

Design Strategies for Improving the Quality of Urban Trails; Using QSPM Matrix; Case Study: Shiraz Health Trail

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ABSTRACT

Urban trails, which are not very old in Iran, are a type of urban spaces created with the aim of promoting the general health of citizens by increasing physical activity and encouraging to take exercises in cities. The current research aims to develop design strategies in line with enhancing the quality of such walkways. In the present study, data are collected using second desk study and semi-structured interview as well as questionnaires. To analyze the data, the strategic analysis of the internal and external factors as well as QSPM Matrix are applied. The case study was the "Health" Trail in Shiraz as the first health-oriented walkway in the city. The study population included 35 municipality experts and urban planning students. In the first stage, the strengths, weaknesses, threats and opportunities of the "Health" walkway were identified after performing a semi-structured interview with the study population. In the second stage, the themes were categorized and subsequently prioritized through a closed Likert-based questionnaire assisted by the tables of internal (IFE) and external (EFE) factors. The study of the tables shows the conservative strategies as the most important strategies for the promotion of the quality of walkway. After these two stages, the conservative strategies were prioritized using QSPM matrix to organize the walkway. The findings show that having an opportunity of being in the proximity to natural factors as two strategies, i.e. "making an appropriate space on the side of the river for visual and environmental enjoyment of being proximity to the river" and "constructing suitable walls in the periphery of gardens in Qasr e Dasht for visual and environmental enjoyment of being proximity to green spaces", are the most important conservative strategies for promoting the quality of Shiraz's Health trail and encouraging people to do more physical activities on this trail.

Keywords: Health-Oriented Trail, Urban Space, Design Strategy.

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1. INTRODUCTION

Taking exercises, performing physical activities and using fresh air are amongst the most important factors for augmenting the urban vitality. Nowadays, the majority of developed countries are in competition with other countries for creating novel programs for developing public sports and physical activities because the studies performed on the effect of exercises on the physical and psychological health, longevity, happiness, expansion of social relations and enrichment of leisure time have made people across the world to more increasingly participate in doing exercises, especially public ones (Rakhshaninasab & Rashidian, 2017, p. 102).

In 2013, WHO introduced sedentariness as the fourth cause of death worldwide (Alimardani, Mohammadi, & Zibae Farimani, 2018, p. 194). This is while about 30% of middle-aged population in Iran does not perform even the required minimum physical activity, as stated in the latest credible statistics (Hakimiyan, 2016, p. 72). Being active and the use of sport instruments in open and green spaces directly motivate feelings and emotions, influence spiritual and psychological communication with the world, improve quality of life, revitalize psychological balance, tranquility and help stay away from everyday life (Chiesura, 2004, p. 133). The studies conducted by the disease control and prevention centers in the US have pointed to the shortage of the structures and facilities, like walkways and parks, as an important reason for the individual's lack of participation in the physical activities (CDCP, 1999, pp. 143-146). Carvalho et al., in a study in Brazil, stated that proper and accessible public spaces encourage individuals to perform physical activities. On the other hand, these spaces provide an appropriate opportunity to the low-income class who cannot afford the costs of playing sports and entertainment (Carvalho Vieira, Sperandei, Reis, da Silva, & Gonçalves, 2013, pp. 198-200).

Health Trail in Shiraz is one of the walkways constructed in 2017 with an approach to the enhancement of citizens' health level through encouraging them to do physical activity and walking. This space has been welcomed by the citizens since the first day it was opened to people. However, its spatial qualities are below desirable level. In the present study, it is attempted to develop design strategies for enhancing the quality of the aforementioned walkway considering the opinions of the users of this trail. These strategies can be utilized to devise a framework for designing similar spaces countrywide.

2. LITERATURE REVIEW

In recent years, the western countries have conducted extensive research to investigate the effect of physical forms on the degree of walking as well as health (Table 1). In many of these studies, quantitative methods and

geographical information system have been employed to add to their objectivity. Considering their nature, these studies cover neighborhood and larger areas and are aimed at planning. The measures of these studies in sum are: mixed land uses, interlaced and non-hierarchical networks, high population density and high building density (Humpel, Owen, & Leslie, 2002; Handy, Boarnet, Ewing, & Killingsworth, 2002; Hoehner, Brennan, Brownson, Handy, & Killingsworth, 2003; Krizek, 2011). The other set of studies have investigated the walkability of urban environments from more specialized perspectives, which finally investigated environmental qualities as adaptation, diversity, legibility, complexity, demarcation and so forth (Sallis, Johnson, Calfas, Caparosa, & Nichols, 1997; Ball, Bauman, Leslie, & Owen, 2001; Boer, Zheng, Overton, Ridgeway, & Cohen, 2007; Owen, Humple, Leslie, & Bauman, 2004; Humpel, Owen, Iverson, Leslie, & Bauman, 2004; Carvalho Vieira, Sperandei, Reis, da Silva, & Gonçalves, 2013). The outcome of such studies is closer to the measures of urban design and applicable to the smaller scales, as well (Bahraini & Khosravi, 2010). Many studies indicate the effect of the physical form of environment on individuals' rate and times of walking (Boer, Zheng, Overton, Ridgeway, & Cohen, 2007). In such studies, physical measures influencing the degree of walking have been extracted using various methods (objective and subjective) (Humpel, Owen, & Leslie, 2002; Sallis, Johnson, Calfas, Caparosa, & Nichols, 1997; Krizek, 2011; Krizek & Johnson, 2006). A number of studies have conducted on how the design of space increase physical activities with an approach to increasing the benefits stemming from the health or encouraging people to do more physical activities (Ord, Mitchell, & Pearce, 2013; De Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003; Lennon, Dauglas, & Scott, 2017; Hakimiyan, 2016).

In addition to the theoretical research, design instructions are also notable and investigable in the professional and practical areas for this set of spaces, especially in the developed countries. In Portland Pedestrian Design Guide, four primary goals have been counted for this set of spaces: safety and security, connectivity, responsiveness to the establishment location and diversity of user groups (Grimwade, Horner, & Everhart, 2009). In "Ontario's Best Trails: Guidelines and Best Practices", in addition to presenting instructions and paying attention to the environmental qualities in these spaces, in line with the two strategic principles of "sustainability" and "unique and pervasive design" for these walkways, the details of design have been dealt with in details in various physical aspects (OTF, 2006, p. 14).

In Table 1, a list of about 26 studies conducted on the effects of the urban environment on citizens' health and physical activity over the past two decades.

In order to benefit from the practical experience of other countries in planning and designing trails, five of



these spaces in the US and Canada have been studied. The most important features of these spaces are shown in Table 2. The length of such spaces in the access network, proper connectivity to access networks,



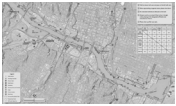





parking, proximity to public transport stations, good pavement and furniture, proximity to natural elements, proper vegetation, security and proper lighting are the most important features of these case examples.

Table 1. Literature Review (Subjective Categorization)

Subjective Categories		Researches
1	Health & Urban Design Health & Urban Space	(Renalds, Smith, & Hale, 2010; Hakimiyan, 2012; 2016)
2	Features of Built Environmental influencing Walking & Physical Activity	(Pikora, Bull, & Jamrozik, 2002; Humpel, Owen, & Leslie, 2002; Handy, Boarnet, Ewing, & Killingsworth, 2002; Hoehner, Brennan, Brownson, Handy, & Killingsworth, 2003; De Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003; Owen, Humpel, Leslie, & Bauman, 2004; Krizek & Johnson, 2006; Reynolds, Wolch, Byrne, Chou, Feng, Weaver, & Jerrett, 2007; Bahrain & Khosravi, 2009; Ord, Mitchell, & Pearce, 2013; Carvalho Vieira, Sperandei, Reis, da Silva, & Gonçalves, 2013; Razzaghi, Alimardani, & Zibae, 2014; Lennon & Scott, 2017)
3	Perceptual & Visual Dimensions Affecting Walking & Physical Activity	(Sallis, Johnson, Calfas, Caparosa, & Nichols, 1997; Ball, Bauman, Leslie, & Owen, 2001; Humpel, Owen, Iverson, Leslie, & Bauman, 2004; Boer, Zheng, Overton, Ridgeway, & Cohen, 2007; Hakimiyan, 2016; Alimardani, Mohammadi, & Zibae Farimani, 2018)
4	Designing & Planning of Urban Sports Centers	(Razavi & Azimi, 2014; Rakhshanasab & Rashidian, 2017)
5	Urban Trails Guidelines & Toolkits	(OTF, 2006; Grimwade, Horner, & Everhart, 2009)

Table 2. Revive of Case Studies

City	Trail's Name	Length / Type	Attributes	picture
Ontario	A.Y. Jackson Lookout	1 mile Suburban	Amenities: Parking- Partial access to wheelchair Character: Landscape, Nature, Wilderness, Crown Land Surface: Grass/Natural, Rock, Soil, Mixed Activities: Hiking & Walking Hours of operation: Year-round Other: Brings economic benefits- Take advantage of all the opportunities and benefits of access to this type of trail	
	A.F. Coventry Nature Trail ¹	0.7 mile	Amenities: Admission Fee, Parking, Picnic Areas, Designated Rest Areas, Camping, Bird-watching, Fishing Character: Protected Natural Area, Eye-Catching, Natural, Urban Surface: Grass/Natural, Soil – Compacted Activities: Hiking & Walking- Camping & Backpacking- Snowshoeing & Backcountry Hours of operation: Year-round Other: Near the Nature Centre- Protection of natural environment	

City	Trail's Name	Length / Type	Attributes	picture
Georgia Atlanta	Atlanta BeltLine Georgia ²	33 mile Intramural	<p>Amenities: To engage people in the progress of the trail, a number of BeltLine tours are offered to them- Narrated bus tours of the developing trail on Friday and Saturday mornings. Spaces for music and theater- Parking can be found in and around the parks</p> <p>Character: Aa an Art Gallery Route</p> <p>Activities: Running- Biking- Skating- Walking- Watching</p> <p>Other: Connects several parks throughout the city- Holding the Olympic games- Convert unused rail to sidewalks- A model for the future of urban green space</p>	 
Austin Texas	Ann and Roy ³	10 mile Intramural (Seaside)	<p>Amenities: Available dock, and a new resort along the 7,250- Foot dock- Parking along the street and river or any parking space near the trail.</p> <p>Activities: Fishing “is allowed on the rest areas but not along the main trail”- Boating- Watching- Walking</p> <p>Boardwalk Access: The Boardwalk can be accessed at several points</p> <p>Hours of operation: The Boardwalk is open from 5am to midnight each day, with a curfew between midnight and 5am.</p> <p>Other: An alternative transportation path to the core of urban growth- Austin’s most famous and popular entertainment area</p>	  
	Slaughter Creek ⁴	5 mile Suburban	<p>Amenities: Low facilities due to environmental protection- The parking here is limited. There might be about 20 spaces total, depending upon how well drivers line up their cars and trucks. Once the parking area is full people are asked to come back at another time.</p> <p>Activities: Walking- Biking</p> <p>Paths and Accesses: There are not separate trails for bikes riders and other users. Instead, the trail forms a loop and the trail planners decided to route bikes in a clockwise direction and the hikers and horseback riders in a counter clockwise direction.</p> <p>Other: Creating a loop of walking and cycling</p>	  

2.1. Theoretical Framework

2.1.1. Health-Oriented Trails

In developed countries, walkways account for an important part of the health-oriented spaces. In western literature, this set of the spaces have been recounted under two terms of “Trail” and “Greenway”. In “Ontario’s Best Trails: Guidelines and Best Practices”, this set of spaces are defined as follows: “Trails are walkways that provide a route from the natural spots in the suburbs of the cities to the more developed spots in the city centers with the objective of on-foot movement that incorporates physical activity, recreation, translocation and corroboration of the aesthetical dimensions of the urban landscape followed

by a subsequent environmental and economic interests to the city” (Grimwade, Horner, & Everhart. 2009).

Ontario guidelines of health-oriented walkways realize “encouraging active lifestyle to enhance physical and psychological health of the society and reduce the risk of common health problems” as the most important benefits these urban spaces. These guidelines enumerate “experiencing the confrontation with the natural environment in the developed sections of the cities by citizens and thereby making efforts for preserving them” as another advantage of these walkways. Social benefits stemming from the enhancement of social interactions and active participation in the environment as well as the economic merits are amongst the other positive effects of these spaces (OTF, 2006, p.16).

Generally, based on the studies and instructions for creating these spaces in the developed countries, the advantages of these paths can be sought in five aspects, namely health, transportation, economy, energy and environment and family and society that can be viewed briefly in Figure 1.

In sum, although many of the features and benefits of these types of spaces are similar to public walkways in cities, their absolute distinction is the monopoly of “exercise “ and “health-oriented” activities and various

types of “optional activities”. In fact, these walkways are first “health-oriented” and then “transportation-oriented”, although they also play a role in transportation networks of city. Environmentally, these spaces also directly involve with the natural environment of the city and its suburbs, with less proximity to the built, dense, and compact urban environment, reflecting the difference between these spaces and public urban walkways. In Table 3, the difference between these spaces and general urban walkways is explained.

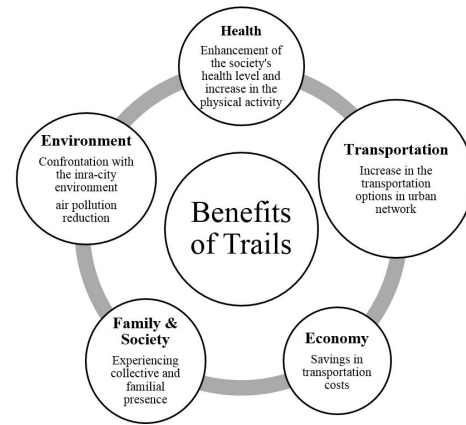


Fig. 1. Benefits of Urban Trails

Table 3. Comparison of Urban Trails and General

Subjects		Health- Oriented Walkways (Urban Trails)	General Walkways
1	Health	-The role of health is strong (Health-oriented space)	-Influencing citizen's health
2	Energy and Environment	-Less proximity to the compact and dense texture of the city -Adjacent to the natural areas and corridors of the city and suburbs -Monopoly of sports activities in space -Enjoyment of the space with appropriate sports furniture	-Adjacent to the main and central areas of the city -Performing all kinds of activities related to urban streets -General Urban furniture
3	Transportation	-Little role of transportation	-Active role of transportation
4	Family and Society	-Influencing social interactions and reinforcing family role	-Influencing social interactions and reinforcing family role
5	Economy	-Saving or reducing health care and treatment costs	-Saving or reducing fossil energy consumption associated with vehicle-driven transport

2.1.2. The Environmental Properties Influencing Walking

Security has been posited in many studies as a key environmental and prerequisite attribute for performing physical activity and walking in such spaces (Hakimiyan, 2012; Grimwade, Horner & Everhart 2009) Convenience and accessibility and, in general, the proper positions of the source and destination are amongst the other primary features of this set of spaces (Owen, Humple, Leslie, & Bauman, 2004; Humpel, Owen, Iverson, Leslie & Bauman., 2004; Grimwade, Horner & Everhart 2009).

Environmental responsiveness and all-inclusiveness have also been taken into consideration and emphasized in developing the strategic vision of Ontario Best Trails and the design instructions and principles have been developed based thereon (OTF, 2006, p. 18). In Portland's guidelines for designing health-oriented Trails, four primary goals have been enumerated for this set of spaces: safety and security, connectivity, responsiveness to location and the diversity of user groups (Grimwade, Horner & Everhart. 2009). The aesthetical aspects, convenience and accessibility of pedestrian-oriented spaces' infrastructures have been recognized as the most important attributes of a

Trail for increasing citizens' times of walking (Owen, Humple, Leslie, & Bauman, 2004; Ball, Bauman, Leslie, & Owen, 2001; Humpel, Owen, Iverson, Leslie & Bauman, 2004, pp. 119-125; Reynoldes et al., 2007; Alimardani, Mohammadi, & Zibae Farimani, 2018, pp. 193-204, Razzaghi, Alimardani, & Zibae, 2014, pp. 27-36; Razavi & Azimi, 2014, p.15).

In a study, Hakimiyan has arranged the qualities of the urban design related to physical activity in three "functional", "experiential-aesthetical" and "bioenvironmental" indicators. In functional component, the accessibility of daily land uses, walking infrastructures, permeability, density, mixture of land uses, safety and security, sport facilities and equipment and active social environment have been pointed out. In experiential-aesthetical component, the properties of natural environment and built environment have been stated. Finally, the climatic conditions and terrains have been emphasized in bioenvironmental component (Hakimiyan, 2016, pp.87-107).

3. METHODOLOGY

The present study was an applied research carried out using a descriptive-analytical approach. The study has been conducted in three steps with a mixture of qualitative and quantitative methods. In the first step, library research has been conducted for finding environmental indices influencing the increase in the times of walking and physical activity as well as for figuring out the environmental properties to be considered in the urban health-oriented walkways. Afterwards, in a second step, field observations were carried out in the case study's site and interviews were made with about 25 of the users of the space to gather information regarding the strengths, weaknesses, opportunities and threats of the path and to develop them as SWOT table (Table 4.) based on the theoretical studies. According to the obtained SWOT table, the four-strategy table, including aggressive strategy (SO), conservative strategy (WO), competitive strategy (ST)

and defensive strategy (WT), was also developed (Table 5). In the third step, a sample of 35 urban planning experts who were very well acquainted with the health-oriented Trail in Shiraz, on the one hand, and familiar with urban planning literature, on the other hand, was selected from Shiraz University and Shiraz municipality to begin the development process of "quantitative strategic planning matrix" (QSPM).

To do so, the research sample was asked to evaluate the strengths, weaknesses, opportunities and threats of the path based on SWOT table within the format of 5-point Likert-based questionnaire. In this evaluation, the importance and intensity rate of each item in the health-oriented walkway in Shiraz were separately scored. The results of the scores enabled the preparation of internal factors evaluation (IFE) and external factors' evaluation (EFE) tables using Excel Software (Tables 6-7). Then, while selecting the range of the selected strategies using IE matrix, the priorities and scores of the selected strategies were analyzed in consultation with a group of 35 experts. The data obtained in this stage formed the QSPM matrix as the most important product of the study.

3.1. Case Study

"Health Trail" in Shiraz is a health-oriented urban space in municipality district 6. The dried river of Shiraz, Shahid Chamran Boulevard and an adjacent linear park are situated in the northeastern side of the trail; Qasr e Dasht gardens are located in the southwestern side of it. The route connects Shahed Intersection (Danesh Amouz-Shahed Crosssection) to Ma'ali Abad Bridge. Two stations of Shiraz's 1th. Line subway are located in the beginning and end of this route which facilitate the public's access to this walkway (Fig. 2). Although the space has been frequently visited and used by Shiraz's citizens since it was opened, there are many gaps and weaknesses observable in various planning and designing dimensions of the route that have to be eliminated to enhance the route's quality and status.

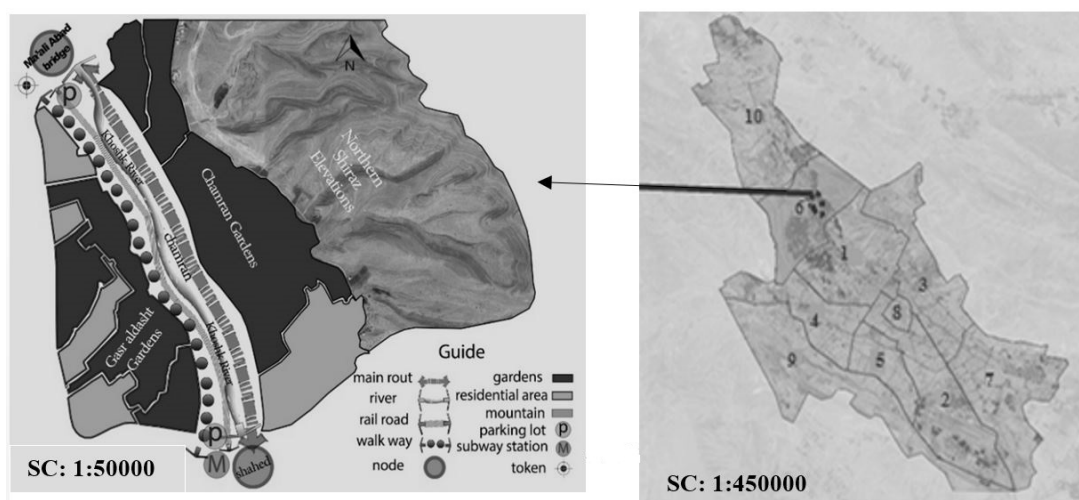




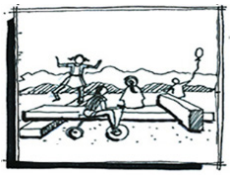




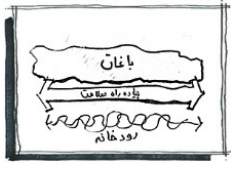
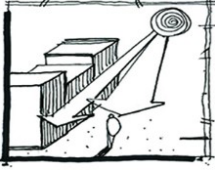



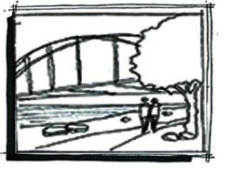
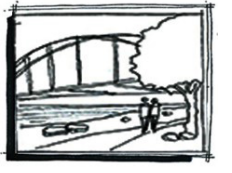
Fig. 2. Shiraz Health Trail; Situation and Spatial Organization of the Region

4. FINDINGS AND DISCUSSION

As seen in tables 4 and 5, the weaknesses, strengths, opportunities and threats of the health-oriented walkway in Shiraz have been evaluated by the help of 35 experts. The value of “2.36” for the sum of the internal factors’ scores indicated the dominance of the trail’s weaknesses on its strengths (values below 2.5). In the external factors’ matrix, the total sum of the scores was obtained 2.54 which was indicative of the dominance of the route’s opportunities over its weaknesses (values greater than 2.5). These two values

have been inserted in IE diagram and indicated the preferred strategies. In the diagram depicted in Figure 3, it is seen that the selected strategies are conservative strategies in the 2nd part of the diagram. This means that the emphasis should be placed on the path’s opportunities in the development of the strategic plan so that the weaknesses can be maximally compensated. A system might have opportunities in the outside but it cannot make use of them due to its internal weaknesses. Under such conditions, adoption of a conservative strategy can enable the maximal use of opportunities (Golkar, 2005, p. 54).

Table 4. S.W.O.T. Table

D	Strength	Weakness	Opportunity	Threat
Functional	S ₁ : Proper accessibility and connection to urban transportation network considering the existence of subway station in the source and destination 	W ₁ : Improper location of the walkway across the city W ₂ : Nonintegrated pavement and disproportionate width to length ratio of the walkway 	O ₁ : The possibility of organizing the path’s source and destination to enhance its efficiency and legibility O ₂ : The possibility of qualitative and quantitative enhancement of the sport equipment and furniture along the path 	T ₁ : Existence of slopes and unguarded edges and the risk of falling of children and disabled persons 
	S ₂ : Existence of parking lot at the beginning and end of the route 	W ₃ : Shortage of suitable facilities and equipment and shortage of marginal proportionate activities at the middle and end of the path W ₄ : Lack of proper definition of the cycling path 		T ₂ : Threat to the safety of the space due to Vehicle-pedestrian collisions at the beginning of the path (in Shahed Street) 
	S ₃ : Existence of proportionate activities (café and food booths) 	W ₅ : Shortage of the preps for supplying the climatic comfort (especially against radiation) in some parts of the path 	O ₃ : Experiencing the peaceful coexistence with the nature in the case of providing proper contexts 	T ₃ : Noise pollution due to the passage of subway train in the immediate margin of the route 
	S ₅ : Trees provide favorable shades at the beginning of the path (Shahed Street) 	W ₆ : Improper pavement in many parts of the path 	O ₄ : Taking advantage of the river course for increasing the bioenvironmental productivity and citizen presence 	

Functional

Bio-Environmental







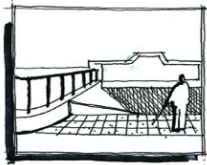

D	Strength	Weakness	Opportunity	Threat
Visual and Physical	<p>S₆: The existence of attractions and natural landscapes in the immediate margins of the path (gardens and dried river and so forth)</p> 	<p>W₇: Insufficient lighting in some sections of the path</p>  <p>W₈: Weak design and shortage of environmental attractions in the second half of the path</p> <p>W₉: Poor legibility and shortage of signs along the path</p> 	<p>O₅: The possibility of making more use of the views and landscapes of the dried river, Qasrdasht gardens and the gardens in the margin of Shahid Chamran Boulevard</p> 	<p>T₄: Improper view of the subway's railroad and niches and unfavorable wire fence</p> 
	<p>S₇: Relatively good citizen presence and welcoming of walking on the path by people</p> 	<p>W₁₀: The space's weakness in relation to special groups' (the disabled and old people and others) use of it</p> 	<p>O₆: The existence of abandoned spaces; an opportunity for designing "behavioral setting of physical activity", hangout and pause places and increasing citizen presence in the space</p> 	<p>T₅: Low security of the path at for women</p>

Table 5. Development of Four-group Strategies

Aggressive Strategies (SO)	Conservative Strategies (WO)
<p>SO₁: Designing and organizing the source and destination for increasing the path's legibility and efficiency (S₁, S₂, O₁)</p> <p>SO₂: Increasing the quality and quantity of the sport furniture along the path (S₃, O₂)</p> <p>SO₃: designing and organizing spaces and landscapes towards the dried river of Shiraz (S₄, O₃, O₄)</p> <p>SO₄: Stretching the linear vegetation and proper designing of the green walls for Qasrdasht gardens in Shiraz in the immediate margins of the path (S₄, S₅, O₃)</p> <p>SO₅: Redesigning of the pause and abandoned spaces along the path (O₆, S₇)</p>	<p>WO₁: Integration of the pavement designs along the path and definition of pause spots and movement using them (W₆, W₂, O₆)</p> <p>WO₂: Setting the proper contexts for establishing proportionate marginal activities (café, fast food restaurants, exhibition stalls and so on) in the second half and at the end of the path (W₃, O₆)</p> <p>WO₃: Defining behavioral setting of physical activity by establishing proper sport furniture in the immediate margin of the path (W₃, W₈, W₉, O₆)</p> <p>WO₄: Increasing the vegetation, especially in the periphery of the second half of the path for enhancing the climatic comfort (W₅, W₈, O₃)</p> <p>WO₅: Proper setting of the space in the margin of the river for visual and bioenvironmental use of being in the adjacency of the river (O₃, O₄, O₅, W₈)</p> <p>WO₆: Proper setting of the walls in the margins of Qasrdasht gardens for the visual and bioenvironmental enjoyment of being in the adjacency of green spaces (O₃, O₅, W₅, W₈)</p> <p>WO₇: Providing the required facilities for the presence and activity of the physically-disabled groups (handicaps, older individuals and others) along the path (W₁₀, O₆)</p>

Competitive Strategies (ST)	Defensive Strategies (WT)
ST ₁ : Organizing the vehicles and pedestrians' movement at the beginning and end of the path (S ₁ , S ₂ , T ₂)	WT ₁ : Organizing the source and destination of the path to minimize the dangers resulting from the interference of motorway and walkway (T ₂ , W ₁)
ST ₂ : Construction of appropriate walls in the margins and adjacency of the route and subway rail for minimizing the noise and visual pollution (T ₃ , T ₄ , S ₆)	WT ₂ : Organizing the danger-prone spots to increase the safety for physically disabled individuals along the path (T ₁ , W ₁₀)
ST ₃ : Enhancing the security of the path using proper lighting and defining suitable furniture, increasing the visibility and establishment of favorable activities (S ₇ , T ₅)	WT ₃ : Defining cycling and wheelchair paths by the aid of proper pavement and safe walls (W ₄ , W ₁₀ , T ₂)
ST ₄ : Enhancing the route's safety in danger-prone zones (vehicles' traffic, falling risk and so on (T ₂ , S ₇))	WT ₄ : Reducing the noise and visual pollutions resulting from the route's adjacency to the subway's niches by wall construction (T ₃ , T ₄ , W ₅ , W ₈)
	WT ₅ : Increasing the security of the space for the presence of special user groups (W ₁₀ , T ₅)

The seven conservative strategies previously developed within the format of the strategies table (Table 5) were evaluated from the perspective of the group of experts and their attractions were scored based on the route's weaknesses and opportunities using QSPM

Matrix. The mean values of these scores, the product of multiplication of them by their related coefficients and, eventually, their final scores of attractiveness are presented in Table 8.

Table 6. Evaluation of the Internal Factors (Strengths & Weaknesses)

	Internal Factors	Importance Degree	Normalized	Current Situation	Score
Strengths	S ₁ Easy accessibility and proper connectivity to the urban transportation network	4.60	0.061	3.60	0.218
	S ₂ Existence of parking at the beginning and end of the path	4.51	0.059	3.74	0.222
	S ₃ Existence of proportionate activities (café and food booths) at the beginning and end of the path	4.66	0.061	3.29	0.202
	S ₄ The existence of dried river and Qasrdasht gardens in the adjacency of the path	4.26	0.056	3.63	0.204
	S ₅ Trees provide favorable shades at the beginning of the path (Shahed Street)	4.40	0.058	3.43	0.199
	S ₆ The existence of attractions and natural landscapes in the immediate margins of the path (gardens and dried river and so forth)	4.63	0.061	3.66	0.223
	S ₇ Relatively good citizen presence and people's welcoming of walking on the path	4.86	0.064	3.51	0.225
Weaknesses	W ₁ Improper location of the walkway across the city	3.97	0.052	1.89	0.099
	W ₂ Nonintegrated pavement and disproportionate width to length ratio of the walkway's	4.09	0.054	1.60	0.086
	W ₃ Shortage of suitable facilities and equipment and shortage of marginal proportionate activities at the middle and end of the path	4.60	0.061	1.37	0.083
	W ₄ Lack of proper definition of the cycling path	4.51	0.059	1.34	0.080
	W ₅ Shortage of the preps for supplying the climatic comfort (especially against radiation) in some parts of the path	4.49	0.059	1.54	0.091
	W ₆ improper pavement in many parts of the path	4.57	0.060	1.46	0.088
	W ₇ Insufficient lighting in some sections of the path	4.66	0.061	1.34	0.082
	W ₈ Weak design and shortage of environmental attractions in the second half of the path	4.43	0.058	1.46	0.085
	W ₉ Poor legibility and shortage of signs along the path	4.17	0.055	1.63	0.090
	W ₁₀ The space's weakness in relation to special groups' use of it (handicaps and old people and others)	4.49	0.059	1.46	0.086
Sum	-	75.9	1	39.95	2.363

Table 7. Evaluation of the External Factors (Opportunities & Threats)

	Internal Factors	Importance Degree	Normalized	Current Situation	Score
Opportunities	O ₁ The possibility of organizing the path's source and destination to enhance its efficiency and legibility	4.51	0.091	3.44	0.312
	O ₂ The possibility of qualitative and quantitative enhancement of the sport equipment and furniture along the path	4.60	0.093	3.67	0.340
	O ₃ Experiencing the peaceful coexistence with the nature in case of providing proper contexts	4.57	0.092	3.44	0.317
	O ₄ Taking advantage of the river course to increase the bioenvironmental productivity and citizen presence	4.63	0.093	3.48	0.325
	O ₅ The possibility of making more use of the views and landscapes of the dried river, Qasrdasht gardens and the gardens in the margin of Shahid Chamran Boulevard	4.57	0.092	3.48	0.320
	O ₆ The existence of abandoned spaces for designing "behavioral setting of physical activity", hangout and pause places and increasing the citizen presence	4.66	0.094	3.26	0.306
Threats	T ₁ Existence of slopes and unguarded edges and the risk of falling of children and disabled persons	4.80	0.097	1.33	0.129
	T ₂ Threat to the safety of the space due to the vehicle-pedestrian collision at the beginning of the path (Shahed Street)	4.74	0.095	1.37	0.131
	T ₃ Noise pollution due to the passage of subway train in the immediate margin of the route	3.69	0.074	1.70	0.126
	T ₄ Improper view of the subway's railroad, niches and its unfavorable wire fence	3.94	0.079	1.44	0.114
	T ₅ Low security of the path at for women	4.94	0.099	1.30	0.129
Sum	-	49.56	1	27.91	2.549

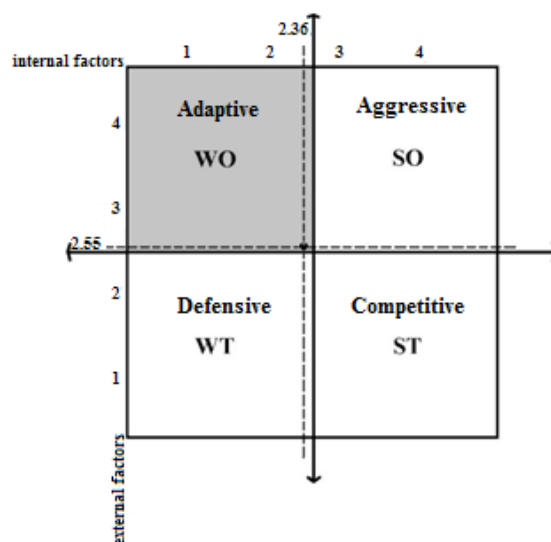


Fig. 3. Determining the Selected Strategic Area by IE Matrix

Table 8. QSPM Matrix

Factors	Coefficient	WO ₁		WO ₂		WO ₃		WO ₄		WO ₅		WO ₆		WO ₇	
		Attractiveness Score	Final Score	Attractiveness Score	Final Score	Attractiveness Score	Final Score	Attractiveness Score	Final Score	Attractiveness Score	Final Score	Attractiveness Score	Final Score	Attractiveness Score	Final Score
Weaknesses	W ₁	0.099	-	-	-	-	-	-	-	-	-	-	-	-	-
	W ₂	0.086	3.34	0.287	-	-	-	-	-	-	-	-	-	-	-
	W ₃	0.083	-	-	3.25	0.27	3.29	0.26	-	-	-	-	-	-	-
	W ₄	0.080	-	-	-	-	-	-	-	-	-	-	-	-	-
	W ₅	0.091	-	-	-	-	-	3.34	0.304	-	-	2.97	0.27	-	-
	W ₆	0.088	3.37	0.29	-	-	-	-	-	-	-	-	-	-	-
	W ₇	0.082	-	-	-	-	-	-	-	-	-	-	-	-	-
	W ₈	0.085	-	-	-	-	3	0.25	3	0.25	3.20	0.027	3.20	0.27	-
	W ₉	0.090	-	-	-	-	2.37	0.21	-	-	-	-	-	-	-
	W ₁₀	0.086	-	-	-	-	-	-	-	-	-	-	-	3.5	0.30
Opportunities	O ₁	0.312	-	-	-	-	-	-	-	-	-	-	-	-	-
	O ₂	0.340	-	-	-	-	-	-	-	-	-	-	-	-	-
	O ₃	0.317	-	-	-	-	-	2.94	0.93	3.34	1.06	3.02	0.960	-	-
	O ₄	0.325	-	-	-	-	-	-	-	3.25	1.05	-	-	-	-
	O ₅	0.320	-	-	-	-	-	-	-	3.31	1.06	2.97	0.95	-	-
	O ₆	0.306	3.14	0.96	3.28	1.00	3.40	1.04	-	-	-	-	-	3	0.91
Sum of Attractiveness Score			1.54		1.27		1.77		1.49		3.45		2.45		1.22

Table 5 shows that the most attractive strategies for compensating the weaknesses and taking advantage of the opportunities were “making proper spaces in the margin of the river for visual and bioenvironmental enjoyment of being in the adjacency of the river” and “making proper spaces in the margin of Qasr e Dasht gardens for visual and bioenvironmental enjoyment of being in the adjacency of green spaces”. This important issue has also been taken into consideration in earlier studies. Owen, Reynolds and Ball, in their studies, have underlined the adjacency to the natural environments and the effect of natural landscapes on encouraging people for walking on such paths (Owen, Humple, Leslie, & Bauman, 2004; Ball, Bauman, Leslie, & Owen, 2001; Reynolds, Wolch, Byrne, Chou Feng, Weaver, & Jerrett, 2007). Also, Hakimiyani, has pointed to the bioenvironmental as well as the aesthetical dimensions of being adjacency to the natural environments in his study of urban design qualities related to the enhancement of the physical activity (Hakimiyani, 2016). It can be stated that the most important strength of the trail was its adjacency to the natural attractions in the northwestern side of Shiraz. Although the dried bed of Shiraz’s river had water during few months of the year, it is still playing a strong perceptual role in people’s mentalities of

Shiraz. Therefore, by making preparations through urban management plans it might become possible to allow water flow in the riverbed during more months of the year to both moderate the air and enhance the climatic comfort level of the region as well as elevate the liveliness and presence of people in the immediate periphery, including on the health-oriented Trail in Shiraz. However, making the contexts for the creation of views towards the riverbed as well as the qualitative enhancement of the supportive walls can contribute to the improvement of the interaction between the walkway and the river. Additionally, Qasr e dasht gardens have played significant roles in both people’s mentalities of Shiraz and the moderation of the city’s weather, especially in the northwestern section, and also in supplying natural attractive landscapes. Benefiting from the opportunity of being adjacency to these gardens has been underlined as the second important conservative strategy. At present, the adjacency of these gardens to the health-oriented walkway can be witnessed on the southern wall in the first half of the path (from Shahed Street). Meanwhile supplying an attractive landscape, such an adjacency enhanced the climatic comfort status of the path, particularly during the warm months of the year. It seems that such a capacity can be more applied

especially on the second half of the path. Construction of proper walls with an approach to the expansion of visual penetration as well as the placement of suitable furniture and proper making of contexts in the sides of these gardens can add to the attractiveness of the space and thereby encouraging people for proving an accentuated presence and taking more frequent walks therein.

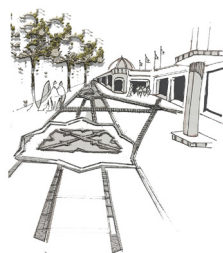
The third attractive strategy from the perspective of experts was “to define behavioral setting of physical activity by establishing proper sport furniture in the immediate edges of the path”. Behavioral setting of physical activity can be considered as new generation of behavioral setting wherein the health- and physical

activity-related behaviors are specifically seen. Making plans for creating and enhancing such spaces can also be viewed in previous research (Hakimiyani, 2016). It seems that according to the eligibility weakness of the health-oriented Trail in Shiraz, making the ground for creating such setting can enhance the functional aspect of the path and encourage physical activity-related activities and, simultaneously, influence the elevation of the perceptual dimension and eligibility of the path, as well.

The other intended conservative strategies and the scores of their attractiveness can be observed in table (9).

Table 9. Prioritization of the Conservative Strategies to Enhance the Quality of Health-Oriented Walkway in Shiraz

Priority	Strategy	Attractiveness Score
1	WO ₅ Making proper space in the margin of the river for visual and bioenvironmental use of being in the adjacency of the river	3.45
2	WO ₆ Constructing proper walls in the margins of Qasrdasht gardens for the visual and bioenvironmental enjoyment of being in the adjacency of green breadths	2.45
3	WO ₃ Defining behavioral setting of physical activity by establishing proper sport furniture in the immediate margin of the path	1.77
4	WO ₁ Integration of the pavement along the path and defining pause spots and movement with the help of them	1.54
5	WO ₄ Increasing the vegetation, especially in the periphery of the second half of the path for enhancing the climatic comfort	1.49
6	WO ₂ making proper contexts for establishing proportionate marginal activities (café, fast food restaurants, exhibition stalls and so on) in the second half and at the end of the path	1.27



Priority	Strategy	Attractiveness Score
7	WO ₇ Making the required preparations for the presence and activity of the physically-disabled groups (handicaps, old individuals and others) along the path	1.23



5. CONCLUSION

Urban health-oriented Trails are new generations of urban spaces which are emerging and established in the cities in Iran following the lead of the developed countries. These spaces intend to increasing the times of walking with the goal of augmenting physical activity and physical health as well as making the contexts for the behavioral setting of physical activity in cities. In the present study, in addition to reviewing previous studies regarding the factors influencing the qualitative enhancement of this set of spaces and citizens' welcoming of them, a health-oriented walkway in Shiraz was investigated. The objective of this study was to develop and prioritize the strategies for qualitative enhancement of this walkway by the QSPM matrix. To do so, the process of developing a SWOT table and quantization of it by the aid of IFE and EFE tables was taken within the format of a 35-individual group of experts. Moreover, conservative strategies were prioritized as the selected solutions to the improvement of this walkway's status by the IE matrix.

The findings of present study indicated that the exploitation of the opportunity of the route's adjacency to the natural factors within the format of two strategies of "making the contexts in the margin of the river for visual and bioenvironmental enjoyment of the path's adjacency to the river" and "constructing appropriate walls in the margin of Qasrdasht gardens for visual and bioenvironmental enjoyment of adjacency to the green

spaces" was the most attractive solution for taking advantage of the opportunities and playing down the weaknesses of the path. The review of previous research and the relevant guidelines, as well, indicated the idea that the adjacency of such paths to the natural factors and seizing of such an opportunity have been taken into account in the process of designing and planning of such spaces. According to the fact that the health-oriented Trail in Shiraz features "adjacency to the green breadth of Qasr dasht gardens" as well as "adjacency to the dried bed of Shiraz's river", using of such opportunities by properly organizing the spaces, wall construction and placement of suitable furniture in the adjacency of these areas can contribute to the increase in the citizen presence and their welcoming of the space. This strategy also can reducing the effect of the space's weaknesses, especially in regard of such an issue as the shortage of climatic comfort and weakness in the environmental attractiveness in some parts of the path. Moreover, establishment of physical activity setting along the path, integration and organization of the pavement, opening micro-scale business activities in proportion to the space spirit and proper setting of the ground for enhancing the trail all-inclusiveness could be amongst the other conservative strategies that, assisted by designing solutions, can ease the actualization of the health trail's goals and increase the citizen presence in such a space in Shiraz.

END NOTE

1. Introducing Different Trails in Ontario
2. Atlanta Belt Line (Overview) Description
3. Ann and Roy Butler Hike-and-Bike Trail and Boardwalk at Lady Bird Lake (Overview)
4. General Specifications the Slaughter Creek Preserve Trail in Austin

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