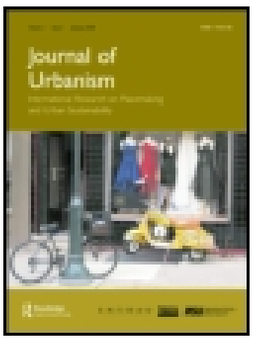

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Urban spatial structure in central Iran: introduction & analysis of *sahe-ja*

Shahead Maghreby [a,b], Samira Hosseini Yazdi[b], Mahmoud Ghalehnoee[b], Ghasem Motalebi[c] and Stephen Caffey[d]

[a]Visiting scholar, Department of Architecture, Texas A&M University, College Station, TX, USA; [b]Department of Architecture and Urban Design, Art University of Isfahan, Isfahan, Iran; [c]School of Architecture, University of Tehran, Tehran, Iran; [d]Associate Department Head for Research, Department of Architecture, Texas A&M University, College Station, TX, USA

ABSTRACT

Modernization of Iranian cities during the 20th century has radically altered and, in some instances, completely destroyed parts of the historic fabric of cities. Two approaches have dominated efforts to address these impacts: development-driven and conservation-driven. Because both approaches originate outside the complex and fragile contexts of Iran's historic fabric, their respective and collective outcomes have proven neither logical nor practical. Scholars have proposed a third, context-driven option, which urban planners and municipal officials try to restore and preserve urban fabric according to their structure while also maintaining quality of life for residents. Applying the context-driven approach to the spatial structure of the Ali-Gholi-Agha quarter in Isfahan reveals one such discrete element: a semipublic type of space called "sahe-ja." By interrogating whether and to what extent sahe-ja serves as a determinative element in the quarter's historic urban fabric, this paper demonstrates the logic and practicality of the context-driven approach.

KEYWORDS

Modernization; historic fabric; spatial structure; Ali-Gholi-Agha quarter; sahe-ja

1. Introduction

Modernization has brought rapid changes to the historic urban fabric of ancient cities. The urgency with which these changes have been implemented has, in many cases, degraded residents' sense of identity and sense of place by damaging some of the most cherished aspects of cultural and material heritage. The central Iranian city of Isfahan provides a case in point (Sharifi and Murayama 2013; Kazimee 2012). Rapid and sometimes reckless modifications to the city's historic urban fabric have forced some long-time inhabitants of the city either to abandon their ancestral neighborhoods, resulting in sometimes profound personal and communal suffering (Ahmadi Venhari and Foroughmand Arabi 2012; Madanipour 2003; Ehlers and Floor 1993), or to permanently alter their relationships with site, structure, and space. Because of their inherent density, Isfahan's historic urban

CONTACT Shahead Maghreby shaheadm@gmail.com

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fabric has proven especially prone to such modernization-related problems as insufficient parking, unsanctioned destruction of historic façades, and disruption of traditional, hierarchical transitions from public to private spaces (Naqsh and Jahan-Pars 1992).

To date, two approach types have dominated efforts to solve the spatial problems of Isfahan's historic urban fabric: development-driven and conservation-oriented. In the development-driven approach, the solution for solving the problems of urban historic fabric is to destroy the fabric and build modern spaces instead (Madanipour 2003). The purpose of the conservation-oriented approach is to conserve the historic urban fabric and solve its problems with the lowest level of interference (Salah Ouf 2001). Many examples have appeared over the past two decades in Iran, but two interventions – the Navab Regeneration Project and the conservation of the Joobareh quarter – represent the challenges associated with the development imperative and the conservation imperative, respectively. In part 3 of this paper these two examples will be explained.

A closer look at these examples of the development and conservation approaches reveals that they were formed based on imported ideas from outside the context, leading to their failure. Current scholars have suggested that solutions for changes to this type of urban area should be aligned with the formal, material, spatial, social, and cultural contexts of the historic fabric and should account for local conditions. This approach is called context-driven.[1] Indicators for best practices may already appear within the selected site, structure, or space to be modified (Cinà, Kamjou, and Tavangar 2018; Falamaki 2009; Habibi 2003; Tavassoli 1986). Such cases require sensitive interrogation of the associated contexts.

This research chose Isfahan's historic quarter of Ali-Gholi-Agha as a case study of spatial solutions based on the spatial structure of historic fabric. To better understand the spatial situation of the quarter, the authors interviewed both random and targeted cohorts of the area's inhabitants. Analysis of the interviews revealed a majority of inhabitants to express dissatisfaction with the spatial quality of the quarter, except for those from a specific part referred to by locals as "sahe-ja." Apart from one relatively superficial definition of sahe-ja, no description of the term appears in English or Farsi language scholarship on architecture and urban design. To demonstrate the potential value of the context-driven approach to adapting historic fabric to modern life, this paper rediscovers, describes, and defines sahe-ja through analyses of interview responses, direct observation, and firsthand encounters. This study reveals that sahe-ja is more than just an open space, and its spatial characteristics accomodate adaptation requirements while preserving the spatial structure of the historic fabric of Isfahan.

This paper is organized into two main parts. The first part presents the relevant scholarly literature and the theoretical background through which the problems associated with modernization impacts can best be understood. Following this literature review is a summary categorization of the different approaches to modernization. The second part of the paper presents the methodology and analysis of the case study on the Ali-Gholi-Agha historic quarter, and sahe-ja is explained with an emphasis on spatial principles common to the historic fabric of central Iranian urban design. The section concludes with a commentary on the role of sahe-ja in the quality of life of the city's residents and the potential for future urban planning initiatives.

2. Background: modernization, changes, and problems

The first steps toward modernizing Iran occurred in the 1870s after the Qajar ruler Nasser-al-Din Shah[2] returned from a visit to Paris. Under the reign of Reza Shah Pahlavi,[3] however, initiatives to bring Iran into the age of modernity took hold (Bahrainy and Aminzadeh 2007), this "accelerated modernization created significant changes in attitudes and approaches in many fields" (Arjomand Kermani 2016, 19). Pahlavi's successor, Mohammad Reza Shah Pahlavi[4] (r. 1941–1979), continued the push toward modernization. Although the Islamic Revolution of Iran was in part a reaction against the imposed modernization processes of the Pahlavi era, the revolutionary government retained some elements and forms of modernization. Therefore, modernization continued to alter the Iranian lifestyle even after the revolution (Madanipour 2003). Some of the most significant sources of these lifestyle changes as related specifically to historic fabric include importing automobiles (Tavassoli 2016; Karimi and Motamed 2003; Ehlers and Floor 1993), new amenities and public services (Zangiabadi and Soltani 2013; Kazimee 2012; Ehlers and Floor 1993), migration of local people from historic fabric (Zangiabadi and Soltani 2013; Assari and Assari 2012; Falamaki 2009; Ehlers and Floor 1993; Naqsh and Jahan-Pars 1992), habitation of strangers and low-income groups in historic fabric (Rismanchian and Bell 2013; Assari and Assari 2012; Ahmadi and Zonouzi 2008; Madanipour 2006; Karimi 2000; Clark and Costello 1973), and decreasing economic value of land (Assari and Assari 2012; Moradi, MehdizadehSeradj, and Tajeddini 2011; Ehlers and Floor 1993).

Other than lifestyle changes, numerous other significant changes have also been imposed directly on the spatial structure of the historic fabric of Iran's cities (Rezvani-Naraghi 2018; Alizadeh and Irandoost 2017; Karimi 2000):

- Carving out New Street Grids and Widening Existing Routes

A severe problem for historic cities is "the uncontrolled nature of vehicular traffic circulation" (Diba 2002, 121). The need for controlled vehicle traffic has led to the construction of new street grids and the widening of historic routes (Karimi 2000; Naqsh and Jahan-Pars 1992). In fact, making a new grid of streets for automobiles seems to have been the basis of all the changes to the historic fabric of these cities (Bahrainy and Aminzadeh 2007).

Carving out new street grids and widening existing routes for vehicles has been superimposed on the historic structures of the areas without any regard for their historical evolution. The fabric has been cut through and new façades have been built along the new streets to hide everything remaining from the past (Madanipour 2003) (Figure 1).

- Transferring Local Urban Functions from the Center of the Historic Quarter to Newly Constructed Streets

The absence of standard vehicular access to the internal parts of historic fabric has led modernization plans to construct bourgeois space along new streets (Mashayekhi 2015; Karimi 2000). "This urban expansion [has been] accompanied not only by residential expansion but also by the expansion of commercial activities and the development of new Western-style shopping districts" (Ehlers and Floor 1993, 265). New high-end shops along the streets, while serving as an attraction for inhabitants, eventually have led to abandonment of the historic fabric. In consequence, the critical elements of the historic fabric has gradually begun to lose their efficiency and functionality (Sharifi and Murayama 2013) (Figure 1).

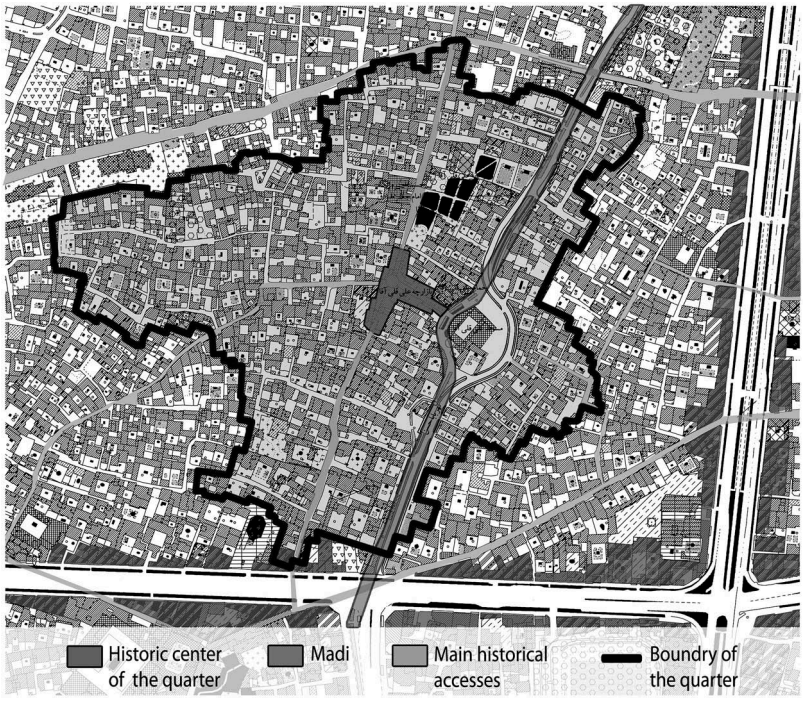

Figure 1. Ali-Gholi-Agha (The source of rare map is Isfahan municipality, modified by authors).

- Adding Parking Functionality

In most Iranian cities, parking functionality was not well-planned (Ehlers and Floor 1993). Indicating the significance of public parking space are the vast number of vehicles in the cities, citizens' interest in using personal vehicles for urban commuting, and inadequate public transportation facilities. Unfortunately, by providing parking spaces in historic fabric, especially in historic city centers, a considerable part of the fabric has been wiped out.

- Forming New Urban Spaces

According to the above-mentioned forced changes, the development of modernization has formed new urban spaces and superimposed severe damage to the historic fabric. The outcome of these changes is the widespread erosion of the overall historic fabric (Zangiabadi and Soltani 2013; Kazimee 2012). In other words, the modernization process has damaged both the structure and the appearance of historic cities, which in return has degraded the spatial value of the historic fabric (Khodabakhsh 2001).

3. Main approaches to historic fabric problems

During and after the modernization era, the number of problems with urban fabric increased, and they became more complicated in nature. As a result, different city organizations became involved to rectify the situation (Khodabakhsh 2001) by applying

one of two opposite approaches: development-driven or conservation-oriented. These two approaches have their basis in confronting the preference for old versus new and change versus continuity (Hosseini Nasab 2018; Rismanchian and Bell 2013; Rodwell 2013; Arrhenius 2012; Izadi 2008; Modarres 2006).

3.1. Development-driven approach

The development-driven approach, in which the fabric is "radically re-planned and re-built" (Lockhart 1939, 11), was formed based on the ideology of modernism in the sense that it regards everything traditional as outdated (Kazimee 2012; Steinberg 1996). This radical break with the traditional means that new forms of urban fabric cannot be developed out of existing ones (Madanipour 2003). Existing practices and institutions are disregarded entirely, and borrowing developing ideas from the West is common (Nasab 2018).

This approach has been implemented mostly by Iran's municipalities, the most potent and largest development agencies, as well as by the central government (Izadi 2008). In general, most types of conservation are regarded as obstacles to development. Therefore, large and fast-growing urban area development plans have considered essential portions of the historic fabric as urban renewal areas (Rojas 2007).

As an example of the development-driven approach, the Navab Regeneration Project represents well a harmful city development policy (Raisdana 2002). The 1996 project covered a total population of 259,828 over 20 neighborhoods, with the majority of buildings having Pahlavi II–era architectural style. There had previously been a cohesive physical, cultural, and social entity in these neighborhoods, and the Navab Regeneration Project completely destroyed the area (Bahrainy and Aminzadeh 2007), to build a highway through the urban fabric with superstructures on each side (Madanipour 2006). The project "failed to respond to the desires, expectations, lifestyles, and tastes of the users" (Bahrainy and Aminzadeh 2007, 267), and it transformed the area into an insecure and crime-ridden space (Teimouri 2014).

3.2. Conservation-driven approach

The Conservation-driven approach has been employed by the Iranian Cultural Heritage Organization (ICHO).[5] Ideally, the primary purpose of this approach is preserving the originality of the historic fabric with the lowest level of interference. But in practice, the most common kinds of renovation and interference have been considered harmful to the historic fabric; too-strict laws and regulations have been passed regarding conservation and construction within the fabric (Hanachi, Diba, and Mahdavinejad 2008). Conservation-driven approaches tend to try and return a structure to a single moment in time rather than acknowledging buildings as living entities that change over time, interrupting the dynamism of the urban fabric of the city.

This approach regards historic fabric as "museum pieces," Therefore, the results have been museum-like conservation, making natural life difficult for inhabitants (Cinà, Kamjou, and Tavangar 2018; Daneshpanah and Mousavizade 2012). This lawful prevention of profitable interference has led to the destruction of fabric over recent decades. The only allowed intervention is "the exact restoration of urban details, through selectivity in

deciding the locations to be conserved, selectivity of the urban elements to be recognized for conservation and selectivity of the site-scape features in need of retention" (Salah Ouf 2001, 73). In fact, the conservation-driven approach "celebrates individual monuments, but neglects entire neighborhoods" (Modarres 2006).

The Joobareh historic quarter is a good example of the Conservation-drivenapproach (Behzadfar and Saneei 2012). Located in the central and historical part of Isfahan, the quarter covers an area of 70 hectares. Conservation and restoration projects began in 2004, but because of ambiguity in the comprehensive plans for the district, it was not permitted for houses to be renewed or repaired. Project activities included collecting building rubbish from around ruined areas and specifying new uses, paving streets and specifying special places for pedestrians, cars, and parking lots, introducing and specifying traffic signs for people, and renewing and developing the district's centers.

Although some of these interventions led to improvement, the implemented activities were superficial and did not solve the Joobareh quarter's fundamental problems. The failure of the project was reflected in responses to an inhabitants' survey, which confirmed that "the projects performed in the Joobareh district [were] not in agreement with the social and economic features of the district" (Momeni, Beik Mohammadi, and Mahdizade 2011).

3.3. Context-driven approach: learning from the context of historic fabrics

Projects applying the development-driven approach to historic fabric have exacerbated the problems of the given area (Rontos, Zitti, and Salvati 2017; Karimi 2000). At the same time, activities based on the conservation-driven approach have left limited effects (Hanachi, Diba, and Mahdavinejad 2008; Izadi 2008). Isfahan, along with many other Iranian cities, has experienced these same fates as a result of officials executing unconscious plans (Nejad Ebrahimi 2015; Khodabakhsh 2001). Despite the great deterioration and change, historic fabric still plays a significant role in the lives of inhabitants (Arjomand Kermani 2016), leaving a critical question still unanswered – "Can the historic fabric of Isfahan survive?" (Cantacuzino 1976, 293)

To answer this question, some scholars have suggested an alternative approach based on the context of the historic urban fabric itself. Investigations have shown that in spite of inefficient responses to the needs and problems of the ever-changing world, advantageous lessons can be learned from the spatial structure of historic fabric for appropriate urban design (Ryberg-Webster 2018; Molavi, Mardoukhi, and Jalili 2016; Alwaz 2012; Ahmadi Venhari and Foroughmand Arabi 2012; Asomani-Boateng 2011; Falamaki 2009; Habibi 2003; Tavassoli 1986) (See Table 1, Comparing the effects of three approaches on the historic fabric).

When it comes to spatial structure, some scholars believe that "mass" and "void" are the two main elements that form the spatial structure of historic Iranian fabric (Esmaeilian and Pourjafar 2013; Sultanzade 1994; Tavassoli 1986). Within this view, the most important factor coordinating the elements of the spatial structure is the relationship between mass and void.[6] Followers of this idea have suggested creating "open spatial buffers" in the historic fabric as a way to balance the equilibrium between mass and void. The open spatial buffers relate quarter and subquarter centers to the main and subsidiary routes. In consequence, the spatial quality of historic fabric is promoted by creating pleasant, multipurpose moving and pausing spaces (Mozaffar, Faizi, and Asadpour 2013; Habibi 2003).

Table 1. Comparing the effects of three approaches on the historic fabric.

The result of implementing approaches in the historic fabric	Development-driven	Conservation-driven	Context-driven
Migration of local people from the historic fabric	☑	☑	☑
Habitation of strangers and low-income groups	☑	☑	☑
Decreasing economic value of land	☑	☑	☑
Carving out new grids of streets and widening existing routes	☑	☑	☑
Transferring Local Urban functions from the centers of historic quarter to newly constructed streets	☑	☑	☑
Making automobile accesses in every public palace regardless of the structure of historic fabric	☑	☑	☑
Demolishing the historic fabric for making parking space	☑	☑	☑
Making new amenities and public services accessible for quarters residents	☑	☑	☑
Eroding of the historic urban fabric	☑	☑	☑

4. Research methodology

This paper presents the Ali-Gholi-Agha quarter as a case study to investigate its spatial structure and to examine the idea of creating open spatial buffers in historic fabric. Ali-Gholi-Agha is a historic quarter located on the northwest side of downtown Isfahan. The quarter officially was founded in 1715 by Ali-Gholi-Agha, one of the tycoons of the Safavid dynasty (Tabassi 2003). He ordered the construction of a complex to serve as the quarter's center, that included a bazaar, hammam,[7] caravanserai,[8] madi,[9] and the Ali-Gholi-Agha mosque (Shafaghi 2002). The inhabitants of the quarter are categorized as "locals", and religious traditions have an important role in their lifestyle. They have a strong sense of belonging to the quarter (Hosseini Yazdi and Maghreby 2011), although they are not satisfied with the spatial quality of the quarter (see Table 2 and Chart 1).

The formation of the Ali-Gholi-Agha quarter was based on central Iranian urban design principles and reflected its inhabitants' traditional lifestyle. The quarter maintained and improved its spatial structure properly up to the beginning of the modernization era, after which both development-driven and conservation-driven modifications substantially diminished the area's spatial qualities. Despite the associated challenges imposed on the quarter, its general spatial structure has remained essentially intact (Khadem Moakhar et al. 2015).

However, despite having its underlying spatial structure preserved, the Ali-Gholi-Agha quarter has suffered from dramatic changes. For the researchers to better understand the spatial structure of the Ali-Gholi-Agha quarter, it was necessary to interview the inhabitants to understand their satisfaction with the existing situation of the fabric. Interview subjects were selected randomly from the inhabitants of the quarter. The questions aimed to understand the particular spatial features favored or disliked by inhabitants, as well as their general level of satisfaction with the quarter (see Tables 2 and 3). The interview

Table 2. Ali-Gholi-Agha quarter inhabitants" (except sahe-ja"s inhabitants) general satisfaction of the quarter"s spatial quality (Source: by authors.).

Level of satisfaction	Frequency	Percent
Excellent	1	2
Very Good	4	8
Good	19	39
Fair	29	41
Fair	5	10

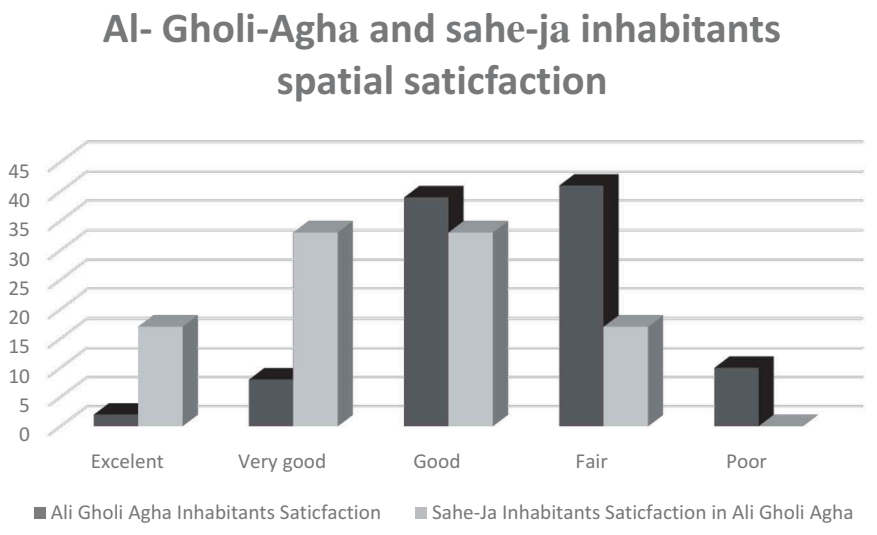

Chart 1. Comparing inhabitants" general satisfaction of the quarter"s spatial quality in Ali-Gholi-Agha quarter (except sahe-ja"s inhabitants) and sahe-ja. Source: by authors.

Table 3. Sahe-ja inhabitants" general satisfaction of the quarter"s spatial quality. (Source: by authors.).

Level of satisfaction	Frequency	Percent
Excellent	1	17
Very Good	2	33
Good	2	33
Fair	1	17
Fair	0	0

protocol followed the "informal conversational interview" model. During the interview, the researchers made sure that all interview questions were asked and answered by the subjects; the questions were designed to evaluate spatial aspects of the quarter based on the experience of its inhabitants. However, the interviews were conducted in open-ended conversations to allow the subjects to share their opinions in case the questions did not address them.

At the preliminary stage, 41 interviews were conducted. After analyzing the results of the preliminary interviews, the researchers decided to continue interviewing new subjects until the results of the interviews stabilized. Therefore, 14 more interviews were added to reach statistical saturation. After adding 14 more interviews, the researchers anticipated that the data was saturated. The analysis of the data showed that the anticipation was correct. Therefore, the process of interviewing was stopped. In total, 55 interviews were conducted from 49 inhabitants of the quarter and 6 inhabitants of sahe- ja and the quarter. The interviewees included 28 female and 27 male subjects, all older than 24 years.

Table 2 summarize the satisfaction level of the interviewees. Tables 2 and 3, and Chart 1 compares the contents of Table 1, revealing a hidden and important point that proved instrumental in offering potential solutions for improving the spatial structure quality. In a specific part of the quarter, not only did significantly fewer problems exist, but the

inhabitants' needs were met favorably as well. Consequently, most of the inhabitants expressed satisfaction with living in the part of the quarter called sahe-ja.[10] The researchers suspect that the spatial structure of sahe-ja offers a unique quality, which is main reason for favoring it. If well understood, the structure of sahe-ja may offer solutions for the problems experienced by the other historic fabric.

Literature review of urban planning and urban design shows that sahe-ja has not been studied in depth in the current body of literature. The only existing reference defines it as void space to which the entrance of neighboring houses opens (Omomi 1997). To further scrutinize the secret of sahe-ja's success, direct observations and six new in-depth interviews were conducted with the inhabitants of sahe-ja. For the researchers to better collect data based on the direct observation method, most of the observations first were converted into notes. Then, all of the notes were rewritten more briefly and were reviewed many times. Over the period of six months, researchers visited sahe-ja 24 times. The in-depth interviews required expert opinions to describe the structure of sahe-ja. The "snowball sampling" method was chosen as an appropriate strategy. This method attempts to recognize the general knowledge of a study group by focusing on the samples that influence the others (Patton 2002). Finally, the collected data derived from the direct observations and six in-depth interviews were categorized into themes and subthemes separately (Table 5). Finally, the main factors that make the inhabitants of sahe-ja satisfy are extracted (Table 4).

5. Analysis of results: sahe-ja

According to the analysis of direct observations and in-depth interviews, sahe-ja is a semipublic open space adjacent to some houses and located in the dense historic fabric of Isfahan usually including greenery (Figure 2.) It should be taken into account that sahe-ja is utterly different from local squares in the historic fabric of Isfahan. Local squares of historic quarters belong to all inhabitants, but according to the in-depth interviews, only those inhabitants whose house entrances open into sahe-ja have a sense of belonging to it. Further, local squares usually include functions such as shops or mosques also located on main routes of the quarter, but sahe-ja does not have such functions, and is situated mostly in subsidiary access or at dead-ends.

Table 4. The satisfaction factors based on the Sahe-ja residents' interviews.

No.	The satisfaction factor
1	I know my neighbors
2	The kids can play safely
3	We (the neighbors) can come together
4	I can park my car easily
5	Because of greenery I feel better
6	I have plenty of memories here
7	Generally, It is a safe place
8	The place is homogenous (socially and spatially)
9	I have a good feeling when I am in it
10	Elder people can come together
11	There is less building demolishing in comparison with other places in the quarter
12	People are nice here
13	There is less house stealing in comparison with other places in the quarter
14	The landscape is beautiful

Table 5. Some of the spatial effects of sahe-ja in historic fabric based on researchers" direct observations and the in-depth interviews of the inhabitants.

No.	Themes	Subthemes
1	Conserving the spatial structure of historic quarters	Modernization does not change: The spatial characteristics of sahe-ja/The general structure of sahe-ja/The form and width of routs/The green space/ The general atmosphere/The inhabitants" strong sense of belonging.
2	Conserving historic facades of historic fabric	None of the historic facades are destroyed for widening the routs/The act of entering into the houses is based on the historic hierarchy/Some functional features of historic facades work (such as sitting platform and entrance arcade).
3	Providing a space for vehicles parking	There are lack of parking spaces in the quarter except in sahe-ja/Some of the houses adjacent to sahe-ja have a good vehicular access for their garages/the houses adjacent to sahe-ja that do not have vehicular access, have some parking space in sahe-ja.
4	A Different kind of spatial hierarchies in historic fabric	Four kinds of spatial hierarchies are distinguished in the historic fabric, and sahe-ja is considered the fifth kind.
5	Microclimatic effects	More shadows and lower temperature/Less noise pollution/Less air pollution.
6	Creating serial vision	The vision of the quarter is expanded by sahe-ja/sahe-ja has the quality of being heterogeneous/There is more visual depth in sahe-ja.
7	Creating an Intimate environment	Different ages and sex group chat with others in sahe-ja, especially women, elder, and young inhabitants/sahe-ja provides a space for some special ceremonies, such as the mourning of Muharram and the Mid-Sha"ban celebration.
8	Creating defensible space	Inhabitants have a good surveillance to sahe-ja/At nights the light of the houses make brighter environment/All of the inhabitants know their neighbors.
9	More relationships with greenery for inhabitants	There is a green space in sahe-ja/Inhabitants take care of the green space in sahe-ja/Sometimes there are some pets (mostly chicken and roaster) in the green space.
10	Creating safe open space for children	Sahe-ja is a good place for children to play/Parents can easily see their children while they play/There is more safety rather than other spaces of the quarter for children when they play.

5.1. Sahe-ja and spatial principles of historic urban design in central Iran

In the following section some of the significant spatial characteristics of sahe-ja will be explained. In this part, the collected data of direct observation and interviews are analyzed with directed content analysis according to the essential spatial principles of historic urban design in central Iran. These principles present fundamentals for organizing spaces in the fabric of the cities and reveal the properties of sahe-ja.

- Spatial Homogeneity and Integrity

The homogeneity and integrity of cities is the most prominent characteristic of historic urban space in central Iran (Daneshpour and Shiri 2015; Sharifi and Murayama 2013). In this respect, the city is considered a set of homogenous and integrated compact fabric. Houses and other urban components make a homogenous and integrated space and provide organic unity between urban and architectural elements. Sahe-ja, an open spatial buffer between narrow accesses and houses, bolsters the spatial homogeneity and integrity.

- Interior and Exterior Spaces

All urban components of historic spaces in central Iran, including open spaces, are introverted. In other words, both interior and exterior spaces are introverted (Shakiba, Fathi, and Bahrieh 2013). For instance, local squares in the fabric resemble courtyards in traditional houses (Alizadeh and Irandoost 2017; Tavallaei 2008). Sahe-ja is an introverted,

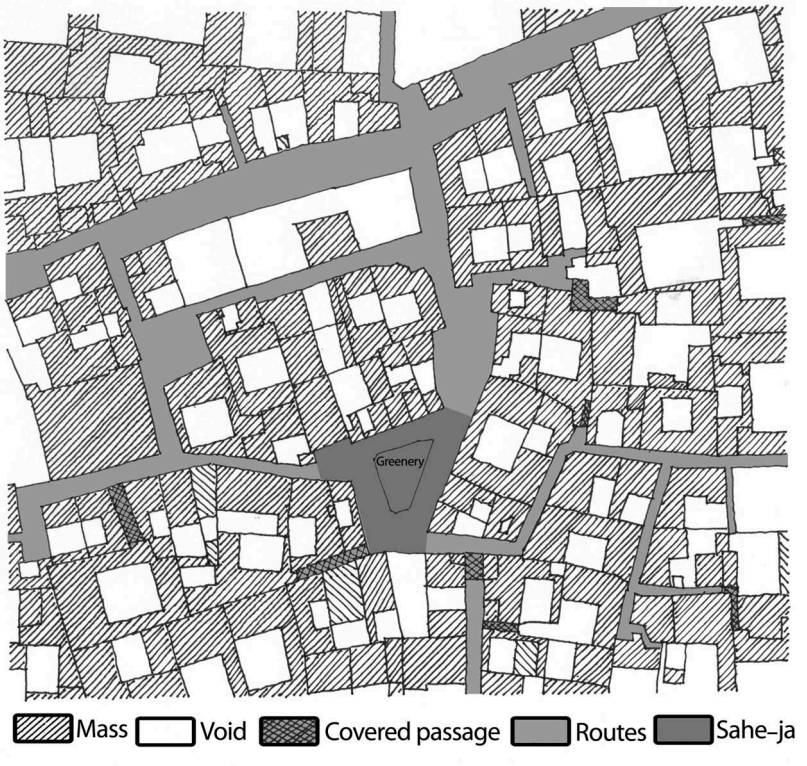

Figure 2. Plan of sahe-ja in Ali-Ghili-Agha quarter. Source: by authors.

semipublic open space at a subquarter scale and functions as a semipublic courtyard for adjacent houses (Figure 3).

- Surrounded Space

"Surrounded space" is also called the "space closing" principle (Fazeli, Shakarami, and Moazezi Mehre Tehran 2014, 24). Historic urban spaces in central Iran are mostly surrounded to create balanced and symmetrical space (Iranmanesh and Amini 2012). The surrounding components, specifically in quarters, are houses. Sahe-ja, as a quarter's open space, provides pleasant surroundings within the historic fabric via house façades (Figure 4).

- Spatial Scale

"Scale is a combination of the ratio of building height to street width, relative distance, permeability and the sense of grandeur or intimacy of space" (Montgomery 1998, 106). Generally speaking, central Iranian urban spaces have human-basis and balanced scale (Tavallaei 2008). Sahe-Ja, as an "open space buffer", strengthens this characteristic.

- Heterogeneous Space

Heterogeneous spaces are successive spaces that differ in length, width, and height (Fazeli, Shakarami, and Moazezi Mehre Tehran 2014). Routes within the historic fabric of

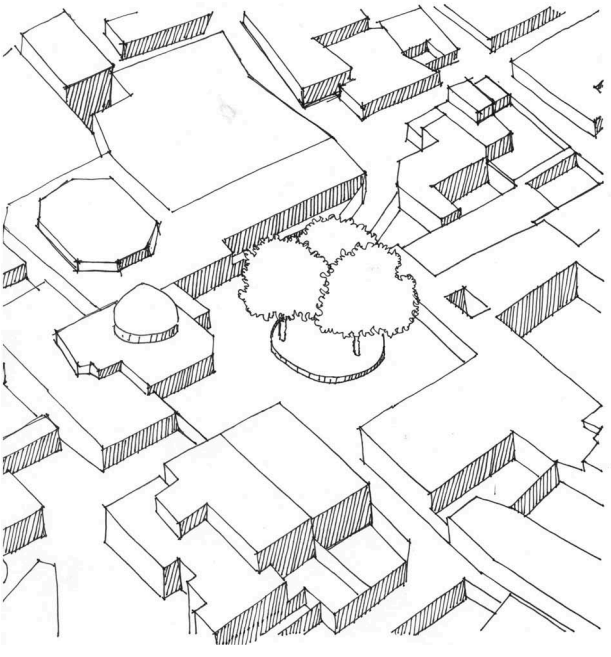

Figure 3. Introverted sahe-ja in historic urban fabrics, Shahshahan quarter, Isfahan.
Source: by authors.

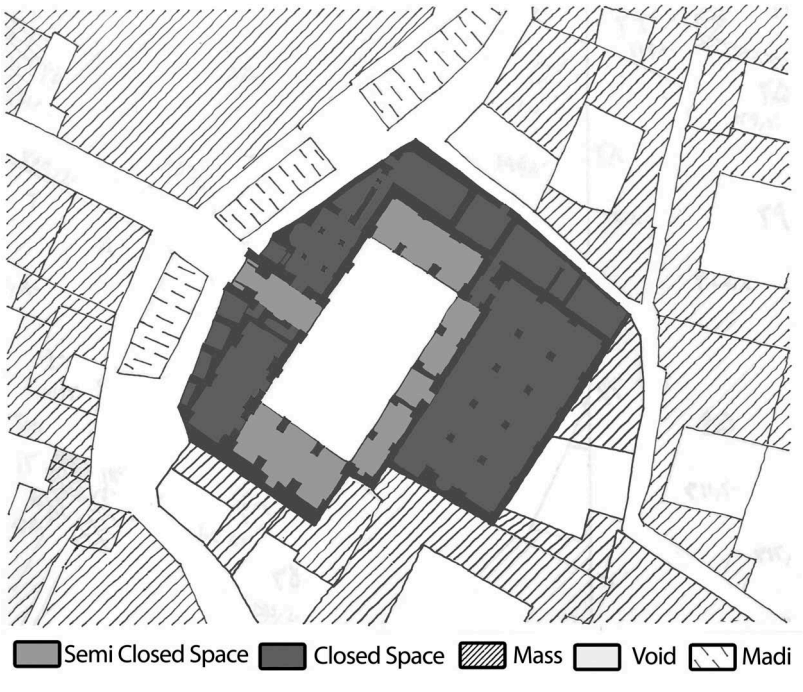

Figure 4. A surrounded courtyard of Ali-Gholi-Agha mosque as a public urban space. Source: by authors.

central Iran are narrow, but their dimensions vary from part to part. Because sahe-ja is one component that provides wider space in the quarter's routes, it creates a pleasurable heterogeneous space in the historic residential fabric (Figure 5).

- Territory

At least four types of space have been identified in the historic fabric of central Iran: private, semiprivate, semipublic, and public. In this fabric, two different functions, house and local accesses, are usually connected with a spatial buffer such as a darband,[11] hashti,[12] or sahe-ja (Omomi 1997). These types of spatial buffers, especially sahe-ja, work as semipublic spaces and provide a territory permitting comfortable movement between a state of separateness and a state of togetherness.

- Space Consciousness

In the historic fabric of central Iran, a hierarchy of various spaces exists (Azizi Bondarabady and Khavarian-Garmsir 2018; Tavallaei 2008). This hierarchical order makes

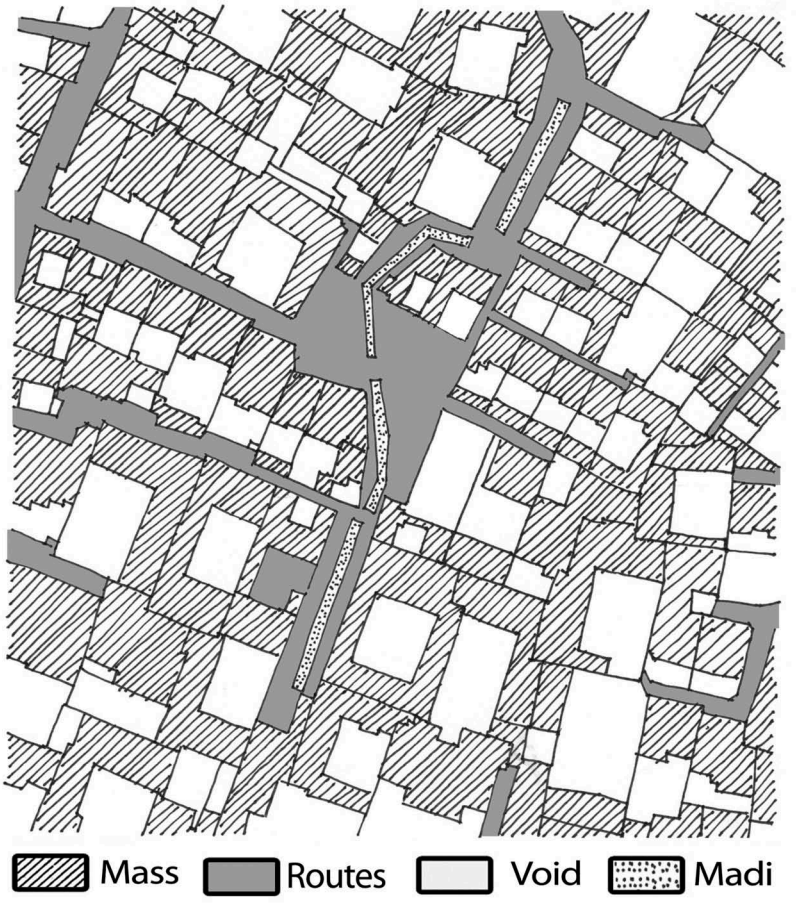

Figure 5. A heterogeneous space of sahe-ja in Ali-Gholi-Agha quarter. (This sahe-ja were completely demolished because on modernization interventions.) Source: by authors.

people conscious of space. In other words, the hierarchical order defines the transition from one realm to other realms. So the inhabitants' need for being conscious of space is met (Sharifi and Murayama 2013). Sahe-ja, as a part of the urban hierarchy, plays an instrumental role in its inhabitants' consciousness. In fact, most inhabitants of sahe-ja are conscious of being in the specific semipublic space of sahe-ja.

5.2. Some of the spatial effects of sahe-ja within the historic fabric

According to the analysis of the researchers' direct observations of the case study and the in-depth interviews of the inhabitants of sahe-ja, the most significant spatial effects of sahe-ja are explained in the following paragraphs: (See Table 5 and Figure 6)

- Conserving the Spatial Structure of the Historic Quarter

Because the inhabitants of sahe-ja are more satisfied with the quarter, not only is there much less motivation to demolish or damage the quarter, but also they have a strong intention to maintain and promote the quality of the space. In consequence, the structure of the Ali-Gholi-Agha quarter in sahe-ja is conserved better than in other parts of the quarter.

- Conserving Historic Façades of the Historic Fabric

As mentioned before, in the process of widening routes for modernizing the historic fabric, a significant number of valuable façades and entrances of traditional buildings have been demolished, in most cases damaging the hierarchy from public to private spaces (Einifar and Ghaffari 2014). Routes have not been widened in sahe-ja, providing an

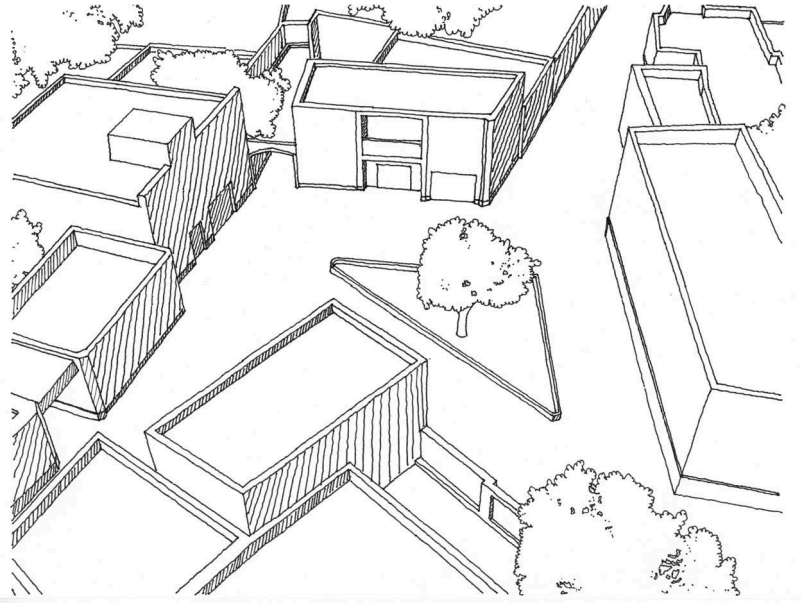

Figure 6. Conceptual sketch of sahe-ja in Ali-Gholi-Agha quarter. Source: by authors.

opportunity to conserve valuable entrances and façades of historic buildings, protecting the integrity of the historic fabric.

- Providing Space for Vehicle Parking

Based on the inhabitants' interviews, vehicles play a crucial role in their lifestyle, and parking spaces are vital for many of them, especially for the inhabitants of houses without standard vehicular access – and there are not enough parking spaces in the Ali-Gholi-Agha quarter. Sahe-ja provides parking spaces and solves this problem for its inhabitants to a certain extent.

- A Different Type of Spatial Hierarchy in the Historic Fabric

Based on previous research on historic fabric, four types of spatial hierarchies have been distinguished based on their proximity to certain access points: main and subsidiary accesses, allies, dead-ends, and darbands. These patterns organize adjacent houses of the fabric. Investigating the Ali-Gholi-Agha spatial structure drove us to conclude that sahe-ja is a fifth kind of spatial hierarchy.

- Microclimatic Effects

  Isfahan is located in a hot, arid environment (Kasmaei 2007), so its inhabitants face several climatic issues:
  - Hot summer and cold winter, solar radiation and excessive heat, and glaring sun, especially in summer
  - Large diurnal temperature range (high during the day and low during the night)
  - Low humidity, and dry weather
  - Dust and sand storms (Tavassoli 2016, 101–103)

The primary factor that helps to reduce these problems is blocking the direct sunlight. All of the urban spatial components combine together to decrease the effects of the sun. The surrounded space of sahe-ja provides favorable shadows. In addition, the greenery and trees in sahe-ja play a useful role in providing positive microclimatic effects. Plant life also promotes environmental quality, beauty, noise filtration, air purification, production of oxygen, and counteraction of other environmental threats (Yfantidou and Anthopoulos 2017).

- Creating Serial Vision

The most significant research on urban sequential view is Gordon Cullen's townscape studies (Carmona et al. 2003). Cullen coined the term "serial vision" as the sequence of views that are seen over the experience in moving through urban spaces (Cullen 1961). Routes in Ali-Gholi-Agha, like most routes within the historic urban fabric of central Iran, are winding and compact (Karimi 2000). They have a lot of curves that create an enriched serial vision. Sahe-ja, mostly because of its heterogeneity, provides an excellent opportunity to create and strengthen these kinds of spatial qualities.

- Creating an Intimate Environment

As Giedion (1962) observes, "One of the basic issues in urban design is how to make intimacy". Furthermore, researchers show that social relationships in open spaces in

central Iranian urban spaces that are formed by facades of buildings are more meaningful and intimate (Habibi 2003). According to inhabitant interviews, sahe-ja is a space where the inhabitants can be physically close to one another, relaxing and enjoying. Also, some special ceremonies, such as the mourning of Muharram and the Mid-Sha'ban celebration is very important in Islamic Iranian culture (Kazemi et al. 2018) and sahe-ja provides a great space for these special ceremonies. In consequence, sahe-ja promotes environmental intimacy.

- Creating Defensible Space

Newman (1972, 3) observes that "Defensible space is a surrogate term for a range of mechanisms – real and symbolic barriers, strongly defin[ing] an area of influence and improved opportunities for surveillance – that combine to bring an environment under the control of its residents". "A defensible space is thus one whose users perceive it as affording easy recognition and control of the activities that take place within it" (Lang 1987, 153). Defensible space can promote quality of life in the historic fabric of central Iran because environmental safety is a crucial issue in these areas (Azizi Bondarabady and Khavarian-Garmsir 2018; Kiaei and Baba Abbasi 2015). Sahe-ja is a semipublic courtyard for surrounding houses, so inhabitants pay more attention to the area itself, increasing security.

- More Relationship with Greenery for Inhabitants

Empirical investigations have shown a direct correlation between being in the vicinity of greenery in urban spaces and people's quality of life and well-being (Weismayer et al. 2017; Ulrich et al. 1991). When these types of space are close in proximity, inhabitants use them, but if the greenery is more than three minutes away, the distance overwhelms the need (Alexander, Ishikawa, and Silverstein 1977). This characteristic can be provided easily by numerous small parks – or greenery – scattered widely (Currie 2017) such that every inhabitant in the quarter is within a few minutes' walk of the nearest green space. Sahe-ja, as an original pattern in the historic fabric of the city, which precisely provides this quality.

- Creating Safe Open Space for Children

Playing with other children is a great necessity for a child (Yfantidou and Anthopoulos 2017; Soozanchi and Tariveh 2011), but parents afraid of traffic or their neighbors keep their children indoors or in their yard if they have one. In this case, a child only has access to other children if each household opens into some safe, connected common space. According to the interviews and observations, sahe-ja provides this space for surrounding houses.

4. Conclusion

The main idea of this paper is to investigate how solutions for the spatial problems of today can be found in the past. To undertake the investigations, the Ali-Gholi-Agha historic quarter in Isfahan was chosen and data is collected via field observation and interviewing its inhabitants. The analysis of the data indicates that most of this quarter's inhabitants are dissatisfied with the spatial quality of the quarter – except those who live in a specific type of open space known as sahe-ja. While proving to be remarkably promising, sahe-ja has remained understudied and

ignored in practice. In fact, the importance of sahe-ja is the main finding of this paper. The comparison between sahe-ja and the spatial principles of urban design in the historic fabric of central Iran shows the most significant spatial characteristics of sahe-ja to be integration, heterogeneity, and hierarchical territories. The most notable beneficial practices from sahe-ja are conserving historic façades, providing space for vehicle parking, and creating an intimate environment. The results from this study make us confidently believe that the past should not remain in the past and that we can learn solutions for the spatial problems of historic fabric from its structure. Indeed, future studies can employ a similar methodology to learn from the past and discover how historic spatial structures can adapt themselves to upcoming new changes.

Notes

1. We acknowledge other common approaches that are explained interventions in historic fabric (such as "heritage conservation", "urban regeneration", and "sustainable urban regeneration"). But these approaches do not describe exactly what is happened in historic Iranian urban fabric. Therefore, we use development-driven, conservation-driven, and context-driven approaches, which specifically dedicated to Iranian urban historic fabric.
2. "Naṣer al-Din Shah, also spelled Naṣir al-Dan Shah, (born 17 July 1831, near Tabrīz, Iran – died 1 May 1896, Tehrān), Qājār shah of Iran (1848–96) who began his reign as a reformer but became increasingly conservative, failing to understand the accelerating need for change or for a response to the pressures brought by contact with the Western nations" (Encyclopedia of Britannica, https://www.britannica.com/biography/Naser-al-Din-Shah access 10/16/2019).
3. "Reza Shah Pahlavi, also spelled Riza Shah Pahlevi, original name Reza Khan, (born 15 March 1878, Alasht, Mazanderan province, Iran – died 26 July 1944, Johannesburg, South Africa), Iranian army officer who rose through army ranks to become shah of Iran (1925–41) and began the regeneration of his country" (Encyclopedia of Britannica, https://www.britannica.com/biography/Naser-al-Din-Shah access 10/16/2019).
4. "Mohammad Reza Shah Pahlavi, (born 26 October 1919, Tehrān, Iran – died 27 July 1980, Cairo, Egypt), shah of Iran from 194 to 1979, who maintained a pro-Western foreign policy and fostered economic development in Iran" (Encyclopedia of Britannica, https://www.britannica.com/biography/Naser-al-Din-Shah access 10/16/2019).
5. In 2004, ICHO was merged with the Iran Touring and Tourism Organization and named ICHTO.
6. When the spatial elements of the historic fabric are studied merely in terms of the interaction between mass and void, other important elements contributing to the formation and evolution of fabric are dismissed, but in practice, this model of analysis has proven successful in many cases (Habibi 2003; Tavassoli 1997).
7. Hammam is a public bathhouse in central parts of Iran with two separate zones for men and women.
8. Caravanserai is a place adjacent to a traditional bazaar to load or unload cargo. Also travelers can stay there temporarily.
9. Madi is a traditional water channel that is separated from the Zayandeh-Rod River in Isfahan.
10. Perhaps sahe-ja (ساحه جا) in Farsi language is formed by the combination of two different words: sahat [(ساحة) or (ساحت)] and ja (جا). The first word is a noun (Dehkhoda dictionary) and means a yard, home yard, and yard between houses. The second word is also a noun and means place.
11. Darband is a roofed transition space outside houses that provides semiprivate entering territory for several houses.
12. Hashti is a roofed transition space inside an Iranian traditional house that provides private entering for the house.

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No potential conflict of interest was reported by the author(s).

Notes on contributors

Dr. Shahead Maghreby is a Ph.D. graduate in Urban Planning, at Art University of Isfahan. He was a visiting scholar at Texas A&M University for three years. His research interest includes the phenomenological debate in urban planning and architecture, placemaking, continuity and change in historic fabrics and urban regeneration projects.

Samira Hosseini Yazdi has a master of art degree in Architecture from Art University of Isfahan. Her research interest is environmental psychology, design process, and architectural interdisciplinary research.

Dr. Mahmoud Ghalehnoee studied architecture at Iran University of Science and Technology. He obtained his Ph.D. in Urban Design in France (Paris Université Paris-Est). Academic staff and assistant professor at Art University of Isfahan (Urban Studies Department) since 2008. He is an associate professor since 2014.

Dr. Ghasem Motalebi is an associate professor in University of Tehran. He obtained his his Ph.D. in University of New South Wales in Australia. He has expertise in environmental psychology, sustainable urban development and theories in built environment.

Dr. Stephen Caffey"s current research includes eye movement studies to determine culture-based correlates of aesthetic perception; building information modeling software as a means of reconstructing defunct architectural forms; the rhetoric of the architectural capriccio in 18th-century history painting; the cognitive science of spatial affect and its applications to sustainability features in residential and commercial architectural design. Following a two-year Samuel H. Kress Foundation dissertation research fellowship at the Courtauld Institute, London, and a summer residency at the Terra Foundation for American Art in Giverny, earned PhD in art history from the University of Texas at Austin. Beyond current research, interests include the forms of and variables contributing to visual and spatial literacies and the roles of image, object and structure in the formation of modern imperial identities.

ORCID

Shahead Maghreby http://orcid.org/0000-0002-0424-0074

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