12 Designing a Rehabilitation Center for People with Physical Disabilities: Social Sustainability-Climatic Approach Interaction in Tehran

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Abstract

Human society is a combination of diverse strata and people with physical disabilities are also an integral part of society. In the past, this group and their needs and challenges they are faced with have been neglected due to lack of knowledge, lack of facilities as well as technology that has led to their low presence in society. One of the most important components of social sustainability is improving life quality, removing discrimination and ensuring individual independence and social identity. Therefore, the society should provide equal opportunities to everyone in the first step, and in the next step, there should be the right of individual choice for everyone independently. Health, efficiency and satisfaction in work and the feeling of human comfort are largely dependent on environmental physical criteria. The stable physical environment, which is the result of complex factors such as ventilation, temperature, lighting, acoustics and installation systems, directly affects people's work ability. Despite the many researches that have been done in the field of providing indoor thermal comfort for the general public, still few researches have focused on special people such as the elderly, the sick and people with physical disabilities. Accordingly, the aim of this study is to achieve a model of design using the definition of architecture and social sustainability and its application to meet the needs of these people, such a center that can be designed in one of the crowded areas of Tehran city to address the challenges these marginal groups are faced with.

Keywords

Social sustainability · Sustainable architecture · Rehabilitation center · People with disabilities · Tehran climate

12.1 Introduction

We are ecologically interdependent with the whole natural environment; we are socially, culturally and economically interdependent with all of humanity; a sustainability, in the context of this interdependence, requires partnership, equity and balance among all parties. A diverse and healthy environment is intrinsically valuable and

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essential to a healthy society (U.I.A. Chicago 1993: 1). In fact, physically disabled people are doubly harmed by the physical problems of the environment. They feel dissatisfied physiologically and their health is impaired, and at the same time, they will depend on the help of other people to provide minimum comfort. This requirement (whether to reach a destination or to reach the appropriate temperature of the environment) is in contradiction with the independence and right of free choice of people in activities and work. Physical movements are an important factor in regulating the body's metabolism and the ability to adapt to the environment, which people with disabilities are limited in using. So, in line with the goal of social sustainability, providing thermal comfort to these people seems to be an important component.

Yet, most research in this area focuses on the urban built environment and design aspect of a city (Bramley and Power 2009; Ali et al. 2019). Other significant researches such as (Karji et al. 2019; Qtaishat et al. 2020) regarded the social sustainability assessment of building and construction. In this framework, a few recent studies have demonstrated the sustainable principles inherent in the conception and design of health architecture (Bonnet 2014; Boys 2017; Goldsmith 2018; Liebergesell et al. 2018).

In the present study, in addition to meeting the criteria effective in the design of a standard rehabilitation center including ease of access and creating all-round comfort to provide various services to people with physical-motor disabilities, the deep effect of climate is reviewed in designing and solving the previous challenges that the target group are faced with, in order to help in empowering them. Based on the intended approach in this research, it has been attempted to distinguish between different aspects of social sustainability, including the user's constructive relationship with the built environment and the individual's relationship with other members of the society, in order to meet the physical and psychological needs of a person who is mentally and physically vulnerable to create an effective communication and examine different factors in climate design and social sustainability. Since the goal of sustainable development was in the past to create a safe and comfortable environment and meet the needs of users, it is highly necessary to focus more on this concept today due to the existence of basic problems in societies.

In fact, as an architect with some physical disabilities who suffers from poor design of public buildings in society and as one of three writers of this paper, this study aims to achieve a model of design using the definition of architecture and social sustainability and its application to meet the needs of people with physical disabilities by means of qualitative research method. The first step is designing a rehabilitation center with observing worldwide standards located in one of the crowded areas of Tehran city to address the challenges these marginal groups are faced with.

12.2 Literature Review

12.2.1 What Is Disability?

Although a disabled vehicle may be considered useless, people with disabilities are not. Putting people first is the right way to describe someone with a disability. Over the past thirty years, activists for the accessibility movement have campaigned to replace words like "handicapped" and "disabled" with the phrase "people with disabilities". This politically correct terminology was chosen to reduce the stigma associated with obvious disabilities.

People with physical disabilities are part of the tapestry of any urban fabric. Most of them lead normal lives. Persons with chronic disease learn to cope with progressive limitations. A person with any type of disability may enlist the support of family, friends and neighborhood organizations. Very few people are completely dependent upon others. From the perspective of universal design, the job of the architect is to design enabling environments that prolong and enhance independence (Heckel 2003, p. 14–22).

There are two origins of disabilities: congenital and acquired. Congenital disabilities exist at birth. In most cases, these disabilities are permanent. Acquired disabilities are the result of events which happen after birth. Age-related disabilities such as hearing loss affect everyone who lives long enough. Accidents can happen to anyone. Disabilities acquired during life may be permanent or temporary, e.g., spinal cord injuries are usually permanent but not always fatal.

12.2.2 Sustainable Architecture

"Our Common Future", a report presented in 1987 by the World Commission on Environment and Development, defined development as sustainable just when it meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987). Despite the almost universal acceptance of this definition among various sciences, sustainable design is subject to a wide variety of ideas and attitudes (Guy and Moore 2007; Sanya 2012; Khademi et al. 2019). Similar to the definition of sustainable development, sustainable architecture addresses specific issues of architecture in terms of the concept of sustainability (Roaf et al. 2004; Akadiri et al. 2012; Esmaeili and Litkouhi 2013; Grover et al. 2019).

At the UIA World Congress of Architects in Chicago, 18–21 June 1993, the following document was adopted. The Declaration of Interdependence for a Sustainable Future recognizes that buildings and the built environment play a major role in the human impact on the natural environment and on the quality of life; sustainable design integrates consideration of resource and energy efficiency, healthy buildings and materials, ecologically and socially sensitive land-use, and an aesthetic sensitivity that inspires, affirms and ennobles; a sustainable design can significantly reduce adverse human impacts on the natural environment while simultaneously improving quality of life and economic well-being.

Today, in order to reduce environmental pollution and optimize energy consumption, sustainable architecture has received more attention from designers and architects. Sustainable architecture is actually a response to the crises in today's industrial and modern world. This type of architecture, which is also known as green architecture, reduces the damage caused by the design of buildings on energy resources and the environment. Therefore, a building based on sustainable design principles has the least incompatibility with the environment.

12.2.3 Social Sustainability

Everyday life and collective action of people encompasses social sustainability (Søholt et al. 2012). 'It concerns how individuals, communities and societies live with each other and set out to achieve the objectives of development models which they have chosen for themselves, also taking into account the physical boundaries of their places and planet Earth as a whole. At a more operational level, social sustainability stems from actions in key thematic areas, encompassing the social realm of individuals and societies, which ranges from capacity building and skills development to environmental and spatial inequalities. In this sense, social sustainability blends traditional social policy areas and principles, such as equity and health, with emerging issues concerning participation, needs, social capital, the economy, the environment, and more recently, with the notions of happiness, well-being and quality of life' (Colantonio and Dixon 2009, p. 5).

12.2.4 Social Sustainability in Architecture

Social stability deals with current events inside the space and it cannot be guaranteed by physical stability alone as it is dependent on human behavior. In other words, the time span that social stability deals with in theory is shorter than its physical type. Therefore, social sustainability focuses more on matching the space with the behavioral patterns in the present time and increasing the quality of life instead of dealing with the stabilization of events for long years. But in order to make this life flow as long as possible, the space should be given the ability to adapt itself to changes in the course of life; in other words, indicators should be considered in the design that make the space flexible. In this research, social sustainability indicators effective on architectural design are considered as follows:

- *Social Interaction*
  The human need for social interaction at different levels is generally accepted and the architects are responsible to design physical space to increase social interaction (Zoghi Hosseini et al. 2020). Architectural spaces are physical phenomena that reflect many cultural and geographical characteristics of a region (Norouzi and Khademi 2021). The sociability of human-made space can reduce or increase the amount of social interaction between people. However, creating a platform for social interactions requires creating physical platforms as well as social platforms and creating spaces that suit the needs of users, especially citizens with specific physical limitations.
- *Social Security*
  Creating a sense of security in the space is another indicator of increasing social sustainability in the quality of the built environment and satisfaction with it (Norouzi et al. 2019). The proper design of urban borders and the design of a defensible space can increase the sense of controllability in users. The sense of security is a psycho-social process that is not only imposed on people, but the individuals in a society fundamentally contribute to its creation or destruction based on their needs, interests, desires and personal abilities; therefore, it seems necessary to pay attention to the issue of security in architecture to develop social sustainability.
- *Livability*
  Livability is a concept defined on the two macro and micro levels. At the macro level, it includes concepts such as justice, efficiency, compatibility and environmental quality as well as the vitality of urban spaces. Livability is a general concept related to a number of other concepts and terms such as sustainability, quality of life, quality of place and healthy communities (Norris and Pittman 2000). Finally, the dynamism and livability in the city lead to increased social stability, since the level of vitality and the citizens' presence in the public spaces of that city is an indicator that distinguishes a city from other cities more than any other criteria.
- *Flexibility*
  'Flexibility is dependent on socio-psychological and economic performance; and the physical spatial organization of the building must be in harmony with the natural and cultural environment, manmade environment, economic and political environment and the livelihood of the community' (Kefayati and Moztarzadeh 2015). In line with this definition, it can be defined as an emphasis on compatibility. To brief, the concept of flexibility is the ability of building to change physically and adapt regarding changes of situation (Habraken 2008).

12.2.5 Sustainability and Designing Based on Climate

As mentioned previously, economic sustainability is among the three basic principles in the sustainable development of buildings (Akadiri et al. 2012). In this regard, climate design is a way to comprehensively reduce the energy costs of a building (Esmaeili and Litkouhi 2013). Building design is the primary frontier against external climatic factors. Buildings that are built according to the principles of climate design reduce the need for mechanical heating and cooling to a minimum in all climates and use the natural energy available around the buildings instead which in turn reduce energy consumption (Hoseinzadeh et al. 2021). Given that the desired rehabilitation center will be built in Tehran climate, it is necessary to study that climate to achieve a design based on the climate of the design site with the aim of increasing sustainability in architecture.

12.2.6 Tehran Climate

Tehran has a hot summer, especially in the south and center of the city, and moderate weather in the north part of the city. The center of the city is mild in winter, but the northern parts are cold. In the cold seasons of the year, Tehran is affected by the high-pressure systems of northern Siberia with a cold, dry and generally polluted winter, while it is affected by the low-pressure thermal systems of the central desert in the hot months of the year indicating hot and dry summers. The maximum air temperature in Tehran reaches + 43°, while the minimum is -15 °C. In the climate zoning map of Iran with housing and residential environments presented by Varmaghani and Kasmaei (2021), Iran is divided into eight climatic groups, and each of these groups has separate subgroups. In this map, Tehran is placed in climate group 5 and subgroup 2, indicating that it has relatively cold winters and semi-hot and dry summers.

12.2.6.1 Temperature

According to the latest official data provided by Mehrabad Meteorological Station of Tehran in 2010 and the analysis by Climate Consultant software, as can be seen in Fig. 12.1, the average annual temperature of Tehran is about 17 °C, which is lower the range of human comfort. That is, the weather is cold in most months in Tehran which proves the necessity of using active heating systems in this city. The minimum temperature recorded in Tehran is about − 5 °C in Dey (approx. January) and the maximum temperature is about + 40 °C in Tir (approx. July). It can also be pointed out that the average temperature of Tehran is observed to be in the comfort zone only in the two months of Ordibehesht and Mehr (approx. May and October).

12.2.6.2 Relative Humidity

Humidity reduces the temperature of dry air. This decreased air temperature is due to the evaporation of the added air humidity, which causes the expansion of the comfort zone. Air cooling may be done mechanically or naturally by increasing humidity using different plants or fountains (Kasmaei 2016).

Given that the city is far from the sea and they are separated by Alborz mountains, the relative humidity level in Tehran is not too much high. According to the diagram and Fig. 12.2, the relative humidity in Tehran is above 60% only in the five coldest months of the year, which decreases to below 20% from June to September. The highest rate of relative humidity in Tehran is recorded in December, January and February at almost 70%; while its lowest amount belongs to June at around 15%, July and August at around 19%. A careful examining of the graph indicates that the difference in relative humidity and temperature increases especially in the morning and at night and moves away from the comfort zone as the dry temperature decreases in the cold months of the year. This difference tends to decrease between 12:00 and 16:00, it is still not in the comfort zone. With the beginning of the spring season, on the other hand, we see that the relative humidity and temperature are in the comfort range only once during the day around 4 pm, and again they distance from each other with the cooling of the air and the increase of the relative humidity. In the most ideal possible situation, these two indicators are within the comfort range in May from 12 noon to 8 pm. In next months, this trend will eventually experience two confluences between 8:00 and 12:00 p.m., until it becomes a little more stable in the month of Mehr that both indices are in the comfort zone from 12:00 p.m. to 4:00 p.m. In general, it can be concluded that if the temperature of Tehran is in the comfort range of 20–27 °C, the relative humidity tends to be in the comfort range, but the amount of relative humidity also increases significantly and it becomes more difficult for the user to bear the conditions as the temperature decreases.

12.2.6.3 Wind

Air flow speed affects the human body in two ways. On the one hand, it determines the amount of heat exchange through convection, and on the other hand, it determines the amount of body cooling through sweating based on the air evaporation capacity (Kasmaei 2016). By examining the wind rose graph of Tehran city in Climate Consultant software, as can be viewed in Fig. 12.3, it can be concluded that the prevailing wind in

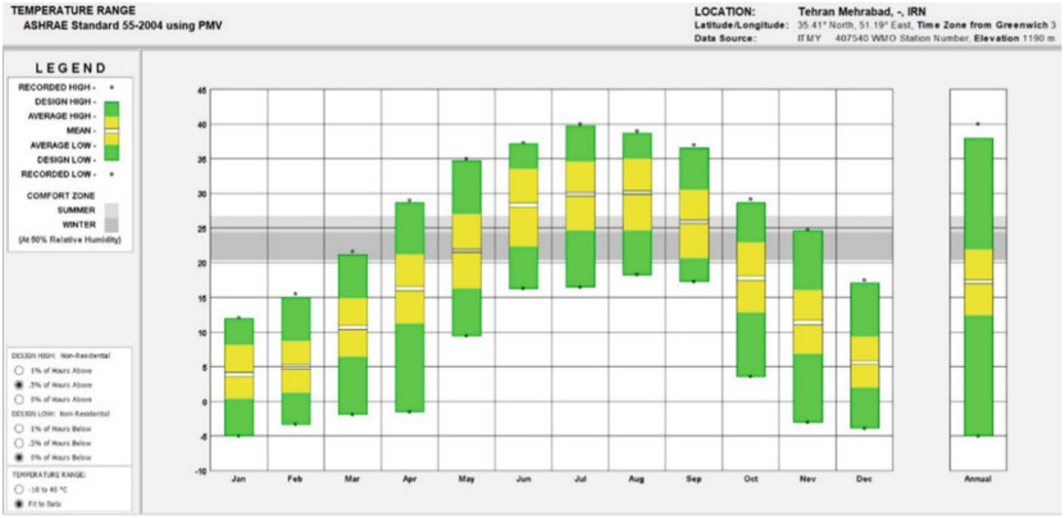


Fig. 12.1 Monthly temperature range of Tehran (Climate Consultant)

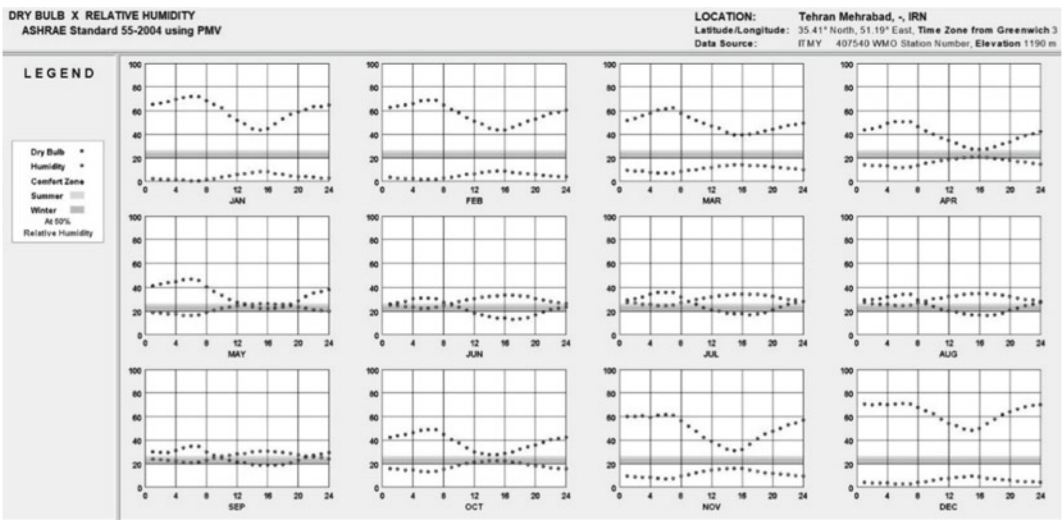


Fig. 12.2 Hourly relative humidity and temperature in Tehran (Climate Consultant)

Tehran city is the west wind with a speed of about 10 m per second. However, a more accurate approach should be taken in providing appropriate design measures to deal with unfavorable wind and to make more use of favorable wind.

According to the temperature chart, the lowest temperature recorded in Tehran in January is − 5 °C, with an average temperature of about 4 °C, which is much lower than the comfort level. Therefore, we found that most of the winds that blow in Tehran in January are cold and humid by checking the wind rose chart in January, but the dominant wind is the westerly disturbing winds with a speed of 8–14 m per second and a temperature between 0° and 21° that are blowing in 8–12% of the hours of the month. Of course, these winds have a relative humidity of 30–70%, which reduces their unpleasantness because they cause less itching and burning on the skin. In the following, the best design

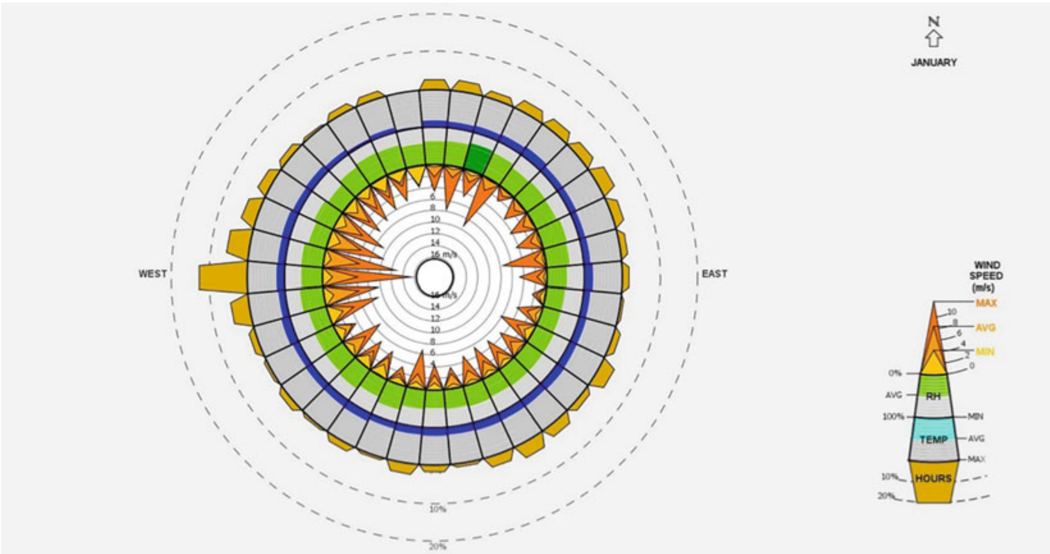


Fig. 12.3 Direction and characteristics of different winds in January in Tehran (Climate Consultant)

approach to deal with cold winter winds is to use a wind breaker on the west side of the building and to use minimum openings on this side.

In contrast, according to Fig. 12.4, the wind rose chart of July in Tehran as the hottest month of the year with the maximum recorded temperature of + 40 °C and the average monthly temperature of + 30 °C indicates that the July winds from different geographical directions are hot with a speed of 4–10 m per second. But the important point is the blowing of cool northeast winds in July. These winds have a temperature equivalent to 21–27 °C and blow at a speed of 4–10 m per second. Although these favorable winds blow in less than 10% of the hours of the month, it is reasonable to consider more openings in the northeast front to take advantage of these winds.

12.2.6.4 Comfort Zone

It is said to be an area where a person feels comfortable in terms of air temperature and humidity without feeling cold or hot or humid. Several climatic factors, such as sunlight, wind and air humidity are effective in determining the comfort zone. Since users in rehabilitation centers are always working and moving, environmental design that is according to comfort zone criteria has an impact not only on their physical performance, but also on their mental performance and mental peace.

12.2.6.5 Psychrometric Chart in Tehran

According to the psychrometric chart of Tehran city which is based on the latest official data provided by Tehran Mehrabad weather station in 2010, we can conclude:

The temperature in Tehran varies between − 5 °C in the cold seasons and + 40 °C in the hot seasons. In addition, the number of days with a relative humidity below 30% at a temperature above 25 °C is more in the hot months of the year, which strongly indicates the use of evaporative cooling sources. Meanwhile, it is recommended to use heating sources in the cold months of the year, due to the high number of days with temperatures from − 5 to + 15 °C and relative humidity above 50%.

As a dry city with a relatively low absolute humidity index throughout the year, according to Fig. 12.5, Tehran is in the comfort zone in 19.6% of the time of the year, i.e., 1720 h out of a total of 8760 h. In other words, a person can feel comfortable in a building with a normal cover without using special equipment only 19.6% of

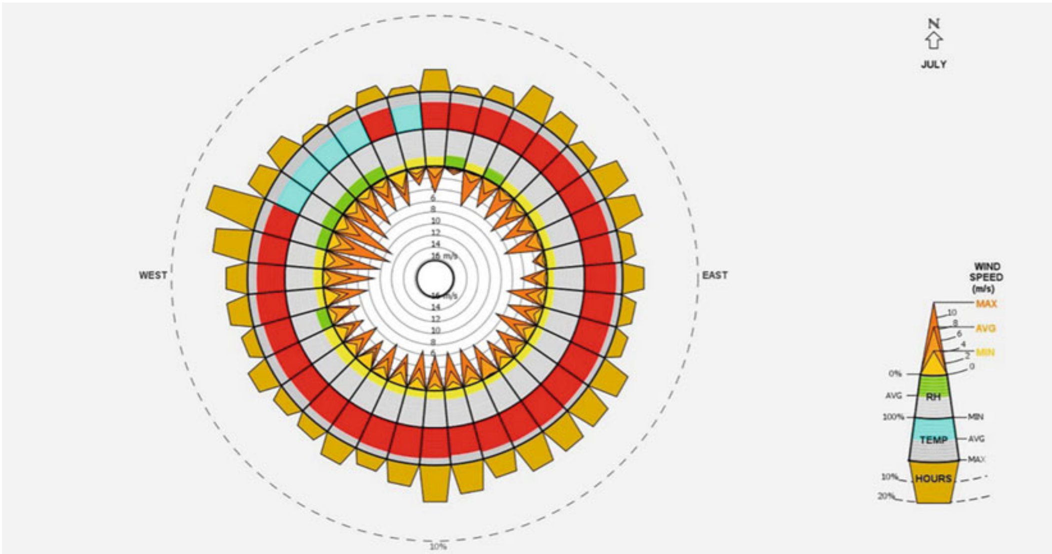


Fig. 12.4 Direction and characteristics of different winds in June in Tehran (Climate Consultant)

the whole year in Tehran. But it is possible to expand the comfort zone using measures such as awnings on the openings, materials with high thermal mass, evaporative ventilation, natural ventilation for the hot season and maintaining the internal air temperature by sealing the openings, passive solar energy, the protection of the building against disturbing winds and the use of internal heating systems.

12.2.6.6 Analysis of Tehran Psychrometric Chart in the Cold Months of the Year

According to the proposed solutions and the range on the left side of the diagram related to the cold months of the year based on Fig. 12.6, it is possible to create thermal comfort from December to March in Tehran by creating heating and humidification as necessary, as the most effective solution in 73.6% of the time (2668 h). In addition, using the internal heat created in the space with proper sealing and insulation 17% of the time (617 h) and using passive solar energy can contribute 7.13% of the time in expanding the comfort zone in Tehran in autumn and winter.

12.2.6.7 Analysis of Psychrometric Chart of Tehran in Hot Months of the Year

According to the proposed solutions and the right-side range on the diagram related to the hot months of the year in Fig. 12.7, the best solution is the use of two-stage direct evaporative coolers that expands the comfort zone by 9.36 and 36.8% in Tehran from April to October. In the next step, thermal comfort conditions can be provided in 25.7% (1318 h) of the time using solar shade for the windows exposed to sunlight. In these months, not only the use of materials with high thermal mass in the building can cause thermal comfort in 11.5% of the time (592 h), but also in the door can achieve the same effect in 16.2%. Finally, 10% effect of natural ventilation and 7.8% effect of unnatural and mechanical ventilation (using a fan) cannot be ignored in increasing the comfort range of people in the hot months of the year in Tehran.

12.2.6.8 Adopting Appropriate Design Strategies in Tehran

The seven efficient and appropriate design strategies to expand the comfort zone in Tehran are shown in Fig. 12.8 according to the

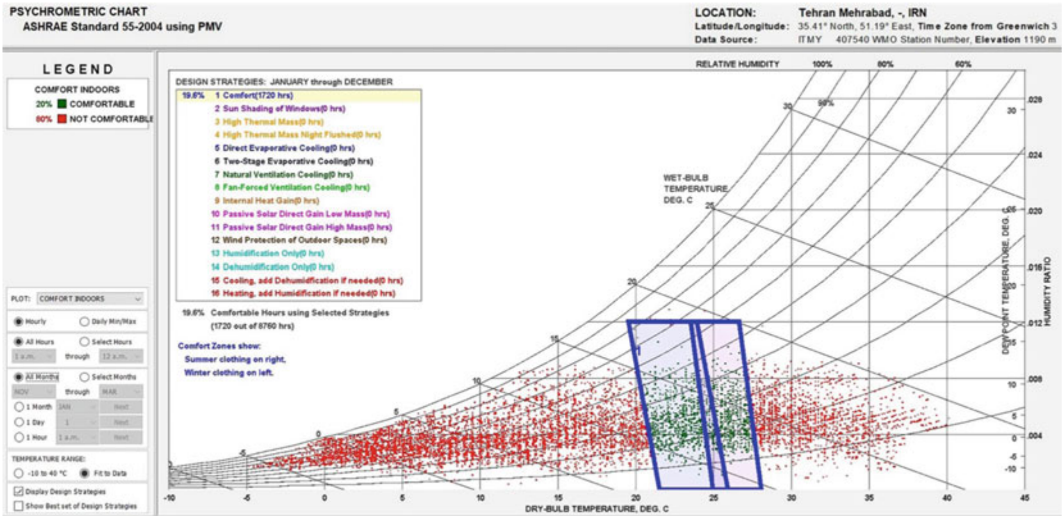


Fig. 12.5 Psychrometric chart in Tehran (Climate Consultant)

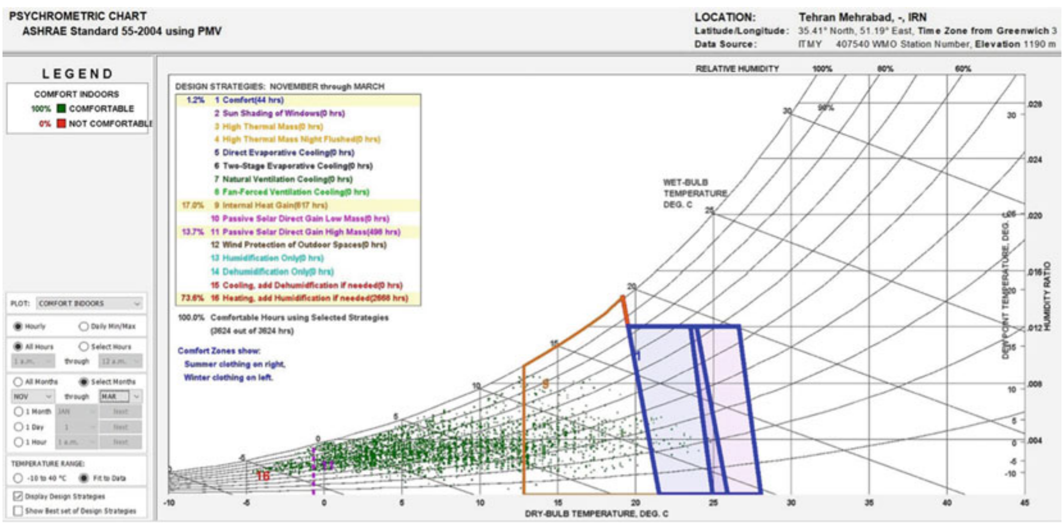


Fig. 12.6 Tehran psychrometric chart in the cold months of the year (Climate Consultant)

psychrometric diagram of Tehran city in the Climate Consultant software.

In the following, the best design solutions are suggested in order to realize the above strategies:

12.2.6.9 Active Heating and Passive Solar Energy

According to the psychrometric chart of city of Tehran and the noticeable decrease in dry temperature in the second half of the year, the comfort zone can be expanded in 33 and 21.3% of the time, respectively, using a suitable heating system by maintaining the internal heat produced by the activity of people and various devices.

The effect of sunlight on the comfort zone is determined by two factors: temperature and air humidity. In areas where the air temperature is less than 21 °C, sunlight may cause the expansion of the comfort zone. In such a way that if the body compensates its lost temperature with the

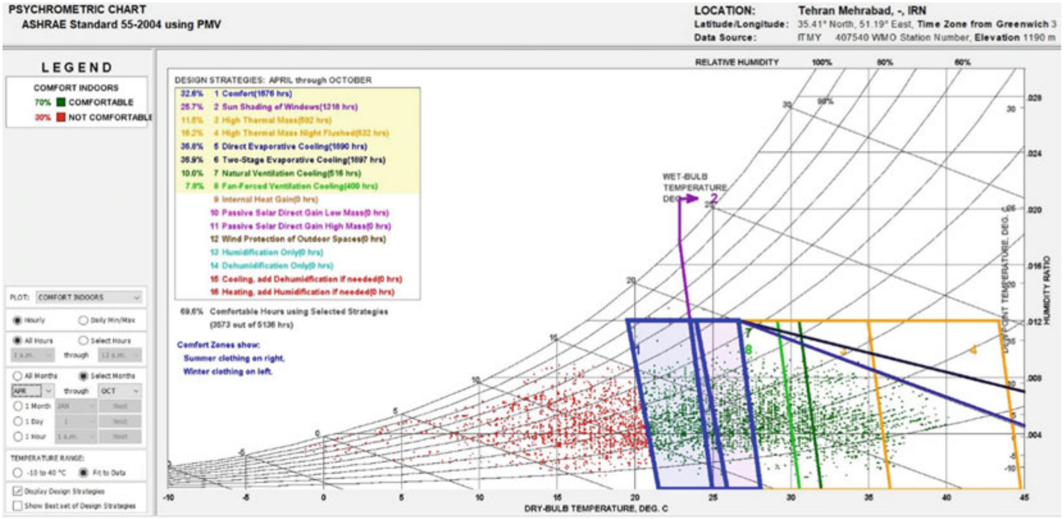


Fig. 12.7 Tehran psychrometric chart in the hot months of the year (Climate Consultant)

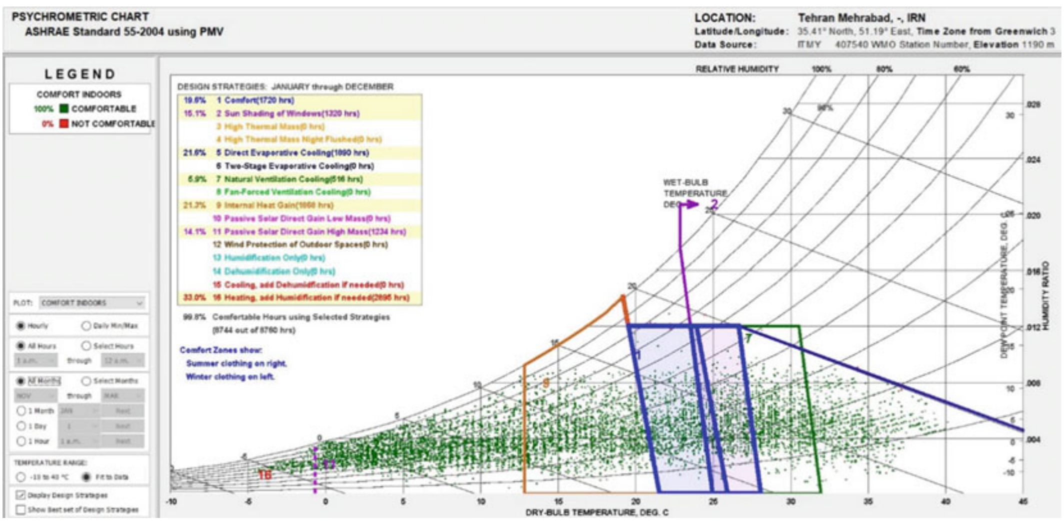


Fig. 12.8 Adopting appropriate design strategies in Tehran (Climate Consultant)

heat of the sun in low temperature, the conditions are provided for human comfort (Kasmaei 2016). As a result, this comfort zone will expand up to 14.1% using passive solar energy. As can be seen in Fig. 12.9, it is recommended to design an elongated form with east–west orientation and create more openings in the south face of the building in order to achieve the maximum amount of passive solar energy. It should be noted that these openings should be protected by horizontal movable shades, so that the glazed surfaces have proper shading during the summer and hot seasons of the year, and the proper sunlight should be used on the south side of the building to heat the interior space in the cold months of the year.

According to the Fig. 12.10, it is recommended to use low-emissivity double-glazed windows on the west, east and north sides in order to make the most of the southern light; but

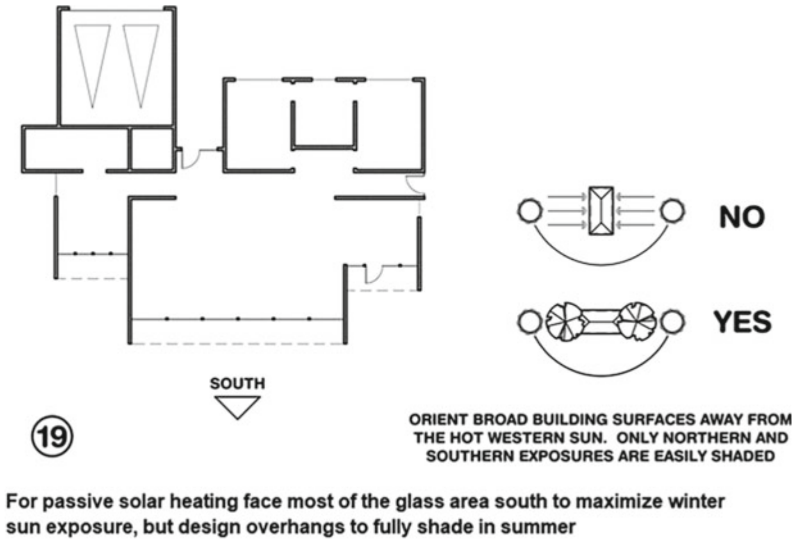


Fig. 12.9 Appropriate design suggestions (Climate Consultant)

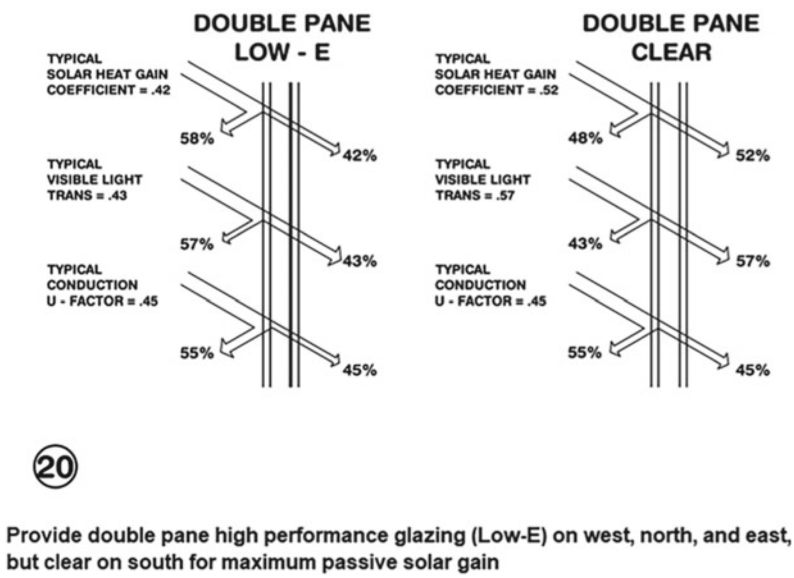


Fig. 12.10 Appropriate design suggestions (Climate Consultant)

transparent glass can be used on the south side (Varmaghani and Kasmaei 2021).

12.2.6.10 Ventilation

Water coolers can be used as a source of ventilation to expand the comfort zone in Tehran in 21.6% of the time in the hot seasons. But natural ventilation can be effective in increasing the comfort zone only 5.9% of the time in a year, if the openings are built along with suitable barriers in the natural wind path in order to direct the wind path and create positive and negative pressure to be embedded. You can perceive the role of natural ventilation in expanding comfort zone in Fig. 12.11.

12.2.6.11 Shading

In Tehran's climate, using skylights or external movable shadings are methods to create shading to prevent direct sunlight in hot seasons, which

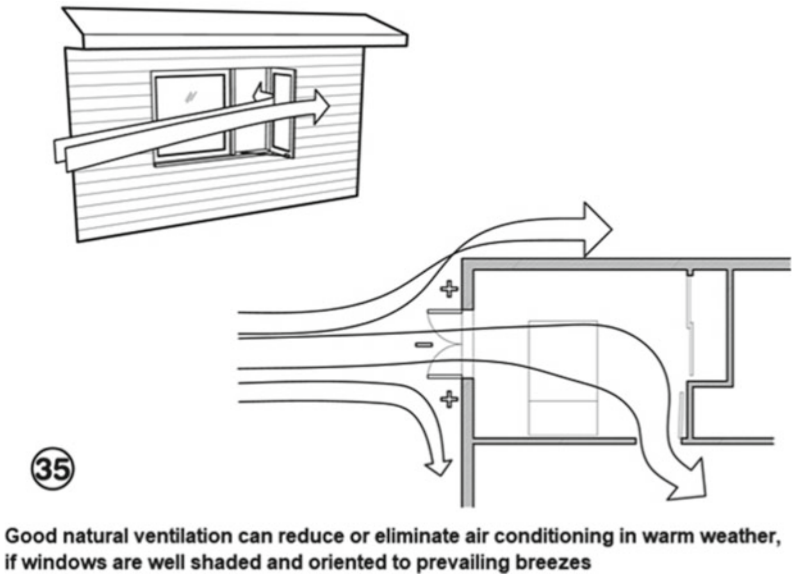


Fig. 12.11 Appropriate design suggestions (Climate Consultant)

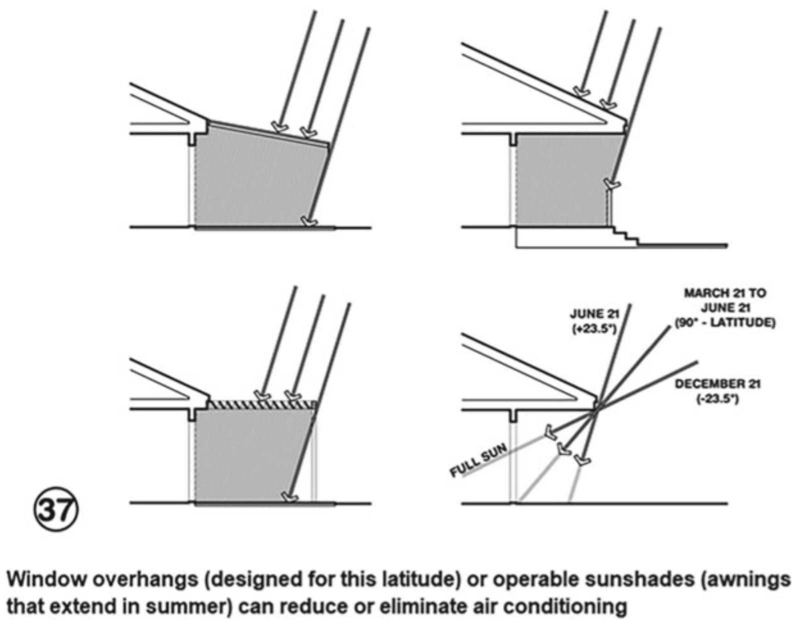
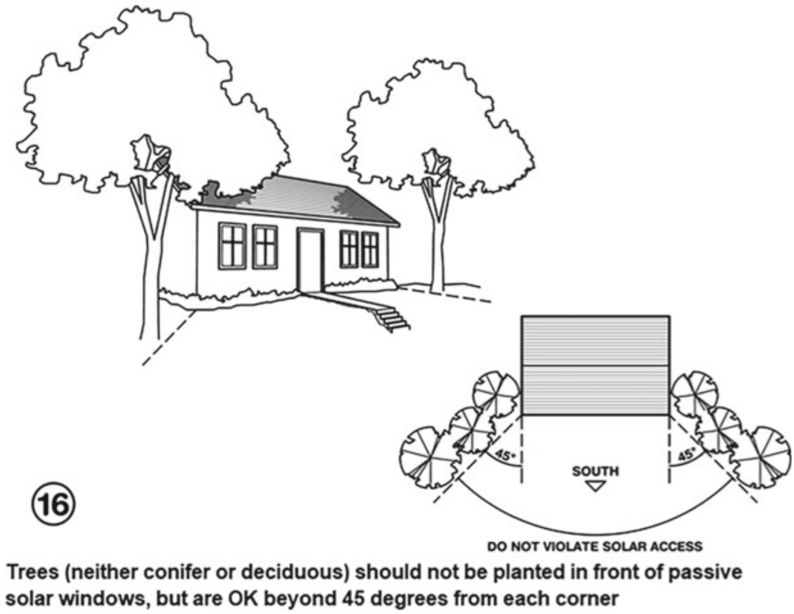


Fig. 12.12 Appropriate design suggestions (Climate Consultant)

expands the comfort zone by 15.1%. This particular method is simply described in Fig. 12.12.

Direct sunlight can also be prevented to some extent in the hot seasons of the year using shading vegetation against the skylights. However, it should be noted that this shading vegetation, including coniferous trees and deciduous trees, should not prevent the entry of favorable southern light in the cold seasons of the year. For this purpose, like Fig. 12.13, it is recommended to plant these trees further from the 45° radius from each corner of the building's southern wall.

Fig. 12.13 Appropriate design suggestions (Climate Consultant)



12.2.6.12 4-Cold and Thermal Ground

Cold and thermal ground is a passive solution for cooling and heating in buildings. The benefits of direct contact of the building with the ground can be taken advantage of by placing the building completely or a part of it under the ground or raising the soil level and embankment on it. By going down in the depth of the Earth (more than 6 m), the temperature of the soil becomes closer to the annual temperature of the region, which in turn makes this constant temperature become cooler in summer and warmer in winter than average temperature outside.

12.3 Conclusion

When vitality, social interaction and social security are felt in the society at the micro and macro level, we are undoubtedly facing a more stable society. Another influential factor in social sustainability is flexibility and harmony with the surrounding natural and cultural environment. Due to the advancement of technology and the expansion of megacities, today, the way people interact with each other has undergone changes. Also, the increase in average life expectancy, population growth and changing needs have caused the need to change the planning and construction. As a result, in order to achieve sustainability in the field of architecture, we must examine social aspects among different aspects in design.

The design and construction of a rehabilitation center in Tehran with the approach of increasing social sustainability along with a climate perspective by adopting appropriate design strategies creates a favorable environment based on sustainable architectural patterns. According to the results of this research, an effective step can be taken with the design of this center to improve the physical and mental health of people with physical-motor disabilities.

A number of solutions and suggestions in designing buildings based on climatic approach can be provided to increase social sustainability. For example, related to accessibility designers can design an attractive path and create visual mobility, create flexible spaces to develop a sense of control and security and focus on the separation of space for visitors and companions. In addition, they should consider facilitating the access of people with physical-motor disabilities on the same floor, if possible, in case of separation of spaces in different floors, it is necessary to design sloping surfaces with a suitable percentage of slope and to install an elevator. In terms of designing buildings for people with physical disabilities, no interruption in service delivery and legibility and recognition of spaces are extremely important.

There is no doubt that placing openings along with appropriate buffers in the natural wind path in order to direct the wind path and create positive and negative pressure is an effective way to develop natural ventilation. Moreover, in terms of building form and shading, designing an elongated form with east–west orientation and creating more openings on the south front in order to achieve the maximum amount of passive solar energy, covering the openings with horizontal movable shadings and using appropriate scale and fit of the interior spaces and their compatibility with the physical conditions of the users are strongly recommended.

Cooling and heating by placing the building completely or taking a part of it under the ground or raising the level of the soil and embankment can be achieved. About utilizing color and light to design buildings which people with physical disabilities are main users, avoid using colors of the same spectrum next to each other, using contrasting colors to create visual appeal, controlling distribution of light in space steadily and avoiding to make the reflective surfaces of sunlight must be considered.

Additionally, to use materials and furniture some subjects, such as using non-slip and resistant materials on the floor, focusing on the scale and standards in the design of all spaces and furniture, using color and light as a guide to the target spaces (the flooring used should not be shiny and light-reflective) and using interior design elements such as appropriate furniture require special consideration.

Furthermore, designers should use suitable flooring to absorb sounds, design external shell for building, install silencer for the ceiling to prevent sound reflection and use sound insulation for walls. In terms of designing green space, not only should architects design a rest area next to the green space and designing a shallow pond in the open air to make the space pleasant, but also, they can increase social interaction and make outdoor spaces fun by shading trees.

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References

Akadiri PO, Chinyio EA, Olomolaiye PO (2012) Design of a sustainable building: a conceptual framework for implementing sustainability in the building sector. Buildings 2(2):126–152. https://doi.org/10.3390/buildings2020126

Ali HH, Al-Betawi YN, Al-Qudah HS (2019) Effects of urban form on social sustainability – A case study of Irbid, Jordan. Int J Urban Sustain Dev 11(2):203–222. https://doi.org/10.1080/19463138.2019.1590367

Bonnet S (2014) Physical rehabilitation center: architectural programming handbook. International Committee of the Red Cross: Geneva, Switzerland

Boys J (2017) Disability, space, architecture: a reader. Routledge, London, UK

Bramley G, Power S (2009) Urban form and social sustainability: the role of density and housing type. Environ Plan B: Plan Des 36(1):30–48. https://doi.org/10.1068/b33129

Colantonio A, Dixon T (2009) Measuring socially sustainable urban regeneration in Europe. Oxford Institute for Sustainable Development (OISD)

Esmaeili S, Litkouhi S (2013) Principles of sustainable architecture extant in heart of desert areas of Iran. Int J Architectural Eng Urban Plan 23(2):103–112

Goldsmith S (2018) Designing for the disabled: the new paradigm. Architectural Press, Oxford; Boston

Grover R, Emmitt S, Copping A (2019) Sustainable development and architectural practice: framing strategic approaches in the United Kingdom. Sustain Dev 27:377–387. https://doi.org/10.1002/sd.1910

Guy S, Moore SA (2007) Sustainable architecture and the pluralist imagination. J Architectural Educ 60(4):15–23. https://doi.org/10.1111/j.1531-314X.2007.00104.x

Habraken NJ (2008) Design for flexibility. Build Res Inf, 290–296

Heckel PF (2003) Beyond the wheelchair, A thesis submitted to the Division of Research and Advanced Studies of the University of Cincinnati

Hoseinzadeh P, Khalaji Assadi M, Heidari S, Khalatbari M, Saidur R, Kiana Haghighatnejad K, Sangin H (2021) Energy performance of building integrated photovoltaic high-rise building (case study: Tehran, Iran). J Energy Build. https://doi.org/10.1016/j.enbuild.2020.110707

International Union of Architects (U.I.A.), (Chicago, June 1993) Declaration of interdependence for a sustainable future

Karji A, Woldesenbet A, Khanzadi M, Tafazzoli M (2019) Assessment of social sustainability indicators

in mass housing construction: a case study of Mehr Housing Project. Sustain Cities Soc 50:101697. https://doi.org/10.1016/j.scs.2019.101697
Kasmaei A (2016) Climate and architecture, 8th edn. Khak Publisher, Tehran
Kefayati Z, Moztarzadeh H (2015) Developing effective social sustainability indicators in architecture. Bull Environ, Pharmacol Life Sci 4(5):40–56
Khademi S, Norouzi M, Hashemi M (2019) Sustainable land use evaluation based on preservative approach. In: ISPRS—international archives of the photogrammetry, remote sensing and spatial information sciences, vol XLII-2/W11, 2019. Milan, Italy, pp 653–660
Liebergesell NP, Vermeersch PW, Heylighen A (2018) Designing from a disabled body: the case of Architect Marta Bordas Eddy. Multimodal Technol Interact 2 (1):4. https://doi.org/10.3390/mti2010004
Norouzi M, Khademi S (2021) Geography: a hidden antidote to rescue modern architecture. In: Krevs M (ed) EUROGEO book series: key challenges in geography, part 5: hidden urban geographies. Springer Publishing, pp 295–312. https://doi.org/10.1007/978-3-030-74590-5
Norouzi M, Meshkini A, Khademi S, Shalchian N (2019) The ascent and failure of New Towns in the Tehran Metropolitan Area: insights into drivers of growth and residential satisfaction. J UrbanisticaTre, Special Issue: Iranian Cities. An emerging urban agenda at a time of drastic alterations 19(7):73–83. https://doi.org/10.2307/j.ctvvb7m32.9
Norris T, Pittman M (2000) The health community's movement and coalition for healthier cities and communities. Public Health Reports 115:118–124
Qtaishat Y, Emmitt S, Adeyeye K (2020) Exploring the socio-cultural sustainability of old and new housing: two cases from Jordan. Sustain Cities Soc 61:102250. https://doi.org/10.1016/j.scs.2020.102250
Roaf S, Chrichton D, Nicol F (2004) Adapting buildings and cities for climate change: a 21st century survival guide. Architectural Press, Oxford
Sanya T (2012) Sustainable architecture evaluation method in an African context: transgressing discipline boundaries with a systems approach. Sustain Sci 7:55–65
Søholt S, Ruud ME, Braathen E (2012) A question of social sustainability: urban interventions in critical neighborhoods in Portugal and Norway. Urban Res Pract 5(2):256–272. https://doi.org/10.1080/17535069.2012.691622
Varmaghani H, Kasmaei A (2021) Factors affecting energy conservation in high-rise buildings (case of 22th District of Tehran). Iranian J Energy 24(1):67–100. http://necjournals.ir/article-1-1677-fa.html
WCED (1987) Report of the world commission on environment and development: Our Common Future
Zoghi Hosseini E, Tabasi M, Hashemi M (2020) Cultural—communicative phenomenology of Iranian Tekyeh from a physical—special value perspective. Creative City Des 3(1):95–101