and the taste for collecting will always be with them. In our modern society, the museum represents the institutionalization of public tendencies toward collecting (Maleki *et al*., 2024; Khanian *et al*., 2013) [23, 21]. The museum in its current form was founded by Ptolemy in Alexandria in the late third century BC. However, in the Middle Ages, due to the rule of the church and the Inquisition, the educational role of museums diminished (Mohammad Mehdi Norouzian *et al*., 2024) [28]. With the beginning of the Renaissance and the flourishing of science, museums began their activities in parallel with the growth and development of various sciences (Abbaszadeh *et al*., 2015) [1]. During the 19th and 20th centuries, the expansion of museums led to education once again being recognized as one of the functions of the museum (Ghadarjani & Gheitarani, 2013) [11]. Activities in various fields of art, culture, and education in the museum are becoming more and more fruitful: Now is the golden age of museum architecture in the world (Dizaji, 2024a, 2024b [7, 8]; Norouzian & Gheitarani, 2025).

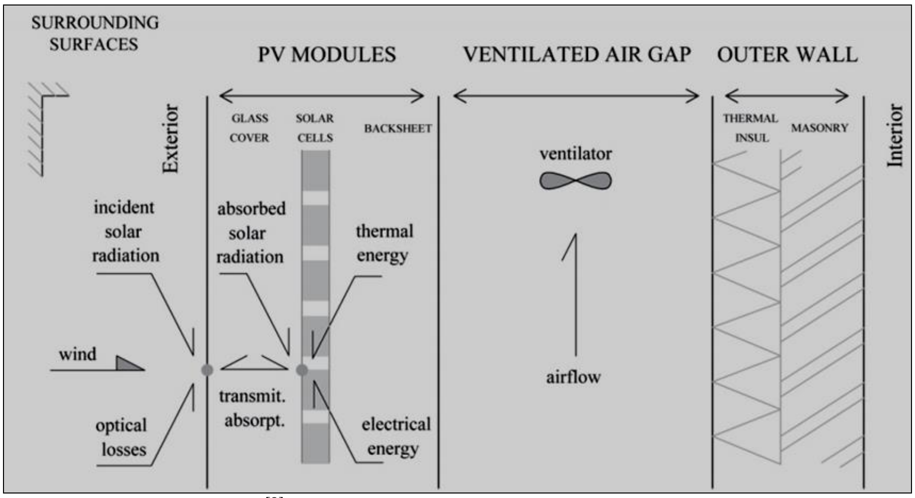
The architectural work of museums in the world is done with more thought and a test of thought and thought. New museums are designed in a way that they accept more visitors create more attraction and also attract more attention to themselves (Norouzian & Gheitarani, 2023; Khanian *et al*., 2019 [22]). The museum has always been a center of culture and research, but now, in addition to all this, it is a gathering, cultural-artistic learning, a center for selling objects made or printed by museums, and also includes boutiques, amphitheaters, restaurants, and the greater use of audio-visual technology (Sarabi *et al*., 2023; Norouzian & Gheitarani, 2024) [41, 35]. There is more innovation and creativity in the design of museums than in other buildings, and the artistic value of their architecture is also greater (Norouzian & Gheitarani, 2023). In the new architecture of the museum, the external volume of the museum is of great importance and it is not only its internal use that is considered, people have also paid more attention to its architecture and its internal architecture, in addition to museum objects (Zaker Haghighi *et al*., 2014; Dizaji, 2024a, 2024b) [42, 7, 8].

The purpose of establishing science and technology museums is also to expand and disseminate scientific culture at the community level (Karimimansoob *et al*., 2024) [20]. Attention to museums as a cultural symbol has a long history; although its foundation has undergone significant changes over time, museums are still fundamental centers that play a significant role in education and cultural enrichment (Saba Sultan Qurraie, 2024) [39]. One of the shortcomings seen in our architecture today is the lack of a specialized center for architecture. Such a center can be suitable for architects, architecture enthusiasts, and architecture students to come together (Gheitarany *et al*., 2013) [17]. This center can be a place for: Holding architectural conferences, and specialized meetings, criticizing and reviewing world architectural works, designing and holding architectural competitions, getting acquainted with new design technologies, and planning and holding architectural film festivals (Kahvand *et al*., 2015) [18]. This place can also work to preserve and maintain valuable architectural works as well as the works of great architects (Samami *et al*., 2024).

In addition, this center can conduct research on the country's current architectural needs and find solutions for them (Gheitarani *et al*., 2020 [14]; Norouzian & Gheitarani, 2025). To make a small move in this regard, I came up with the idea of designing a museum called the Architectural Science and Technology Museum Park (Dehghan *et al*., 2024 [6]; Gheitarani *et al*., 2024). In this museum, in addition to an important section aimed at teaching architectural science and technology, there is also a section dedicated to the preservation and specialized archive of architectural works (Aghazadeh Dizaji, 2017) [2]. Museum parks are of great importance due to their various scientific and cultural dimensions and recreational and educational attractions, as they closely display biological and natural issues to the public (Norouzian *et al*., 2024 [35]; Naghibi Iravani *et al*., 2024). An important feature of these museums is that the general public can benefit from visiting them (Gheitarany *et al*., 2013) [17]. This museum can conduct new and up-to-date research and provide a platform for mutual thinking and exchange of ideas, it aims to create unity among architects and architectural practitioners on the one hand and to find constructive architectural solutions (Qurraie, Saba Sultan, 2024; Arash Sohrabi, 2024a, 2024b) [39, 3, 4].

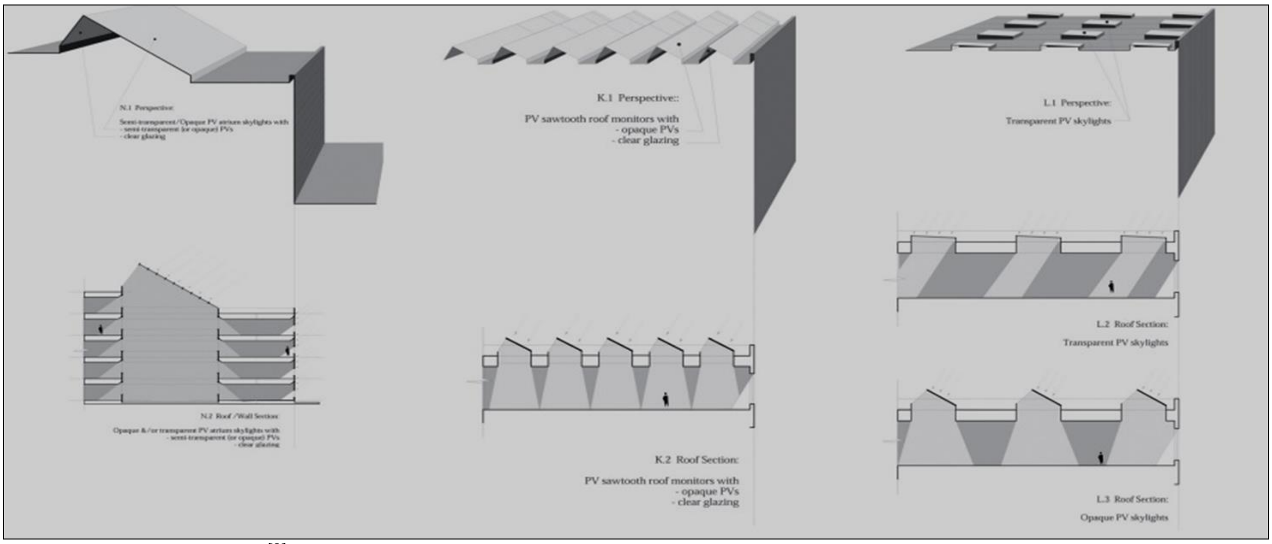
## 2. Theoretical

Designers can integrate photovoltaic systems with the building in such a way that ventilation, use of solar heat in winter, use of natural light (direct and indirect), view of the outside landscape, and other things are provided together (Norouzian, 2024) [34]. As a result, the best efficiency is achieved when active and passive solar systems in a building are coordinated and adapted to each other (Zakerhaghighi *et al*., 2015 [43]; Ghadarjani *et al*., 2013). To achieve this goal, the overall energy solution for the building must be foreseen before the design process begins (Norouzian & Sarabi, 2023; Gheitarani *et al*., 2013) [37, 15].




**Source:** Dizaji *et al*., 2023 [9]

**Fig 1:** Panel ventilation details




**Source:** Dizaji *et al*, 2023 [9]

**Fig 2:** Types of roofs suitable for photovoltaic cells

In the design of roof systems, the issue of snow accumulation and moisture removal is important. For this purpose, appropriate solutions must be selected to remove rainwater and snow accumulation on photovoltaic panels, to the local climatic conditions (Niloofar Akbarzadeh *et al*., 2016 [32]; Naghibi Iravani *et al*., 2024).

**3. Methodology**

In this study, various methods have been used to collect and analyze information. In the section examining the characteristics of modern science and technology of architecture and energy saving, the scientific-interpretative method is used (Gheitarani *et al*., 2024). In this way, documents and sources are first identified, and after collecting information, they are organized and interpreted. In the section examining existing samples and various museums, the descriptive-analytical method is used. In this way, the documents of each sample are first analyzed separately, and at the end, conclusions and summaries are drawn (Karimimansoob *et al*., 2024) [20]. Then, according to the existing documents and information obtained, the museum park is designed. The information collection method is carried out in two ways: Library and field (visiting some buildings and museums close to the topic of the thesis), (Naghibi Iravani *et al*., 2024).

In necessary cases, interviews with experts in the field of the thesis will be conducted, and their points of view will also be obtained. Library data collection will be done by taking notes and observation will be used to examine architectural examples (Aydin *et al*., 2020) [5]. The content of the tables: Will also be filled in through observation and questioning of appropriate people. Interviews with experts (people familiar with new technologies, museum owners, and architects who have designed inspired by energy-saving patterns and their continuity, etc.) will also be used. Despite being one of the world's oil-rich countries and having huge natural gas resources, Iran: Fortunately, due to the intensity of solar radiation in most parts of the country, the implementation of mandatory solar projects and the possibility of using solar energy in cities and sixty thousand villages scattered across the country can bring significant savings in oil and gas consumption (Farrokhirad & Gheitarani, 2024) [10].

Simple technology, no air and environmental pollution, and most importantly, storing fossil fuels for future generations, or converting them into valuable materials and artifacts using petrochemical techniques, are among the main reasons that make the need for solar energy obvious for our country. Converting solar energy in any form is desirable, but the economic possibilities of different projects must be carefully assessed. Today, using solar thermal energy to heat homes is technologically feasible. From an economic perspective, due to the increasing price of fossil fuels and other energy sources and the efforts of experts to reduce the cost of raw materials and equipment needed to collect heat and solar rays, researchers and scientists have been encouraged to study and optimize solar systems, and important advances have been made.

**4. Findings**

One of the first goals of building a museum is to display objects. In addition, these objects themselves can be a means of displaying the museum. The body of a museum is not only a means of physical protection against nature or a means of objective communication. Rather, its main goal is to influence the audience and create a mental and visual relationship through direct contact with objects and objective, sensory, and intuitive perception. At the same time, the museum can also play several social roles. Such as providing a reflection of the power of states or religions and providing a wide field for research by academics and individual researchers, providing a picture of the diverse interests of educated classes, or providing a symbol of the wealth and social status of collectors; from another perspective, the museum is also a cultural base.

Above all, the museum is a reflection of man and his activities, of the natural, cultural, and social environment. The museum speaks a special language, which is the language of the object or the language of the "real thing". In this way, it affects both the uneducated viewer and the viewer saturated with visual impressions from objects. Museum of Science and Technology Architecture: The purpose of holding this scientific gathering is to create an opportunity to explain the role of museums and science centers in society, as well as to establish and increase scientific communication between researchers and informal educational institutions in the field of science.

Launching a science and technology museum in our country is a new issue, and without a doubt, inviting experts from other countries who have years of experience in this field can play an important role in familiarizing experts in this field with the activities of science and technology museums worldwide.

## 5. Results

The museum's service affairs generally have the following duties:

A. Managing the museum's facilities and maintaining them.
B. Managing the museum's restaurant and kitchen.
C. Museum repairs and technical affairs: The staff and facilities required for repairs and technical affairs related to museum equipment and furniture can also be used for other technical affairs related to museum objects and samples.
D. Museum supervision: The number of patrol officers and supervisors in the museum and the exhibition space depends on the size and type of the museum. In the museum exhibition space, if there are tall panels and showcases or interference between short and tall objects, more blind spots will be created and naturally the issue of guarding and increasing the number of guards will be more important. Due to the importance and value of objects and collections of some sizes, it is necessary to guard the museum 24 hours a day.
E. Cleaning services: In small museums, the cleaning of the museum is usually done by security staff before people enter the building. In large museums, it is necessary to hire special cleaning staff, male or female. With the increase in the number of cleaning staff, it is necessary for a specific person, with the necessary ability to supervise, to take responsibility for supervising cleaning and supervising cleaning staff.

***Transportation*****:** Given the sensitivity of the transportation of museum objects and collections, it is necessary to have independent transportation facilities depending on the type of museum and the characteristics of its collections. In this case, it is necessary to foresee a special parking lot and hire a driver as needed.

***Facilities*****:** Today, in modern museums, technical and security facilities have undergone fundamental changes. This change has had a great impact on the lighting, health, security, and information systems in museums and has generally encompassed various areas of museum activity, including the following:

A. Controlling the workflow in the museum and creating facilities for internal and external communications about information communication equipment.
B. Controlling the exhibition space and warehouse space in terms of protection, lighting: Environmental conditions, etc. The rapid pace of technical innovations to carry out the above activities in an automated and accurate manner has made it possible for smart museums to emerge, like other similar buildings.

Although the formation of such museums requires the acquisition of appropriate technological facilities and the availability of sufficient financial resources, in general, the generalization of such facilities, even in the national network of museums of rich countries, is not practical and feasible in the same way, but at the same time, it should be noted that the design of museum buildings should be designed to adapt to such facilities and equipment as much as possible and the necessary forecasts should be made. Heating and cooling systems. Like all buildings, the museum space also needs to provide a comfortable and air-conditioned environment, as well as requirements specific to the storage of objects with special storage needs. The use of a central heating system for heating, chillers for cooling air conditioning systems for mechanical air exchange, and fan coils for final conversion are recommended.

## 6. Conclusion

Objectives of science and technology museums. The reality is that the world is completely changing and evolving. The population living on this planet is increasing, and along with the increase in population, establishing justice will be more necessary than ever so that poor countries can also benefit from facilities for a better life like rich countries. The changes we face in today's world are not limited to ecological changes and advanced technologies. But signs of these changes can also be seen in the social lifestyle of humanity. More than 1.3 billion people still do not have access to electricity. In the next 25 years, another 2 billion will be added to this population. For the future and future generations, we need energy, food, water, and resources that are not available. If everyone on Earth lived like Italians, we would need 2.7 more planets to meet their needs. If everyone lived like Americans, we would need 5 more planets. If they lived like Emiratis, 10.6 more planets would be needed to meet all their needs. This is while if we want to live like Indians, we would need 0.59 more planets, and this is not fair. New opportunities are created as a result of new technologies and we must be able to create this possibility for everyone through sharing.

In the past, only journalists had the opportunity to produce content that their audience could use, but today, with the expansion of the Internet and social networks, I am no longer the audience of a media, but I can be a producer. This is a two-way communication that everyone can use. People's information and knowledge doubles every two to three years. Today, science is also important culturally. Science and knowledge in today's world are a culture and this culture is the same facilities that can bring us a better life. If we consider this feature in science, we conclude that we have a different future ahead of us and all the inhabitants of the earth must prepare themselves for these changes.

## 7. References

1. Abbaszadeh M, Sultan QS, Mohajer MA. The Influences of Physical Features of Space on Sense of Place (Case study: Prayer Rooms of Mehrabad International Airport), 2015.
2. Aghazadeh Dizaji A. Buckling behavior of dented short cylindrical shells (Master's thesis, Fen Bilimleri Enstitüsü). Fen Bilimleri Enstitüsü, 2017.
3. Arash Sohrabi S. How to Estimate the Risk of Failure of Urban Renewal Projects from the Economic and Managerial Aspects. European Online Journal of Natural and Social Sciences: Proceedings. 2024a; 13(4 (s):114.

4. Arash Sohrabi S. Integrated Management of Urban and Rural Crises (Challenges and Solutions). European Online Journal of Natural and Social Sciences: Proceedings. 2024b; 13(4(s)):80.
5. Aydin AC, Yaman Z, Ağcakoca E, Kiliç M, Maali M, Aghazadeh Dizaji A. CFRP effect on the buckling behavior of dented cylindrical shells. International Journal of Steel Structures. 2020; 20:425-435.
6. Dehghan S, Karimimansoob V, G Hoover C, Sadigh Sarabi M, Gheitarani N, Sohrabi SA. Performing Dynamic Analysis of the Conceret Structures using Genetic Algorithm and Determining the Optimal Range during a Natural Hazard Crisis (Tempe, Arizona, U.S.A). International Journal of Advanced Multidisciplinary Research and Studies. 2024; 4(5):1136-1146.
7. Dizaji AA. Dynamic analysis of high-rise residential structures through the cone method. Edelweiss Applied Science and Technology. 2024a; 8(6):1895-1914.
8. Dizaji AA. Through What Factors does Polymer Concrete have Mechanical Resistance? International Journal of Advanced Multidisciplinary Research and Studies. 2024b; 4(6):424-434.
9. Dizaji AA, Kiliç M, Maali M, Aydin AC. Buckling behaviour of dented short cylindrical shells retrofitted with CFRP. Proceedings of the Institution of Civil Engineers-Structures and Buildings. 2023; 176(1):62-75.
10. Farrokhirad E, Gheitarani N. How Green Wall Imploratory Strategies Can be Facilitated and Optimized through Public Engagement? European Online Journal of Natural and Social Sciences. 2024; 13(2):128.
11. Ghadarjani R, Gheitarani N. Methods for enhancing public participation in the rehabilitation and renovation of deteriorated housing (case study: Joulan neighborhood in the Hamedan City), 2013.
12. Ghadarjani R, Gheitarani N, Khanian M. Examination of city governorship pattern and citizen participation as a new approach to city management in region 5 of Isfahan municipality using T-test in SPSS. European Online Journal of Natural and Social Sciences. 2013; 2(4):601.
13. Gheitarani N, Arash Sohrabi S, Naghibi Iravani S, Dehghan S. Analyzing the Mechanism of the Possible Effect of Place Attachment of Residents of Iranian Neighborhoods in Improving the Level of Quality of Life (Study Example: Joolan Neighborhood in Hamedan City). European Online Journal of Natural and Social Sciences. 2024; 13(1):42.
14. Gheitarani N, El-Sayed S, Cloutier S, Budruk M, Gibbons L, Khanian M. Investigating the mechanism of place and community impact on quality of life of rural-urban migrants. International Journal of Community Well-Being. 2020; 3:21-38.
15. Gheitarani N, Ghadarjani R, Kahvand M, Mehrabadi SAM. Explaining the effective measures in decreasing the vulnerability of urban area against earthquake using AHP model (case study: Tehran, a metropolis). Journal of Basic and Applied Scientific Research. 2013; 3(8):675-681.
16. Gheitarani N, Mehdi Norouzian M, Safaei-Mehr M. Space Configuration and Identity of Urban Neighborhoods. European Online Journal of Natural and Social Sciences: Proceedings. 2024; 13(4(s)):62.
17. Gheitarany N, Mosalsal A, Rahmani A, Khanian M, Mokhtari M. The role of contemporary urban designs in the conflict between vehicle users and pedestrians in Iran cities (case study: Hamedan City). World Applied Sciences Journal. 2013; 21(10):1546-1551.
18. Kahvand M, Gheitarani N, Khanian MOJTABA, Ghadarjani RAZIEH. Urban solid waste landfill selection by SDSS. Case study: Hamadan. Environment Protection Engineering. 2015; 41(2):47-56.
19. Karimimansoob V, Mahdaviparsa A, Sadigh Sarabi M, Safaei-Mehr M. Application of BIM in Energy Conservation in Low-Cost Housing in Case of Study in Dallas Independent School Residential District, Texas. European Online Journal of Natural and Social Sciences. 2024a; 13(3):188.
20. Karimimansoob V, Safaei-Mehr M, Mehdi Norouzian M, Gheitarani N. Scrutinizing of City Taxes Effects on Final Housing Price in Hamedan. European Online Journal of Natural and Social Sciences. 2024; 13(3):235.
21. Khanian M, Bolouhar B, Gheitarany N, Nezhad SM. Studying the causes of vitality in traditional markets of Iran (Case Study: Shoemaking Order of Central Market of Hamadan). World Applied Sciences Journal. 2013; 22(6):831-835.
22. Khanian M, Serpoush B, Gheitarani N. Balance between place attachment and migration based on subjective adaptive capacity in response to climate change: The case of Famenin County in Western Iran. Climate and Development. 2019; 11(1):69-82.
23. Maleki M, Gheitaran N, El-Sayed S, Cloutier S, Gaelle Giraud E. The development and application of a localised metric for estimating daylighting potential in floor plate. International Journal of Ambient Energy. 2024; 45(1):2277310.
24. Mehdi Norouzian M, Gheitarani N. Analysis and Determination of Factors Affecting Flexibility (UR) and Urban Sustainability (US). European Online Journal of Natural and Social Sciences: Proceedings. 2024; 13(4 (s)):28.
25. Norouzian MM, Gheitarani N. The Impact of Commercial Sectors on Environmental Quality: A Case Study of Tabriz's Ecosystem and Financial Landscape. International Journal of Advanced Multidisciplinary Research and Studies. 2023; 3(6):1553-1559.
26. Norouzian MM, Gheitarani N. Method of balanced scorecard for evaluating the performance of the Tehran Municipality's Plans. Journal of Humanities and Education Development (JHED). 2025; 7(1):46-61.
27. Norouzian MM, Gheitarani N. The Impact of Civil Financial Markets on Environmental Quality. Journal of Humanities and Education Development (JHED). 2025; 7(1):62-69.
28. Mohammad Mehdi Norouzian, Nima Gheitarani, Najmeh Heidarian, Mahboobe Safaei-Mehr, Mohammad Amin Gheitarani, Seyyed Arash Sohrabi, *et al*. International Journal of Advanced Multidisciplinary Research and Studies. 2024; 4(5):1055-1063.
29. Naghibi Iravani S, Arash Sohrabi S, Gheitarani N, Dehghan S. Spatial Configuration as a Method to Measure the Actual and Potential Ability of Spaces Used by Indoor and Outdoor Users. European Online Journal of Natural and Social Sciences. 2024a;

13(2):90.
30. Naghibi Iravani S, Karimimansoob V, Arash Sohrabi S, Gheitarani N, Dehghan S. Applying Fuzzy Logic and Analysis Hierarchy Process (AHP) in the Design of Residential Spaces; Case of Study: Arak City. European Online Journal of Natural and Social Sciences. 2024b; 13(2):144.
31. Naghibi Iravani S, Sohrabi SA, Gheitarani N, Dehghan S. Providing a Pattern and Planning Method for Footpaths and Sidewalks to Protect Deteriorated and Vulnerable Urban Contexts. European Online Journal of Natural and Social Sciences. 2024c; 13(1):1.
32. Niloofar Akbarzadeh, Ali Aghazadeh Dizaji, Reza Ahmadian. Transport cooridors role in improving the urban environment studies: Axis Khayyam (Tehran metro line 1). International Conference on civil engineering, Architecture and cityscape, Istanbul, Turkey, 2016.
33. Norouzian MM, Talebian MH. Reviewing Cultural Heritage Catalyzing Role in Tourism Development Planning. ISAR Journal of Arts, Humanities and Social Sciences. 2023; ((1)2):56-64.
34. Norouzian MM. Investigating the qualitative components of meaning and the role of the endowment tradition in Iranian urban spaces. Edelweiss Applied Science and Technology. 2024; 8(6):477-490. Doi: https://doi.org/10.55214/25768484.v8i6.2104.
35. Norouzian MM, Gheitarani N, Heidarian N, Safaei-Mehr M, Gheitarani MA. The mechanism of using the geographic information system in detecting unsafe spaces in the municipal areas of big cities (Investigation of unsafe places in the city of Dallas, Texas, USA), 2024.
36. Norouzian MM, Gheitarani N. The Impact of Commercial Sectors on Environmental Quality: A Case Study of Tabriz's Ecosystem and Financial Landscape. International Journal of Advanced Multidisciplinary Research and Studies. 2023; 3(6):1553-1559.
37. Norouzian MM, Sarabi MS. Analyzing the dynamic data of Mashhad metro line 1 tunnel using seismic table. ISAR Journal of Science and Technology. 2023; 1(2):1-9.
38. Qurraie Saba Sultan, Seyed Amir Mansouri, Maryam Singery. Landscape Syntax, Landscape Assessment Using Landscape Approach Indices. MANZAR Sci. J. land. 2023; 15:20-27.
39. Saba Sultan Qurraie. Assessing Accessibility and Promoting Inclusion for People with Disabilities in a Historical Context in Tabriz. Journal of Buildings and Architecture (JBA), 2024, 1-6.
40. Samami H, Naghibi Iravani S, Arash Sohrabi S, Gheitarani N, Dehghan S. Evaluation and Optimization of Building Greening Methods in Four Different Climates Using Building Information Modeling (BIM). European Online Journal of Natural and Social Sciences. 2024b; 13(1):27.
41. Sarabi MS, Sohrabi SA, Dehghan S, Gheitarani N. Impact on Seismic Risk Analysis of Possible Pulse in Nearby Areas, 2023. Doi: https://doi. org/10.62225 X, 2583049, 6-3285.
42. Zaker Haghighi K, Gheitarani N, Khanian M, Taghadosi R. Examination of effects of urban street configuration on the amount of commercial buildings establishment (according to natural movement theory), Case study: Hamedan. European Online Journal of Natural and Social Sciences. 2014; 3(1):20.
43. Zakerhaghighi K, Khanian M, Gheitarani N. Subjective quality of life; assessment of residents of informal settlements in Iran (a case study of Hesar Imam Khomeini, Hamedan). Applied research in quality of life. 2015; 10:419-434.