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Assessment of Criteria of Social Sustainability and Livability in Valiasr Ave. by Events to Create Good Placemaking

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Research Article

Abstract

Nowadays, paying attention to various dimensions of sustainable development and quality of life has led to efforts to achieve social sustainability in urban spaces for increasing livability and social interactions. In this field, the event space is known as an effective tool to create a lively, experiential, creative, livable, and sustainable urban space. This research aimed to evaluate the sustainability and livability of Valiasr Ave. To this end, the potential spaces were initially identified to create event space by three techniques of the questionnaire, field observation, and space syntax. Afterward, the alternatives were suggested for these spaces, by the platform technique. Based on the results obtained from the questionnaire, a large percentage of people tend to stroll and walk ($p< 0.05$) on Valiasr Ave.; while the results of field observation indicated that this street possesses a commercial-service nature. The results of the space syntax technique also demonstrated that this street has the ability to gather people. The superposition of these 3 techniques led to the determination of forgotten places and the potential spaces to design the places with events of life-giving and consequently increase the sustainability and livability of this street.

Keywords: Social Sustainability; Livability; Event Space; Social Interactions; Space Syntax

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1. Introduction

The main goal of a sustainable society is to promote the quality of life of citizens by providing the fields of growth and achievement of sustainable goals in cities. In this field, social sustainability is known as the one of most important dimensions. Indeed, social sustainability tries to meet the social needs of the present and future by emphasizing the concepts of quality of life, vitality, health, social justice, and the ability to live well. Indeed, the social sustainability dimension in addition to trying to improve the level of the quality of life, seeks to promote vitality, livability, preserve values, as well as social and cultural identity of the city. In this regard, one of the most important contexts to create social sustainability in the city is public urban spaces. Studies have shown that public urban spaces as the main part of the urban structure reflect values and social-cultural relationships, such that, according to them, spaces can well facilitate or influence the ability to live in the city and establish social interactions. Therefore, to move towards social sustainability and urban livability, the creation of lively and active public spaces that provide the active presence of the human in the environment, seems essential in the cities.

Nowadays, due to the arrival of new patterns of modern life in urban space, less attention is paid to human needs as a social being. Such that urban spaces have become a transit path, instead of being a context for the pause and presence of citizens, the place for creating various events and social interactions as well as experiencing face-to-face interaction.

Hence, the creation of the event space and the new experiences for space users can be led to livability and space sustainability. In this field, many countries applied livability as the main idea in their urban planning. However, in some countries, urban development programs with modernist thinking have been led to the loss of urban vitality and livability and consequently deep rupture with its identity. Tehran's Valiasr Ave. (Iran) is one of these paths that have lost its livability and sustainability due to the loss of genius loci and lack of formation of lively collective spaces.

Therefore, this research aims to assess the effective factors in the social sustainability and livability in Tehran's Valiasr Ave. (the distance between Beheshti St. and Vanak Sq.) by emphasizing the creation of event space, by three techniques of the questionnaire, field observation, and space syntax. Notably, this Avenue was selected due to its key role in the urban performance-physical structure (in terms of historical, tourism, and cultural-social) and national registration in Iran's Ministry of Cultural Heritage, Tourism and Handicraft. Moreover, given that the objective approach introduces quality of life as a set of real and external conditions related to living standards, it depends on secondary data obtained from official statistics. Likewise, the subjective approach relates to people's perception of life (Chen et al., 2016). Hence, these two approaches are known as important criteria for the assessment of livability, so, here, we selected the evaluation of the indicators of the mentioned approaches as a method of our study. In this regard, subjective and objective approaches have been respectively considered in the form of a questionnaire and GIS (geographic information system) maps. In the following, we assessed the indicators of behavioral approach for a more complete analysis of livability because objective and subjective indicators possess low efficiency and reliability respectively, for assessing individual welfare (Telesca et al., 2018). According to what was said, the mentioned approaches were applied in from three techniques:

1. Objective approach via assessing field observation techniques including accessibility, transportation, existing events, occupancies, and how to occupy space by them.

2. Objective approach via assessing questionnaire techniques including the of identity, social interactions, culture and sustainability, social participation, economic, and environment.

3. Behavioral approach via assessing the criteria space syntax and Gait techniques.

In the following, all studied criteria are assessed by the superposition method, due to the multiplicity of parameters, to determine livability in Valiasr Ave. Afterward, the alternatives were suggested for increasing the sustainability and livability of this Ave., by the platform technique.

2. Literature Review

Sustainable development is an evolving concept which its most prevalent definition according to the Brundtland Commission, is known as the development that can meet the needs of the present generation without compromising the ability of future generations to meet their own need (Jischa, 1998).

The study indicated that sustainable development possesses three dimensions: environmental, economic, and social so that tries to reduce environmental pollution, adjust unstable economic situations, and establish social balance in society (Niamir-fuller, 2012). However, based on reports, the social dimension of sustainable development is the most important factor in this field, because it means strengthening the vitality of society and increasing social and cultural values (Johnston, 1993). In this regard, sustainable architecture is a kind of attitude in architecture which pays attention to the environment and ecological matters in the design of urban space. This kind of architecture also possesses 3 dimensions of sustainable development. Although, far less attention has been paid to the aspect of social sustainability (Kumar and Anbanandam, 2019; Leal Filho et al., 2022). While sustainable architecture and urban planning/ urbanization in the social dimension seek to create opportunities through which urban spaces and places can transfer experiences, promote social interactions, and increase the sense of responsibility and belongingness. Thus, social sustainability in the city is related to social connectedness, social interactions, social stability, social participation, and a sense of responsibility and belongingness (Long & Hutchins, 2003). Hence, paying attention to components of social sustainability including aesthetics, comfort, security, social identity, etc., which have been listed in Table 1 can provide dynamism and vitality in the urban space. The components of social sustainability from theoreticians' point of view have been listed in Table 1.

Table 1 The components of social sustainability according to theoreticians

The components of the study	Socially sustainable development principles	Theoretician	Ref.
Social interactions, identity, sense of belongingness	The neighborhood unit theory (derived from the social attitude of the 1900s): this concept is a residential design model with a neighborhood population that pedestrians can move freely along the interior street. Accordingly, this model can encourage social interaction, neighborhood and collective identity, collective activity, social solidarity, and cohesion among residents in the neighborhood.	Clarence A. Perry	(Lawhon, 2014; Ostrowski, 1968)

	The concept of a hierarchy of needs "Theory of Human Motivation" includes five different levels: to achieve the ultimate levels, basic needs must be met. These needs involve physiological needs, safety needs, and love/belonging as social needs that are known as background for esteem and self-actualization as advanced needs.	Abraham Harold Maslow	(Maslow, 1977)
Social interactions, security	Focus on social interaction, security, vitality, social justice, protection of strangers as well as networks growth of small-scale and everyday public life (attention to humans).	Jane Jacobs	(Jacobs, 1961)
	Focus on security, crowding (dynamics of space), social interaction, privacy, territory, and personal space.	Irwin Altman	(Altman, 1975)
Social interactions	Focus on social interaction, crowding (dynamics of space), vitality, and human scale.	Jan Gehl	(Gehl, 2011)
Social interactions, security, identity	Focus on social interaction, tradition and culture, space intelligibility, security, proper density, social homogeneity, location memory, and the meaning of space.	Amos Rapoport	(Rapoport, 1981, 1984, 1990, 2006)
Social interactions, identity	Focus on social interaction, identity, human scale, access, activity/dynamics, and social justice.	Christopher Alexander,	(Alexander, 1979)
Security	Theory of Defensible Space (about crime prevention and neighborhood safety): a higher crime rate existed in high-rise complexes compared to in low-rise.	Oscar Newman	(Newman, 1996)
	Focus on four principles of social sustainability: Equity, Inclusion, Adaptability, and Security.	Oxford Institute for Sustainable Development (OISD)	(Colantonio & Lane, 2008; Dixon, 2011)

Social interactions, security, participation/ contribution	The development of neighbourhood theory and contribution: focus on social interaction, participation, sense of belongingness, the relationship between neighbourhood (social participation), collective activity, security, and ease of access	Charles Choguill	(Choguill, 2008)
	Focus on social interaction, participation, collective sustainability, sense of place, social equity, and security.	Nikolai Dempsey	(Dempsey et al., 2011)

The studies also illustrate that the concept of sustainability, in addition to the meaning of permanence and stability over time, socially means the permanence of space between people over time (both present and future). Accordingly, space should be such that maintains its applications over time and provides the constant presence of people, the contexts of the formation of activities for different ages and genders, their presence and pause, as well as social interactions via responding to their needs. This is the definition of the dynamism and vitality of space (Mahmoudi, Ahmad, and Abbasi, 2015). Therefore, a space that is vitality and active in terms of people's presence possesses socially sustainable and can provide livability of the space (Mahmoudi, Ahmad, and Abbasi, 2015; Wheeler, 2001), because of livability refers to the subset of sustainability effects which directly affects people in a community, like economic development, public health, affordability, social equity and pollution exposure (Litman, 2011). Hence, Godschalk states that livability emphasizes the optimal quality of life as well as the present time and place (Godschalk, 2004; Larice, 2005). Our studies and analyses focused on the definitions of livability also indicate that this concept overlaps with some concepts and approaches such as sustainability. Therefore, here, we first found common components between livability and sustainability by reviewing and analyzing 24 important studies in this field (from 1975 to 2021) and then used these common components to continue the study. The studied parameters, in some of the most important studies, on livability have been listed in Table 2.

Table 2 The studied parameters of livability

Studies	Parameters*	Ref.
The Project of Public Spaces (1975)	1- 19- 23	(Kent, 2019)
International Conference of Making Cities Livable (1985)	7- 8- 9- 14- 19- 20	(‘International conference of Making Cities Livable’, 1985)
Quality of urban life and the Perception of Livability (1988)	3- 4- 7- 22	OF LIVABILITY: A CASE STUDY OF NEIGHBOURHOODS IN BENIN CITY, NIGERIA’, 1988)
Principles for the livable city (1997)	5- 9- 19- 20- 21- 22- 23	(Lennard, 1997)
Urban Vitality (2000)	5- 7- 11- 12- 22- 24	(Landry, 2000)
Livable Communities (2001)	1- 3- 5- 7- 8- 10- 13- 14- 15- 20- 21- 22	(Wheeler, 2001)
Department of Transportation (U.S., 2003)	1- 2- 4- 5- 8- 10- 12- 13- 14- 15- 16- 19- 21- 22- 23- 24	(Rice et al., 2003)

Measuring the livable city (2003)	3- 5- 7- 8- 9- 10- 11- 13- 14- 20- 21	(Southworth, 2003)
Measuring the Livability of an Urban Center (2004)	4- 5- 6- 8- 10- 13- 15- 21- 23- 24	(Balsas, 2004)
Ottawa County Urban Smart Growth (2004)	4- 8- 10- 11- 15- 16- 17- 21- 22- 23	(Commission, 2004)
New Zealand Urban Design Protocol (2005)	6- 16- 17- 22- 23	(Pirrit et al., 2005)
Livability: What makes a Community Livable (2005)	9- 12- 13- 19- 20-21-22-23	(AIA, 2005)
Livable Communities (AARP- 2005)	2- 3- 5- 7- 8- 14- 17- 18- 22	(Kihl et al, 2005)
Tackling social exclusion (NEHOM project- 2006)	2- 21- 22- 23	(Kährik, 2006)
An Inquiry into Enhancing Victoria's Livability (2008)	2- 5- 6- 12- 15- 16- 17- 21- 22- 24	(Competition & Commission, 2008)
Achieving livability and vibrancy (World Cities- 2009)	3- 9- 11- 14- 19- 20	(Ooi & Yuen, 2009)
Sustainability versus livability (2009)	3- 4- 5- 15- 17-	(Howley, Scott, & Redmond, 2009)
Importance of livability dimensions and attributes (2010)	1- 2- 3- 5- 6- 7- 8- 13- 15- 18- 22	(Leby & Hashim, 2010)
A livable city study in China (2011)	6- 8- 13	(Song, 2011)
Community development (New Zealand, 2011)	3- 4- 6- 10- 12- 16- 17- 22- 23- 24	(New Zealand, 2011)
Sustainable use of biological diversity (2015)	2- 4- 5- 8- 13- 23	(Gu & Subramanian, 2015)
The economic value of walkability (2017)	2- 4- 5- 6- 8- 10- 11- 14- 15- 16- 17- 21- 22- 23- 24	(Litman, 2017)
Creating Livable Cities (U.S, 2019)	1- 4- 5- 8- 13- 23	(Oumarou, 2019)
The Global Livability Index (2021)	1- 2- 6- 10- 13- 15- 16-	(The Economist Intelligence Unit, 2021)

*1.Training and its quality, 2.Sanitation and health, 3.Suitable housing and its diversity, 4. Economy and Employment, 5.Security, 6.Urban infrastructure, 7.Access to daily needs, 8.Variety of transportation, 9. Mixed land use, 10.Cultural and historical factors, 11.Population and building density, 12.Creativity, 13.Green Space and Park, 14.Pedestrian-oriented, 15.Cleanliness, 16.Pollution air and its quality, 17- Fun and leisure, 18.Access to police, 19.Designing in-scale human, 20.Public spaces, 21.Beautiful landscapes, 22.Social interaction and dignity, 23.Local communities and participation, 24.Identity and sense of place

Based on this Table 2 (livability parameters), the most frequentation is related to social interaction and human dignity; security also ranks second. Moreover, local communities and participation, transportation, and its quality ranked third in this assessment. Notably, various dimensions of livability such as urban management, quality of life, vitality, and protection of the city center have been not considered in most studies. However, the assessment of the studies indicated that various dimensions of livability such as functional, physical, and social environments, which reflect the people's common understanding of the quality of their living environment, have been considered in all studies. Therefore, it seems that livability can increase by creating and improving these parameters in the city. This carries out by three main groups of objective indicators, subjective indicators, and behavioral indicators are known as the important criteria in the field of livability (Tiran, 2016).

Given that street, as one of the components of the built environment and a public realm, provides the possibility of access and communication with various destinations of the city, as well as a set of activities, it possesses a significant place in the life of the city (Martinelli, 2019); Hence, this study focused on the street scale.

On this matter, one of the most important Avenues of Tehran is Valiasr Ave. which is known as the largest street in Iran and one of the longest Chenarestan in the world. This Avenue due to having 200-year-old landmarks of contemporary Iranian history possesses historical and identity memory of Tehran. However, today, it is used only for forced activities (no social interactions), due to the increasing physical growth and lack of proper planning, as well as the application of some unprincipled policies and methods in the face of the street; such that, its role in pause and social interactions and consequently livability has been largely lost. Hence, this study aims to assess the effective factors on the sustainability and livability of this Avenue by emphasizing the event space; because the events can give meaning to space and turn urban spaces into lively, experiential, and creative places to create good placemaking (Richards and Duif, 2018). In this case, the social impacts of events such as better access to cultural programs (Richards and Palmer, 2012), new facilities, cleaning of urban space, transformability of unit/land according to the needs, social identity, social participation (Minnaert, 2012; Rich et al., 2011), quality of life, social belonging (Rich et al., 2011; Wood, 2006), genius loci (McCartney et al., 2010; Ramchandani, Coleman, and Christy, 2019), safety and social interaction (Fredline, Jago, and Deery, 2003) can be led to the sustainability and livability of cities. This can make the city attractive to domestic and international users.

3. Methodology

In this study, three techniques of the questionnaire, field observation, and space syntax were used to evaluate social sustainability and urban livability in Tehran's Valiasr Ave. (the distance between Beheshti St. and Vanak Sq.).

3.1. Questionnaire: A Technique for Assessment of Livability Criteria from the Citizen's point of view

In this method, to assess the sustainability, vitality, and eventful of the studied area, a questionnaire was designed according to the criteria of identity, social interactions, culture, and sustainability, as well as, social participation, the economic, environment, security, health, and transportation. The participants in this study included permanent residents, strangers, and employees/shopkeepers. Notably, the Cochran formula was used to determine the sample size due to the uncertainty of the statistical community (Eq. 1).

$$\begin{cases} n=\dfrac{Z^2 pq}{d^2} \\ Z=1.96 \\ p=q=0.5 \\ d=0.0794 \end{cases} \qquad \text{Eq. (1)}$$

Given the Cochran formula, the sample size included 152 participants (residents/employees/shopkeepers: 94 and strangers: 58).

3.2. Field Observation: A Technique for Assessment of Behavioral Dimension

In this method, primary paths around the studied area along with its primary nodes, landmarks, and secondary path were first identified by the methodology of Kevin Andrew Lynch's main factors/elements (Lynch, 1960; Yun et al., 2019) and then the field observation made (the

preparation of cognitive map). Notably, in this method, the data possess a qualitative nature. The spatial information required along with Tehran's occupancy maps were also obtained from the maps of Iran's national cartographic center and Iran's ministry of roads and urban development, respectively. Afterward, the GIS maps of the different information layers (residential, commercial, educational, historical, traffic, office, etc.) which were prepared from Tehran's municipality site were superposed by ArcGIS software. Finally, given the different information layers and their analysis, the potential areas were identified to create event space and more interactions of people and consequently increase the sustainability and livability of the studied area.

3.3. Space Syntax Technique: A Technique for Assessing the Configuration of Space

Given that the axial map is a major topic in the space analyses and space syntax criteria, a space-mass map of the studied area (from the center of Valiasr Ave. within a radius of 1 Km, on either side) was drawn by AutoCAD software and then loaded into the DepthMapX software to achieve axial map (Fig 1). Finally, 6 analyses were carried out according to the parameters of integration (local and global), connectivity, choice, total depth, intensity, and entropy. The Gait technique was also applied to confirm the research's validity. Based on this method, the analyzed paths by using DepthMap (in terms of the evaluation of social sustainability and livability factors) were visually analyzed.

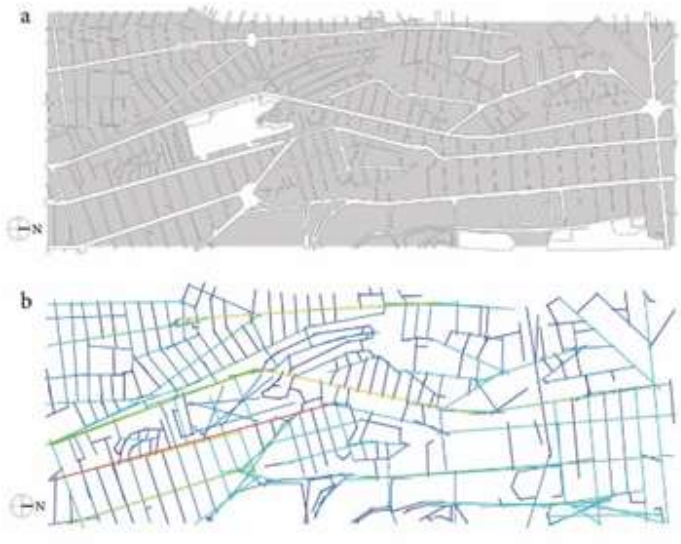


Fig 1 (a) The space-mass map (by AutoCAD software), (b) axial map (by DepthMap software)

4. Results and Discussion

The general approach in this section is to evaluate and promote livability and sustainability in Tehran's Valiasr Ave. (the distance between Beheshti St. and Vanak Sq.). In this regard, all important and potential points were identified for creating the event and providing the spaces to increase social interactions and vitality of urban space. Notably, to spatially identify the studied area, the methods of questionnaire and Field observation were used. The spatial configuration of the area was also evaluated by space syntax techniques.

4.1. Questionnaire

The questionnaires analysis derived from the public's understanding of the studied criteria indicated that the area in terms of security, health, and transportation is favorable so that the mean of the questions for every three criteria was equal to or higher than the medium limit of their criteria (medium limit for security: 76, health: 76, and transportation: 50.44). Notably, the standard deviation = 0 and p> 0.05 for questions related to these three criteria demonstrate that there are no significant differences between citizens' answers.

Moreover, based on the opinion of the participants, the studied area is not at the desired level in terms of the criteria of identity, social interactions, culture and sustainability, social participation, the economic, and environment. Such that the results of statistical analysis (one-sample test with a confidence level of 95%) indicated that from the 24 questions asked to assess the mentioned criteria, 16 questions possessed a mean lower than the medium limit of its criteria. This means that ~67% of the participants believe that the area is weak in terms of these 6 criteria and needs urban regeneration and space sustainability. However, the ranking of these criteria based on their medium limit has been shown in Table 3.

Table 3 The ranking of criteria of livability

Criteria	Identity	Social interactions	Culture and sustainability	Social participation	Economic	Environment
Medium limit	53.77	52.53	53.33	54.08	57	57
Ranking	Third	First	Second	Fourth	Fifth	

4.2. Field Observation

In the first step of this method, space identification was carried out by evaluating Kevin Andrew Lynch's important factors (including three environmental factors: the path, node, and landmark (Fig 2a).

The results of observations showed that Valiasr Ave. (in the studied area) is considered as a first-class street in the area and the streets of Gandhi, Khaled Slamboli, Akbari, Abbas Pour, Ebne Sina, Asad Abadi, and Nelson Mandela are known as the second-class streets. The traffic nodes of the area also include the junction of Valiasr Ave. with Beheshti St. and Vanak Sq. Moreover, Hajar Hospital, Saei Petrol Station, Saei Park, Book City, Mehregan Hospital, School of Traditional Medicine, Dey Hospital, Niloufar Park, Hemmat Bridge, administrative and commercial centers, Embassy of the Republic of Bulgaria, and 9 staircase entrances at the west of the studied area were identified as the important landmarks in this area.

The existence of more than 11000 sycamore trees along the entire path of Valiasr Ave., that a significant number of these trees are in the studied area, is another landmark of this area. Afterward, how to occupy space by the occupancies of the street edge was drawn through the evaluation of the different information layers of GIS maps (Fig 2b and c).

The results showed that most blocks of this area are related to occupancies of the office, therapeutic, residential, and small commercial, so that, most of the paths in this area have been turned into crossing due to the density of the mentioned occupancies and the existence of the

limited number of active urban spaces. Indeed, the area is merely used to get to work or use the public transportation network which contradicts the nature and history of Valiasr Ave.

Notably, Dey Hospital (junction of Valiasr Ave. and Abbas Pour St.), Hajar Hospital (junction of Valiasr Ave. and Beheshti St.), and Mehregan Hospital are known as the most important occupancies in this area. Moreover, Saei Park with a surface area of ~12 hectares is the most important leisure center in the area. The observations also indicated that Simorgh and Raamtin Hotels and commercial shops (such as cafes and restaurants, confectioneries, supermarkets), Nayeb restaurant, Tavazo's Nuts, Petrol Station, Saipa Corporate, book city, Saei Park Library, and Embassy of the Republic of Bulgaria are other occupancies and activities which exist in this area. Furthermore, several bleak blocks (no occupants) were observed in this area (the building at 16th St., garden land (lower of Vanak Sq.), student dormitory building at the corner of Delbasteh Alley).

The evaluation of current plans in this area also demonstrates, although, the cultural-social, historical, and tourism tissue of Valiasr Ave. is important based on the reports of the urban planning and strategic planning, however, there are no special regulations to preserve the cultural-social, historical, and tourism characteristics of this avenue.

The results obtained from the study of the spatial distribution of global occupations in Valiasr Are., also indicated that the link between art, tourism, and global occupancies like Saei Park, cultural center, cinema, etc. have not been considered. Such that, this area of Valiasr Ave. due to the existence of therapeutic, offices, and company centers, is the only space for city trips, and activities that occur in living space and everyday life have not been considered in urban and strategic planning.

Followed by, the maps of different layers of the performance of space, how local residents, strangers, and employees move, as well as daily and nightly activity on the site were evaluated and drawn by the Gait technique (Fig 3a-f).

Based on the results, employees of companies, offices, and shops, as well as strangers as pedestrians, are present in the main body and the first layer of the Avenue, which increases in the middle of the day. The local residents are also in the second layer of Valiasr Ave. which can access the first layer of the mentioned Avenue through staircase paths and east and west accesses.

The results of field observation illustrated that Valiasr Ave. (in the studied area) possesses 12 communication staircases with 2 different forms of the staircase to connect two parts of the city (i.e. staircase that rises completely and provides the possibility of an urban view for the user, and stairs with a platform that can change the direction of the stairs and provide a different view from the city). However, the absence of events in these paths provides no opportunity for the user to pause and stay in the space; so that, these paths are the only paths for city trips and are considered the urban abandoned and lost urban spaces in terms of identity and social interactions.

Given the number of therapeutic and administrative occupancies along the area and the existence of BRT stations (bus rapid transit) around important landmarks and occupancies, the movement of users in this area is often to reach the destination, so that, most of the spaces in this area have been turned into dead space, in most hours. Although, a large number of strangers observe in the junction of Valiasr Ave. and Beheshti St. (in both parts of Valiasr Ave.) which can be due to the existence of therapeutic occupancies such as Hajar Hospital. However, their presence on this path is temporary due to the lack of attractive events, a concentrated population, and suitable space for the user to pause, understand, recognize, and influence the space.

Fig 2 The maps obtained from the Field observation and GIS: (a) paths, nodes, and landmarks of the studied area, (b) occupancies and activities of the site, (c) how to occupy space

Moreover, most administrative and commercial occupancies exist at the junction of Akbari St. and Valiasr Ave. to Saei Park (in both parts of Valiasr Ave.). Hence, after the end of office hours and the closure of the mentioned centers, the area suffers from the phenomenon of nightlife in-activeness. The area of Saei Park also attracts a large number of people, especially local residents, due to the existence of the park, Children and Adolescents Intellectual Development Centre, book

city, and library. However, the main body of the Avenue, especially its western edge, has remained uneventful and forgotten. Further, from Saei Park to Vanak Sq., most of the occupancies are medical and administrative, so that, there are no spaces for social interactions and vitality in the area; the traffic of local residents also is more dependent on the location and who access to the neighborhood (a linear and scattered pattern, except for middle-aged people who are in the park for a long time).

Generally, the results show that many spaces in this area are dead and forgotten spaces that need to design the event for increasing social interactions and urban vitality and consequently promotion of the livability and sustainability of space. The superposition of the obtained maps largely reflects the livability map of the studied area (Fig 3g).

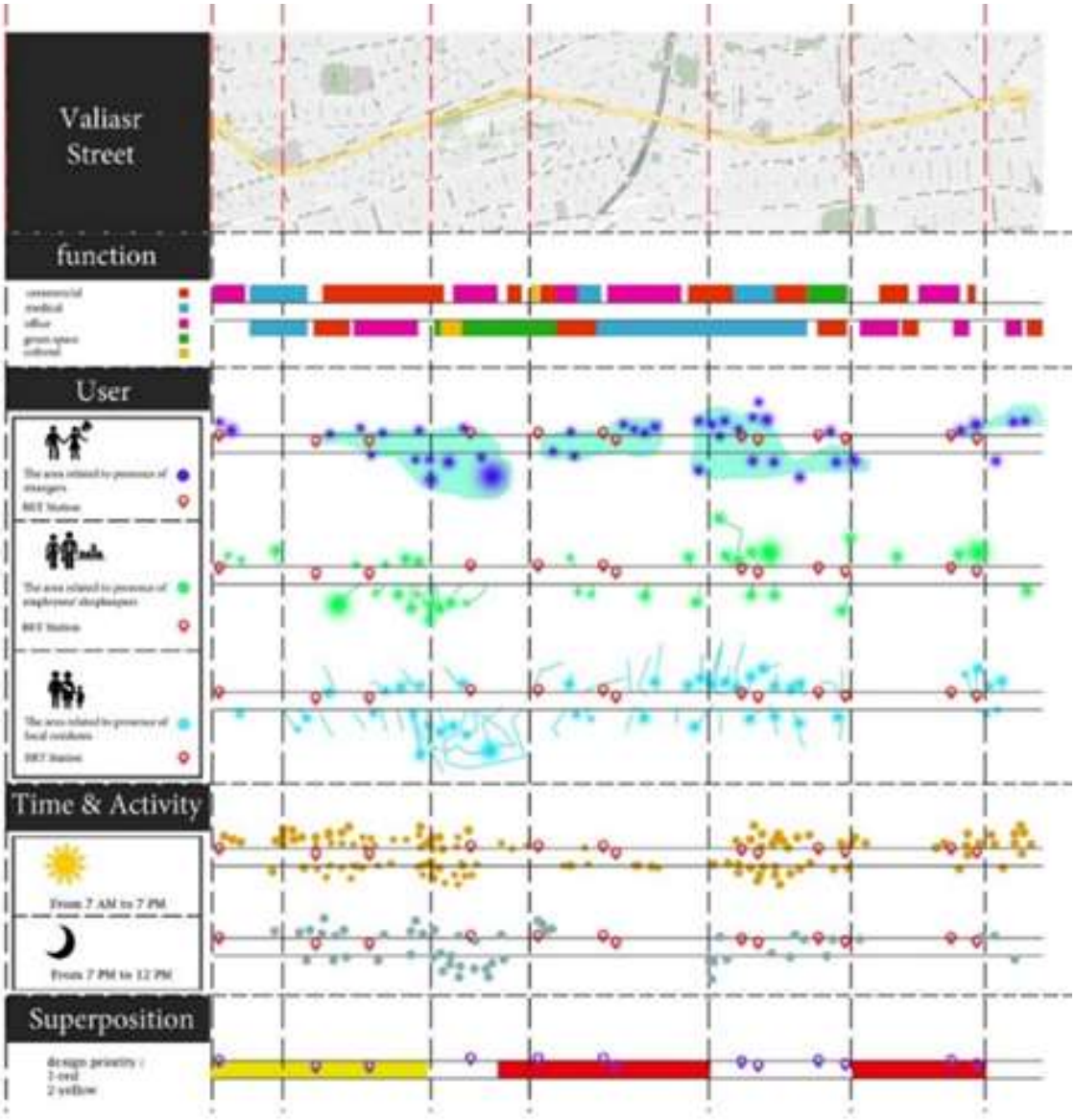


Fig 3 The assessment of the user's movement paths by the Gait technique: function, user, time, and activity, as well as the layers superposition for spaces, need to design

Finally, the analysis of the maps (Fig 2 and 3) led to the creation of the map related to the distribution of event spaces in the studied area. This map includes important events and sensory points, as well as potential spaces for the creation of event space and more interactions of people (Fig 4a). Notably, staircases, graffiti art, oversailing of the façade, and windows, as well as street decoration and artwork (as visual events), street music (as audio events), the smell of coffee and sweets (as olfactory events), etc. are events on the site which attract the attention of users.

Our results indicated that the potential spaces for creating event space that can increase the quality of life and space include the following items:

A. The regions with the government and public ownership to join to the sidewalk (Fig 4b).

(1) vacant land (Northwest side of the Vanak Sq.), (2) Office building parking related to the Institute of Standards & Industrial Research of Iran, (3) garden lands (no use), (4) land without occupancy (the side of Sayed Al-Shuhada Alley), (5) the area of under the Hemmat Bridge, (6) vacant land at the side of the Hamasi staircase of Yousef Abad Neighborhood (west side of the Valiasr St., between Sirvan St. and Hamsayegan St.), (7) vacant land (the side of the Panah staircase), (8) Grassland (no use)(East side of the Valiasr St., between Alleys of Yas and Mehregn), (9) vacant land (the side of Zandeye Alley).

B. Forgotten names, places, and edges (Fig 4c)

Translucent and hard-edge related to Telecommunication Company, [first of hospital Alley, near Hajar Hospital] (1), hard-edge related to Ayadi Alley (2), forgotten place related to Hajar Hospital (3), solid and hard-edge related to Hajar Hospital [in front of Beheshti St. (Abbasabad)] (4), solid and hard-edge related to Shapour Bakhtiar's former garden house [distance between Nader Alley and Delafrooz Alley] (5), bleak building (former student dormitory building) [next to the Delbasteh Alley] (6), Solid and hard-edge related to land's National Iranian Copper Industries Co. [distance between 18th Alley and 20th Alley] (7), translucent and hard-edge related to Saei Park [the southern part of the edge, next to the Asaadi Alley] (8), hard-edge near the 4th staircase (9), forgotten place related to the closed two restaurants (10), bleak shops (11, 12), brick hard-edge related to University of Applied Science and Technology (13), translucent and hard-edge related to Mehregan Hospital (14), translucent and hard-edge related to Grassland near the Mehregan Hospital (15), forgotten place next to Shirvan Alley (16), land of no use next to Ehtesham Alley (17), land of no use near Hamasi staircase (18), several bleak shops (19), translucent and hard-edge related to parking [between 2sd Alley and Shams Alley] (20), translucent-edge related to Dey Hospital (21), forgotten place [Dead end Alley (4th Alley)] (22), solid-edge related to parking (23), forgotten place's Shafagh Alley (24), forgotten place's Falagh Alley (25), forgotten place's 8th Alley (26), Sol Café Gallery [near the Hemmat Bridge] (27), forgotten place [under the Hemmat Bridge] (28), forgotten edge related to the land of no use (29), solid-edge between 10th St. and 12th St. (30), bleak shops (31), forgotten place related to public parking (32), solid and hard-edge related to garden land (33), solid and hard-edge related to around the Vanak Square (34), solid and hard-edge related to west side of the Vanak Sq. (35), land of no use [Northwest side of the Vanak Sq.] (36).

Hence, the superposition of the three maps in Figure 4 indicated spaces that need to design events for the livability of the area (Fig 4d).

Finally, the evaluation and conformity of Fig 4d and the results obtained from the questionnaire with the definition of theorists and researchers about events and the presence of people in the space, as well as urban sustainability and livability indicated that the four dimensions of the people's

participation, social interactions and culture, landscape, and environment, as well as, security are more important than the other dimensions, for sustainability and livability of the studied area. Accordingly, components, criteria, and activities that can lead to sustainability and livability in Valiasr St. space (the studied area) have been listed in Table 4.

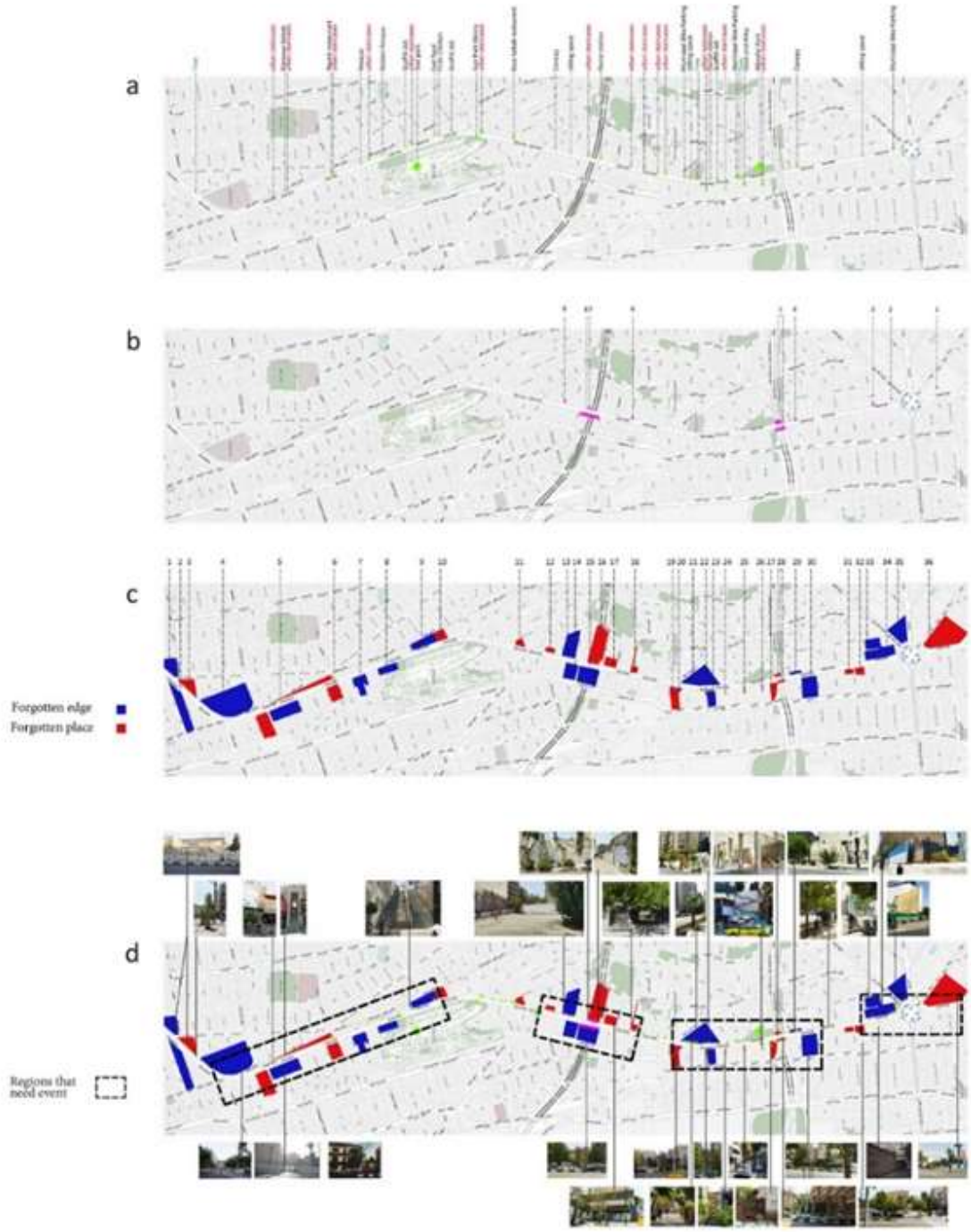


Fig 4 The evaluation of existing events and potential spaces for the creation of event space: (a) the existing events in the studied area, (b) the regions with government and public ownership, (c) Forgotten names, places, and edges, (d) superposition of layers to design event space

Table 4 Assessed dimensions, components, and criteria based on the event and vitality space in Valiasr St.

Dimensions	Components	criteria	Effective activities in the vitality of Valiasr St.
Social	Social interactions	Random social interactions	Everyday social interactions
			Sudden social interactions
		Organized social interactions	Organized social interactions
			Public ceremonies and celebrations to promote the role of space
			Self-Organized social interactions
	Accessibility	Social access	Accessibility of space for all age groups
			Accessibility of space for all genders
			Accessibility of space for a specific group
	Sense of convenience	Peace of mind	Adjacent to nature and natural elements
			Reduction of noise pollution
	Security	Security	Protection against crime
	people's participation	Presence of people	Presence of people in age and gender groups
Cultural and activity	Activity	Selective activities	Walk
			Study
		Social activities	Observe
			Conversation
		Occupancies	Distribution of occupancies based on the spirit of space
			Providing the necessary facilities for the elderly, the disabled, and the children
			Proper separation of incompatible activities
	Aesthetics	Public art	Live music
			Painting in Space
		Side activities	Restaurants and cafes
			Innovation and creativity according to the native culture
			Sale of handicrafts
landscape and environment	Cleanliness	Reduction of pollution and cleanliness of the path	Environmental sanitation

	Climate	suitable vegetation and green space, shading	preservation of sycamore trees and ditch/waterway, suitable creation of green space,
			walking in the shade
	Proper furniture	Fits in urban furniture	Proper furniture for all genders
			Attractive outside finish
	Visual	Natural features	The corridor overlooking the Alborz mountains, the existence of thousands of sycamore trees, wide-ditch/waterway on both sides of the Avenue
Security	Security in urban space	Promotion of social security	Night activities
			Planning for all groups to diversify the Avenue by changing the population, seasons, and hours of day and night
			Quiet movement of people via creating a potentially safe space to stop and stroll
			Adhere to design principles for the disabled
			The attention to lighting and materials

4.3. Space Syntax Technique

In this technique, six analysis groups were performed based on parameters of Integration (global, local), Connectivity, Choose, total Depth, Intensity, and Entropy.

A. Integration

In the first step, the Integration maps of the area (in both global and local scales) were drawn (Fig. 5a-b). As observed in this Figure, warm and cool colors indicate higher and lower Integration, respectively. Based on the results, Valiasr Ave., in the studied area, possesses high Integration.

Given that, in the Space Syntax technique, accessibility and cohesion of space are defined by Integration, areas with more accessibility lead to cohesion and the higher presence of people. Likewise, less accessibility means less pedestrian presence (Chiaradia, Law, and Schwander, 2012).

Hence, the number of people present on the Valiasr Are., in the studied area and global scale, is more than other paths, although, it ranks second on the local scale; so that, people's willingness to use this path has led to more possibility of movement and activity on this Avenue. This is more evident in the area between Saei Park to the junction of Valiasr Ave. and Abbas Pour St. due to the existence of communication staircases with back streets. Thus, the mentioned area can be suitable for cultural-social and commercial occupancies.

The results obtained from the Integration HH map (Fig 5a) also demonstrated that although the streets of Khaled Slamboli St., Gandhi St., and Beheshti St. are considered as second-class streets, in terms of the Asad Abadi. However, Integration HH in more inner-streets possesses cooler colors that show the lower accessibility in these streets.

Moreover, the evaluation of the Integration HH (R3) map (Fig 5b) indicated that Khaled Slamboli St. and Asad Abadi possess a higher flow of pedestrians than Valiasr Ave., so that this Avenue is known as the second-class path. The streets of Akbari, Nelson Mandela, Mughniyeh, and Qasir also possess the highest number of people's movements, after Valiasr St. (in the studied area). Further, the paths that are near important landmarks (such as Saei Park, Children and Adolescents Intellectual Development Centre, book city, Hajar Hospital, Mehregan Hospital, Dey Hospital, Simorgh and Raamtin Hotels, Nayeb restaurant, Tavazo's Nuts, Saipa corporate, and Embassy of the Republic of Bulgaria), possess more accessibility than paths around themselves (in local scale). Data in Table 5 confirm these results.

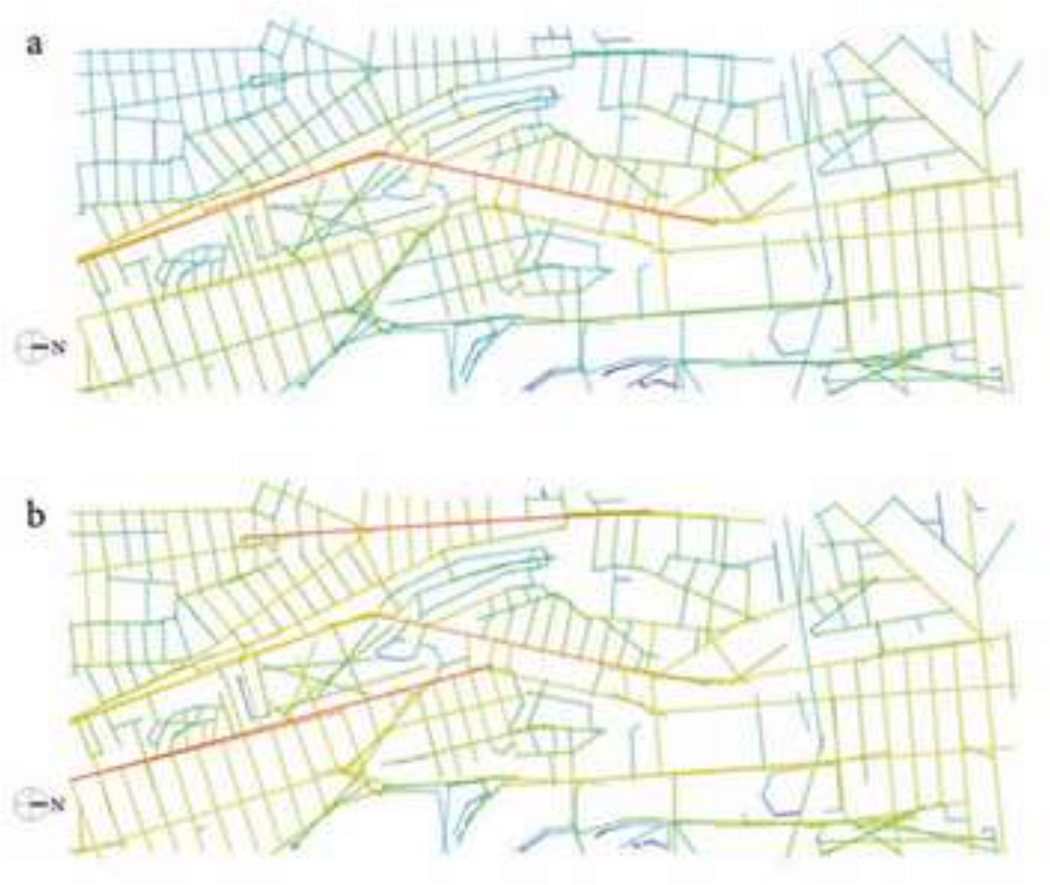


Fig 5 Integration maps: (a) HH (global scale), (b) HH (R3) (local scale)

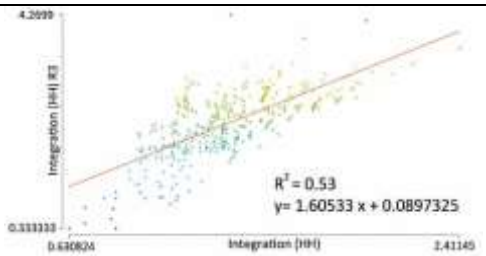
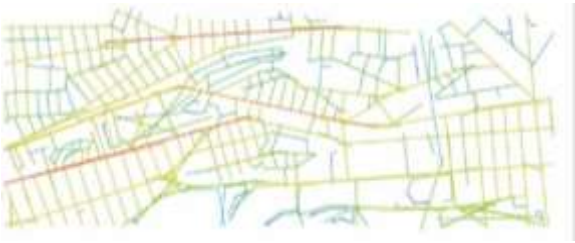
Table 5 The evaluation of paths in the studied area in terms of integration parameter

	Path	Integration HH	Integration HH (R3)
	Minimum	0.63	0.33
	Maximum	2.41	4.26
	Average	1.35	2.27
Valiasr St.	From Beheshti St. to Saei Park	2.19	3.38
	From Saei Park to the junction of	2.41	3.65

	Valiasr Ave. and Abbas Pour St.		
	From the junction of Valiasr Ave. and Abbas Pour St. to Vanak Sq.	2.04	3.36
	Khaled Slamboli St.	1.98	4.15
	Gandhi St.	1.74	2.85
	Abbas Pour St.	1.89	3.10
	Asad Abadi St.	1.36	4.26
	Nelson Mandela St.	2.46	3.28
	Beheshti St	2.65	3.30
	Mughniyeh St.	1.44	3.10
	Qasir St.	1.64	3.37
	Ebne Sina St.	1.43	3.31
	Akbari St.	1.56	2.97

The correlation analysis for Integration HH and Integration HH (R3) indicates the amount of integrity and presence of people in the studied area (Table 6). Based on the results, this area possesses no integrity (R2= 0.53) and needs to form centers for the interaction of people and communication nodes and consequently increase the spatial attractiveness, for sustainability and livability of the area. Notably, the presence of the people in this area is due to administrative and commercial activities, and not merely for using space and meetings.

Table 6 The Evaluation of Integration

Parameter	Correlation curve for path integrity (Integration HH - Integration HH (R3)	Integration of urban tissue, in a radius of 3 Km
Integration HH (R3)		

B. Connectivity

In the next step, Connectivity as a local criterion studies the relationship between space and immediate neighbors (Table 7). Indeed, the connectivity degree indicates the permeability of street spaces, so that, the warmer colors indicate better permeability and consequently higher connectivity (Li, Yan, and Yu, 2016).

Here, the results showed that Khaled Slamboli St. and Valiasr Ave. have high Connectivity, respectively, and are consequently more accessible. In this field, Asad Abadi St. indicated the second rank, while other streets possess less number of accesses (generally, the studied area has low Connectivity). The correlation coefficient analysis between Integration and Connectivity also

indicated that this area possesses low intelligibility and imageability, so that, people cannot understand the basic structure of the area (R2= 0.21).

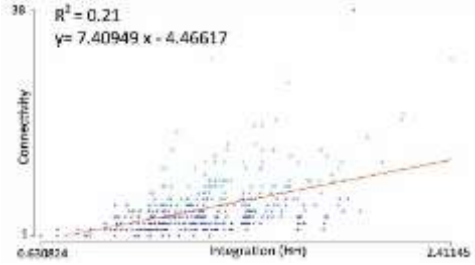
As shown in the correlation curve, Khaled Slamboli St. and Valiasr Ave. (in the studied area); especially the distance between Saei Park and Dey Hospital (due to the existence of urban-staircase) as well as Asad Abadi St. have the highest intelligibility, respectively, and stays better in people's minds. Notably, the density of points at the correlation curve also indicates the existence of paths with low intelligibility. Likewise, the dispersion of points means the existence of paths with higher intelligibility so that in these paths, people can understand the configuration of space with more peace of mind.

These paths include paths that lead up to the entrance of the main paths and paths that are around the main landmarks such as the entrances of Abbas Pour St., Akbari St., and Qasir St. (Fig 6). Based on the results, in this area, the paths with high intelligibility have the following 3 characteristics:

1. The existence of landmarks with suitable scale
2. The existence of changes in the length and width of spaces
3. The existence of a more continuous network of paths

Hence, to increase intelligibility in the whole area, space must be imageability to properly create a sense of familiarity with space and interaction in the environment. Likewise, the creation of event space can provide social interactions, imageability, and security, and consequently sustainability and livability in the area.

Table 7 The evaluation of intelligibility

Parameter	Correlation curve for the intelligibility of movement space (Connectivity - Integration)	Connectivity of urban tissue, in a radius of 3 Km
Connectivity		

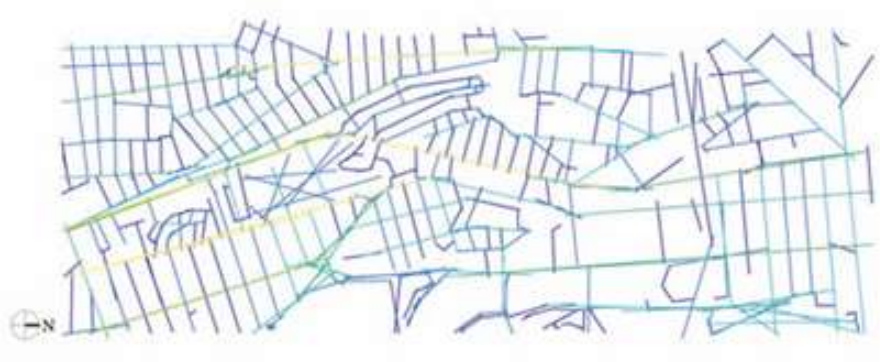


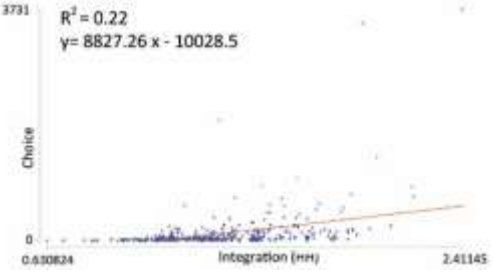
Fig 6 Intelligibility map of the studied area

C. Choice

The choice is a dynamic global criterion for the "passing flow" through space and can measure the potential of possible movement through the space in passing between origin and destination (Chou, 2022). A higher choice value of a street part means busier traffic or more movement of pedestrians in that part (Berhie and Haq, 2017).

Based on the parameter of Choice, the blue spectrum of color on the map of the studied area means fewer choices of these paths by pedestrians. Following the map in Table 8, Valiasr St. (in the studied area) and Khaled Slamboli St. are the first and second priorities of people, respectively. Although, the whole studied area does not possess high selectivity that is related to the urban network structure and people movement pattern. The reports show that there is a significant relationship between Integration and Choice parameters (Bafna, 2003; Li et al., 2017). Here, the correlation analysis of the mentioned parameters indicated that the streets of the studied area possess less value for collecting people and play less role in the pedestrian's movement path (R^2= 0.22). Thus, the techniques of collecting people can be effective in their presence and interaction in the area.

Table 8 The Evaluation of Choice

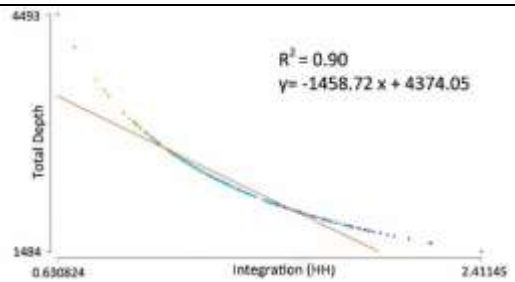
Parameter	Correlation curve for the choice and presence of people in the urban tissue (Choice - Integration)	Choice of urban tissue, in a radius of 3 Km
Choice		

D. Total Depth

The total depth degree demonstrates the openness (lack of restriction) of street spaces (Li et al., 2016). The analysis of the Depth parameter demonstrated this area includes fewer paths that are not easily accessible to the users (Table 9). Generally, there are no differences in privacy between the paths of the studied area which indicates the ease of urban access to this area. Therefore, Valiasr St. (as the longest street in this area) has been able to provide access to this area, such that further presence of citizens on this Avenue can be led to the lack of stagnation in space. The correlation coefficient (R2) of 0.9 derived from the correlation curve of total Depth and Integration illustrates the ease of access to the studied area.

Based on the studies of Matijošaitienė et al. all kinds of crimes are related to the parameters of Integration HH and total Depth so that lower correlation coefficient results in a higher crimes rate in the area (Matijošaitienė, Zaleckis, and Stankevičė, 2013). Therefore, given the R2 value, the area is less vulnerable to crime, due to ease of access.

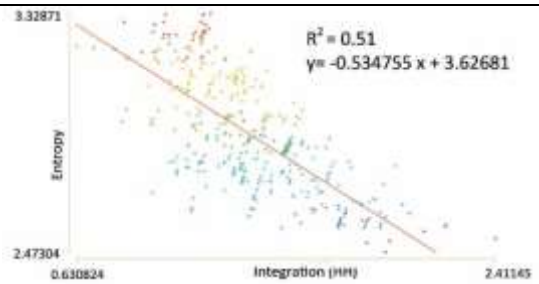
Table 9 The Evaluation of total Depth

Parameter	Correlation curve for map depth in the movement space (total Depth -Integration)	Depth of urban tissue, in a radius of 3 Km
Total Depth		

E. Entropy

According to Hillier's definition (1996), the entropy related to the notions of order and chaos into a single concept is " how easy it is to traverse to a certain depth within the system, so that low and high disorders are known as easy and hard, respectively (Coelho and Krüger, 2015). Therefore, it seems that entropy is a parameter to evaluate the sustainable distribution of people in the environment and their random activities in the urban system. Here, the results of the Entropy analysis indicated that Valiasr St. (in the studied area) has less Entropy which can be due to the excessive similarity of spaces in this Avenue and the common value of most of its spaces. Hence, the sustainability of this Avenue can increase through the creation of events, due to the high accessibility of the area. More Entropy was also observed in the west of the area i.e. Asad Abadi St. (Yousef Abad neighborhood), and the parts of the east of the area, Nelson Mandela St., Ab-o-Atash Park. It can be due to the existence of more options to distribute stranger users and reach the urban space with higher Integration (Table 10). Hence, even if a path is randomly selected, it more likely can lead users to crowded paths. The evaluation of the correlation curve of Entropy and Integration also exhibited that this area has no suitable performance in terms of user distribution, social interaction, and the use of public space (R^2= 0.51), hence, it needs to apply methods such as the creation of event space for an increase in social interactions, the livability of the area, and space sustainability.

Table 10 The Evaluation of Entropy

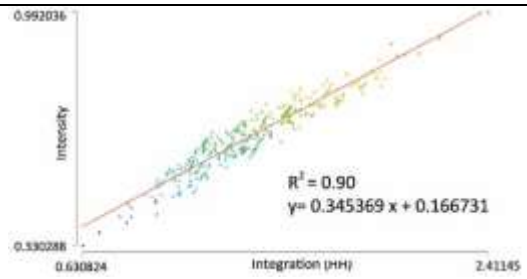
Parameter	Correlation curve for distribution of people in the movement space (Entropy -Integration)	The entropy of urban tissue, in a radius of 3 Km
Entropy		

F. Intensity

Intensity possesses a subjectively emotional dimension and speaks of feelings, responses, and stimuli. People's responses to whether the intensity of space is good or not are related to happening around them in the public realm. Hence, intensity possesses static and kinetic dimensions of stationary people in space. The population that is participating clearly and every day in the public realm of an area. Accordingly, intensity is meaning co-present and interaction in space (Stonor, 2019). Hence, it seems that two techniques of space syntax and field observation should be simultaneously considered for studying intensity (both co-present and human interactions).

In this regard, the analysis of Intensity revealed that the highest Intensity is related to Valiasr Ave. and the streets Khaled Slamboli St., Gandhi St., Nelson Mandela St., Ebne Sina St., and Akbari St. are in the next degree (Table 11). However, the study of the correlation curve of Intensity and Integration indicated a high Intensity for the whole studied area (R^2= 0.9), that is meaning high co-present in the street. Hence, creating places with enlivening events can promote the livability of the street.

Table 11 The evaluation of Intensity in physical and social dimensions

Parameter	Correlation curve for activity/dynamics of the movement space (Intensity -Integration)	The intensity of urban tissue, in a radius of 3 Km
Intensity		

G. Superposition of Results of the Questionnaire, Field Observation, and Space Syntax Technique

Here, the superposition technique was used for integrated analysis of the studied area and locating points that need to design the event for the creation of livability and sustainability.

The results obtained from this technique revealed interesting information. Such that, the overlap of the parameters obtained from the three techniques of the questionnaire, field observation, and Space Syntax indicated that although, the presence of people on Valiasr St. (in the studied area) due to various occupancies is more than other streets of this area.

However, there are no characteristics of Imageability, Intelligibility, activity, security, accessibility, and presence of people in this space. The area of Saei Park to Dey Hospital is an example of this space that lost its perceptual and social pattern and is not considered the place for the formation of social interactions due to the existence of therapeutic centers and office buildings. Moreover, this area considers as a dead urban space, at most hours, due to the existence of lots of buildings, forgotten edges, and lands of no occupants, as well as urban-staircase that are the path only for people's traffic. The area of Saei Park (west side of Valiasr St.), despite several famous restaurants, possesses poor social interactions. The east side also has no livability due to the existence of forgotten edges of Saei Park. The area of Dey Hospital to Vanak Sq. also possesses forgotten edges and poor social interactions, and the presence of people in this area is merely

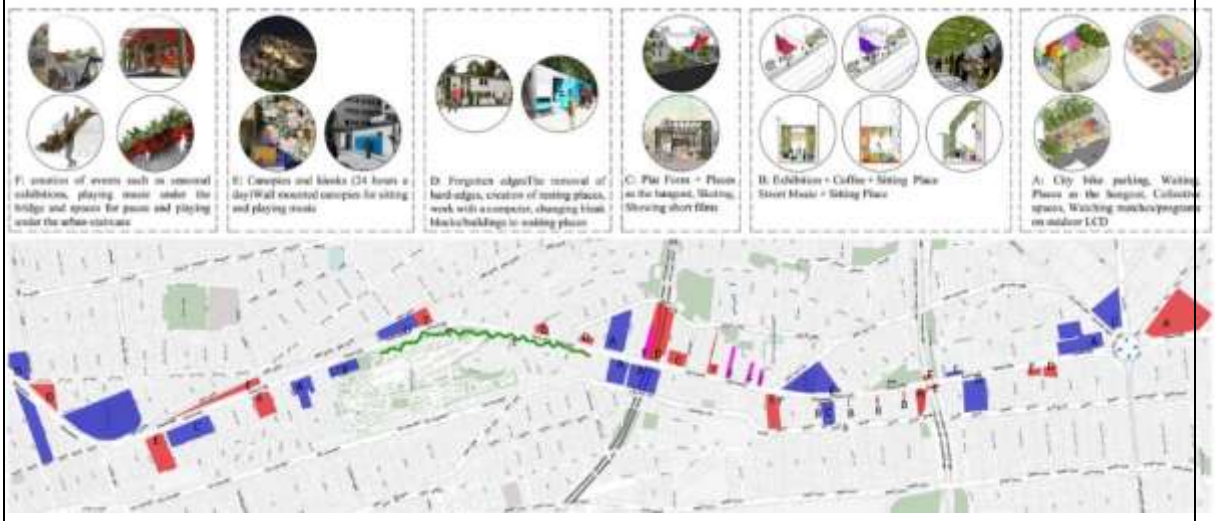
related to the existence of office centers. Hence, there is no opportunity to see, hear, meet, perform human activities, and do routine daily events, so that, this has led to the phenomenon of nightlife inactiveness in the mentioned area.

Generally, our results indicate that Valiasr St. (in the studied area, both edges of the street) has no perceptual-social pattern and its memories have been forgotten; so, it needs meaning for evoking urban memories. In this case, the presence of people and their interactions can be led to an increase in the livability and sustainability of Valiasr St. Based on the superposition technique; the paths that need to design have been listed in Table 12.

Table 12 The paths that need to design, based on the superposition of the field observation method and Space Syntax technique

Assessed criteria	Space Syntax	Field observation	Questionnaire
Integration and accessibility	Valiasr St. (in the whole studied area)	Valiasr St. (in the whole studied area), possesses high access due to the BRT access network (round-the-clock) and subway; although, the presence of people is due to the existence of the office and medical centers.	Valiasr St. (in the whole studied area)
Integrity	Generally, the area is poor	The crowd is on this path only for forced activities (no social interaction)	The whole studied area needs to create space for pausing, conversation, and entertainment (for the voluntary presence of people)
Intelligibility	The area of Saei Park to Dey Hospital	- Saei Park - Urban staircase	- Saei Park - Hamasi staircase to 8th staircase
Social interactions	Valiasr St. (in the whole studied area) possesses high Choosability and cumulatively properties	Saei Park	Saei Park
Total depth and security	Valiasr St. (in the whole studied area)	Valiasr St. (from 7 Am to 9 PM), from Saei Park to Dey Hospital	Valiasr St. (from 7 Am to 9 PM)
Entropy	Valiasr St. (distance between Akbari St. to Dey Hospital)	Valiasr St. due to the natural view existence of sycamore trees and waterway	The whole studied area
Intensity	Valiasr St. (in the whole studied area)	Saei Park	Saei Park, as well as spaces to sit

Combining criteria of 3 techniques (space that needs to design)



Designs to increase livability:
Design of small commercial spaces and places as the hangout such as street kiosks for coffee and ice cream- Design of place to socialize, such as designing space near the staircase and under the bridge, as well as creating the urban gallery- Design of the small events near-forgotten places and creation of landmarks to increase intelligibility and sustainability of the area- Design of urban staircase and creation of space for conversation- Design of night space on the path, such as fast food kiosks- Design of Dead End and forgotten places to remove abandoned spaces and increase the presence of women and children- Design of under the Hemmat Bridge- Design of places for daily events such as conversation.

5. Conclusion

This study aimed to assess the livability and sustainability of Tehran's Valiasr Ave. (the distance between Beheshti St. and Vanak Sq.). To this end, given that the events are known as life-giving factors to space, the potential spaces were initially identified to create event space by three techniques of the questionnaire, field observation, and space syntax. Afterward, the alternatives were suggested for eventful of these spaces that the main technique for their design was the platform. In this regard, the results of field observation indicated that there is no special rule for preserving the context of this street as a historical-tourism and cultural-social area, and currently, this street possesses a commercial-service nature. Therefore, livability can increase by regenerating identity and creating physical attraction. According to the questionnaire, a large percentage of people also stated that the area in terms of security, health, and transportation (as the important parameters in livability) is favorable (medium limit for security: 76, health: 76, and transportation: 50.44) so that they were interested in the stroll and walking on Valiasr Ave. While they stated this area is not at the desired level in terms of the criteria of identity, social interactions, culture and sustainability, social participation, the economic, and environment (from the 24 questions asked to assess the mentioned criteria, 16 questions possessed a mean lower than the medium limit of its criteria). Suth that ~67% of the participants believed that the area is weak in terms of these 6 criteria and needs urban regeneration and space sustainability, via creating a space to hangout, gather, talk, leisure hours, and visit the artwork.

The results of the space syntax technique also demonstrated that Valiasr Ave. can gather people due to its high accessibility. However, the organized plans in this path are further related to flooring and beautifying the street floor, which in practice cannot create activity, vitality, and sustainability

in urban space. The superposition of these 3 techniques confirmed these results. Generally, our study indicates that the development of event-based programs can become this area to an eventful path via the regeneration of event-free paths. In addition to space syntax, these programs can be included the response to needs such as privacy and aesthetic elements of the environment. Hence, here, to assess the levels of sustainability and livability of the area, all analyses were performed based on the events. Based on the results, the creation of the events of life-giving, by the platform technique, the design of dead ends and the creation of the space for pause and hangout, the design of forgotten places, design of coffee and ice-cream kiosks (24-hour a day), design of the places to sit, talk, and audio events (street music/live music), as well as the places for children to play and presence of elderlies can turn the forgotten places or the potential spaces into live places and lead to the increase in the livability and return of the identity of the area.

6. Acknowledgement

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