

Original Research Article

Enhancing Social Sustainability by Revitalizing Post-industrial Landscapes (Case Study: Brick Kilns in District 19 of Tehran)

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Abstract | Relocating industries from the urban fabric of the cities emerging from globalization to their outskirts, like what happened in the 19th district of Tehran, has resulted in post-industrial landscapes and various and numerous social problems for these landscapes' surrounding areas. Despite this issue, post-industrial landscapes are an opportunity to revive the dimensions of urban life; however, urban approaches on which actions have been taken in the 19th district, including the 2007 Master Plan of Tehran and the 2005 Detailed Plan of the 19th district, have not been successful in solving problems and increasing social sustainability. This article examines the reasons associated with the failure of the applied approaches in increasing social sustainability and attempts to understand how to revitalize post-industrial landscapes to increase social sustainability. For this reason, after studying the concept of landscape and post-industrial landscape, the standard views towards them, and social sustainability, different layers of the landscape of the case study were analyzed and integrated. Finally, the reasons for the failure of the currently used approaches were outlined, and general suggestions for solving social problems were provided. The result of the research is that the use of non-inclusive definitions of these landscapes has resulted in physical actions, ignoring the identity of these post-industrial landscapes, the main audiences, and their needs. However, the social problems in this area are not only related to physical issues but are also influenced by a set of characteristics. An accurate definition of the landscape by emphasizing the objective-subjective and holistic nature of the landscape by examining the different dimensions of post-industrial landscapes can lead to the origin of existing problems in the area. The problems of the residents around the kilns, who are their main audience in these landscapes, require comprehensive solutions according to the origin of the problems.

Keywords | *Post-industrial landscape, Landscape grammar, Brick kilns, Social sustainability.*

Introduction | The horizontal and fast growth of cities in recent years has made large industries, resulting from world industrialization, change their sites from suburban areas to inside the cities. However, the criticisms regarding this subject led to the abandonment of these sites, and the areas that were supposed to create development and commutation, became empty of life (Ekman, 2004), causing many problems, such as low social sustainability for their surrounding areas. Social sustainability includes indicators such as accessibility, health, welfare, social solidarity, just distribution of employment

and income, local participation, cultural heritage, education, social stability, communication, movement, social justice, and a sense of place and belonging (Daneshmehr et al., 2018, 1). The physical development of District 19 resulting from Tehran's growth led to the transfer of brick kilns from the area and the formation of post-industrial landscapes. Post-industrial landscapes are objective-subjective and holism phenomena indicating an area with a valuable and legible economic use at first, which is now abandoned. Such an area causes much harm making the neighborhood identity-less, insecure, and socially unsustainable. In recent years, despite numerous urban plannings provided, the proposed solutions

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for these kilns could not convert these landscapes into active urban living environments and enhance social sustainability. On the other hand, the social aspect is one of the most important aspects of landscape, and based on numerous problems leading to social unsustainability in the area, this article aims to answer the following questions by finding and analyzing the dimensions of this area's landscape integrating them to achieve a unified whole based on social sustainability.

Main Questions

1. Why could the plans and programs used in the studied area not enhance social sustainability?
2. How can revitalizing these post-industrial landscapes cause an increase in social sustainability?

Method

This is an applied research that has used the descriptive-analytical method. First, as shown in Fig. 1, the documentary data collecting method was used to study the concept of landscape, post-industrial landscape, its issues, popular views on post-industrial landscapes, and social sustainability and ways to achieve it. After, a conceptual model derived from theoretical foundations is proposed and evaluated for the case study combined with the documentary method to study the previous projects and the field method to review the area and identify realities purposefully. Finally, data analysis was done after comparing the information to present suitable solutions for planning and designing brick kilns that represent a case of post-industrial landscapes.

Theoretical Foundations

• Landscape and post-industrial landscape: a human and social issue

The landscape is an objective-subjective and holistic phenomenon (Lindström et al., 2013, 104), which has emerged based on the human-environment interaction in society and natural and historical framework throughout history (Mansouri, 2010, 31). Landscape pertains to humans and communities, and people shape their identities based on it (Baharloo, 2010). The landscape is embedded in our relationship with our surroundings (Berque, 2013, 30), leading to audience-centeredness, different forms of environment interaction and perception, creating a dynamic mindset of audiences, relateness,

and dynamics of the landscape (Mansouri et al., 2021). Therefore, the city landscape addresses the citizens' dynamic perception of the city in terms of its physical symbols and aspects by surveying the history and social incidents (Mansouri, 2010, 32). The landscape creates a spatial and visual organization of elements in two- and three-dimensions allowing objects to be perceived by the human and community (Partar, 2013, 14). Due to its direct relationship with society, the landscape can create a powerful background to learn about social issues and shape the mindset of people in society to achieve social sustainability (Selman, 2008, 24).

The advent of industrial activities in cities, suburban and rural areas has highly affected urban spaces and concepts and proposed a specific architecture (ICOMOS, 2011, 2-7). However, in the mid-20th century, numerous criticisms against the physics and geography of the industries that moved into the urban fabric led to abandoned areas that were devoid of life (Ekman, 2004). This case affected the physical environment and topography, creating many economic, environmental, and social dilemmas (Pulatkan, 2021; Loures et al., 2020 & Lovell-Anderson, 2019, 164). Furthermore, this incident has led to a negative perception of these landscapes among people interrupting positive interactions between society and landscapes. Therefore, the post-industrial landscape introduces an urban area that was useful and legible at first owing to its economic use but now is abandoned (Baharloo, 2010, 66), and the loss of social life is one of the most serious problems in its surroundings.

Multidimensional problems and issues about the transformation of these lands require a kind of reclamation through multidisciplinary measures considering the society's needs by proposing long-term multifunctional solutions based on the cultural, social, and economic objectives (Loures, 2015, 75). Designers must be aware of the ideas, needs, and concerns of various people to achieve a successful result (Loures & Burley, 2012). Paying attention to both the objective and subjective nature of the landscape in operational and management contexts is essential, leading to the uniqueness and complete ability of the landscape (Greber & Hess, 2017, 719-720). Landscape grammar includes two back-and-forth phases: Analytical Landscape Grammar (ALG) and Generative Landscape Grammar (GLG). Analytical grammar

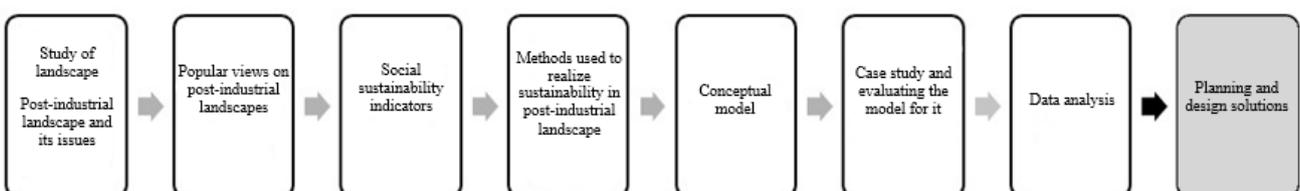


Fig. 1. Research steps. Source: Authors.

means selecting the dominant elements and layers, while generative grammar means integrating and synthesizing the analytical phase (Partar, 2013, 14). The issue of space in the public sphere of the city is focused on the spatial-social structure of urban life, it has multiple dimensions and is affected by different social, economic, and political forces (Abarghouei Fard et al., 2023a, 85). therefore, different characteristics of the surrounding environment of every urban landscape including physical-architectural, historical, demographic, economic, and environmental properties shape various landscape dimensions. In the post-industrial context, peripheral fabric and worn elements form the core subject in the analytical grammar phase (Partar, 2013, 14). After reviewing theoretical foundations, this study investigates the characteristics of the surrounding environment of the case study as landscape dimensions and elements influencing the social life of the studied area. Finally, it presents suggestions for social problems by comparing theoretical foundations and data analysis in the next step.

• Some common views on post-industrial landscapes

Various approaches have been proposed at the design and management levels based on the different definitions of landscape, emphasizing the objective and subjective components. Some theorists consider these landscapes only to be associated with the objective dimension. These definitions, combined with people's perceptions and post-industrial landscape pollution, led to an approach towards the degradation of what was left from the industrial era, returning to the pre-industrial period or leaving it behind. In contrast, increasing public awareness of the necessity for industrial heritage preservation led to an approach toward reclaiming physical memories (Loures, 2008). Accordingly, some authors believe that landscape design must be in visual and ecological integration with its surroundings (Lehenbauer, 2012) and that integrating aesthetical concepts with landscape reclamation helps create more successful designs (Loures et al., 2008, 73). Sometimes, designers and planners focus on aesthetical-physical issues putting other needs of society on second priority (Forman, 2002; Nijnika & Mather, 2008), converting post-industrial landscapes into an only objective phenomenon. These views may influence the productive use of public spaces, but they are not the definitive foundation of social actions and interactions (Abarghouei Fard et al., 2023b, 46).

The correct definition of landscape expresses it as an objective-subjective phenomenon resulting from human-environment interactions (Mansouri et al., 2021; Berque, 1995; Berque, 2013, 62-67) with a multifaceted nature (Loures, 2015, 75). Landscape is defined as any forms of human activities in the environment so that

interactions between humans and the environment are not separable from these activities (Berque, 2013, 30, Gerber & Hess, 2017; Olwig, 2010, 160). Accurate definitions examine different dimensions of post-industrial landscapes and address society's needs. Furthermore, based on the decreased quality of social life around these landscapes and their close connections with the surrounding society, it seems helpful to adopt social sustainability policies in such landscapes.

• Social sustainability and its indicators

Sustainability is a multidisciplinary approach to developing the quality of human life that includes economic, environmental, and social aspects (Lau & Chow, 2019). First, social sustainability aims to provide just access to social resources, longer human-space relationships, and space support (Kefayati & Mortarzadeh, 2015, 41; Raeisi et al., 2010, 103).

The application of indicators that represent a sample of the main characteristics of a whole (Miller, 2007, 5) is a suitable technique to measure social sustainability. However, due to a lack of consensus on the definition of social sustainability, this study examined the opinions of different authors. As a result, the results have been defined and classified into six main indicators and relevant sub-indicators, as reported in Table 1.

Enhancing social sustainability indicators requires flexible techniques. The sustainability indicators should be interpreted based on their unique times and places, so a single solution cannot improve all of them at all times and places (Negari & Javan Majidi, 2015, 8). However, these indicators and sub-indicators are trackable within the design and organizational planning of the landscape. Table 2 reports some of the required measures to achieve these indicators in urban landscapes based on the experts' opinions.

• Summary of theoretical foundations

According to the abovementioned points, social sustainability indicators are associated with physical-architectural issues, and standard definitions of the post-industrial landscape have been based only on these issues. Moreover, these indicators are also linked to other dimensions, including historical, social, economic, and environmental dimensions. Therefore, changes in one dimension cannot enhance social sustainability indicators. The relationship between these indicators and different aspects has different importance rates, and these dimensions and indicators mutually affect each other. Social capital and justice require social contextualism to encourage society's participation and fair distribution of resources and jobs; they also require physical contextualization for space provision and suitable accessibility; and they also require improvement of people's economic situation and

Table 1. Selected and classified indicators. Sources: Authors.

Index	Sub-indexes	References	Definition of index
Social capital and participation	Social Networks and relationships	Behzadpour et al. (2019), Sajadi et al. (2019), Daneshmehr et al. (2018), Yousefzadeh & Sabaghpor (2017), Nouri & Maharvan (2016), Ghafourian et al. (2017), Mokhtari Malekabadi et al. (2014), Nastaran et al. (2013), Abdollahzadeh et al. (2013), Kefayati & Moetezazadeh (2015), Yung & Chan (2012), Lau & Chaw (2019), Murphy (2012), Bramley et al. (2006), Glasson & Wood (2009), Moore- Colyer & Scott (2009), Mckenzi (2004), Landorf (2011)	Social capital can resist social harms and promote cooperation and connection between individuals (Yousefzadeh & Sabaghpor, 2017, 5 & Abdollahzadeh et al., 2013, 38)
	Social coherence and solidarity		
	Social trust		
Social justice	Satisfying the fundamental needs and welfare	Behzadpour et al. (2018), Hadizadeh et al. (2013), Abdollahzadeh et al. (2013), Mokhtari Malekabadi et al. (2014), Yousefzadeh & Sabaghpor (2017), Lau & Chaw (2019), Yung & Chan (2012), Murphy (2012), Landorf (2011), Colantonio (2011), Spangenberg & Omann (2006), Gats and Lee (2005), Mckenzi (2004), Moore-Colyer & Scott (2005)	Social justice means how services are distributed equally in land use allocation, zoning, and resources among spatial units (Abdollahzadeh et al., 2013, 38)
	Just distribution of services and welfare		
	Spatial justice		
	Intergeneration equity between social classes		
Security	Physical-spatial coherence	Behzadpour et al. (2019), Sajadi et al. (2019), Tin et al. quoted from Daneshmehr et al. (2018), Yousefzadeh & Sabaghpor (2017), Ghafourian et al. (2017), Movahedi et al. (2014), Mokhtari Malek Abadi et al. (2014), Abdollahzadeh et al. (2013), Nouri & Mehrvan (2016), Glasson & Wood (2009), Spangenberg & Omann (2006), Bramley et al. (2006), Gats & Lee (2005), Kefayati & Moetezazadeh (2015)	Security includes two dimensions, objective (declining or lack of crime) and subjective (public perception or sense) dimensions (Hadizadeh, 2013, 162); security means individuals are not worried about fear, anxiety, threats, ideas, lives, money, jobs, and any kind of risk (Yousefzadeh & Sabaghpor, 2017, 4)
	Legibility		
	Penetrance		
Sense of belonging and identity	Considering the cultural, religious, and historical roots of the society	Behzadpour et al. (2019) Ghafourian et al. (2017), Movahedi et al. (2014), Hadizadeh et al. (2013) Abdollahzadeh et al. (2013) Yousefzadeh & Sabaghpor (2017), Mokhtari Malekabadi et al. (2014), Yung & Chan (2012), Colantonio (2011), Glasson and Wood (2009), Bramley et al. (2006), Mckenzi (2004), Lau & Chaw (2019), Murphy (2012)	A sense of belonging means a close relationship between people and place (Ghafourian et al., 2017, 35), and conformity to the environment with emotional and mental abilities and cultural structures is defined as identity (Noorian & Abdolahi Sabet, 2009).
	Knowing the difference between cultures and communities		
Flexibility	Adaptability	Nouri & Mahravan (2016), Yousefzadeh & Sabaghpor (2017), Abdollahzadeh et al. (2013), Mokhtari Malekabadi et al. (2014), Gats & Lee (2005), Colantonio (2011)	Flexibility is an approach to achieve new conditions based on different demands (Yousefzadeh & Sabaghpor, 2017) and appears in three types; diversity, adaptability, and transformability (Kefayati & Mortezaazadeh, 2015, 46)
	Diversity		
	Climatic comfort and social satisfaction		
Vitality	Sociability and presence of public space	Yousefzadeh & Sabaghpor (2017), Nouri & Mahravan (2016), Movahedi et al. (2014), Abdollahzadeh et al. (2013), Behzadpour et al. (2019), Hadizadeh et al. (2013)	The rate of citizens' presence in urban spaces estimates the vitality of the atmosphere (Yousefzadeh & Sabaghpor, 2017)
	Presence of Residency		

facilities. The security consists of mental and physical dimensions, requiring physical, social, economic, and environmental improvement. The sense of belonging and identity needs the satisfaction of people in terms of

the physical, social, and economic situation to increase their stay time in a place, in addition to a strong interconnection with historical factors in society. The physical characteristics of the area and appropriate

Table 2. Principles and policies to realize social sustainability in the landscape based on the experts' opinions. Source: Authors' findings adopted from mentioned references.

Index	Physical (objective) factors	Other factors (subjective factors)
Social capital	<ul style="list-style-type: none"> -People-oriented and pedestrian-centered furniture (Sajadi et al., 2019, 25) -Space density and continuity (Yousefzadeh & Sabaghpor, 2017, 3) -Physical contextualization and inviting space (Kefayati & Mortarzadeh, 2015, 46) -Accessibility (Behzadpour et al., 2019, 184) 	<ul style="list-style-type: none"> -Social contextualization (Yousefzadeh & Sabaghpor, 2016, 3) -Variety of activities (Kefayati & Mortarzadeh, 2015, 46) -Participatory methods (Negari & Javan Majidi, 2015)
Social justice	<ul style="list-style-type: none"> -Accurate land use and zoning (Abdollahzadeh et al., 2013, 38) -Eliminating barriers to the movement of disabled people and older adults (Nouri & Mahravan, 2016, 30) -Enhancing access to underlying services (Murphy, 2012,19) 	<ul style="list-style-type: none"> -Meeting basic needs (Nouri & Mahravan, 2016, 30 & Murphy, 2012,19) -Service, sports, cultural, and educational uses (Behzadpour et al., 2019, 184 & Murphy, 2012,19) -Increasing satisfaction with housing (Abdollahzadeh et al., 2013, 38) -Allocating resources and services to different units and low-income classes (Abdollahzadeh et al., 201, 38) -Enhancing job opportunities (Murphy, 2012,19)
Security	<ul style="list-style-type: none"> -Solving problems related to pedestrian and traffic interference (Sajadi et al., 2019, 25) -A Safe urban environment (Kefayati & Mortarzadeh, 2015, 46) -The permeable and flexible physic (Raeisi et al., 2010, 105) -Spatial hierarchies (Behzadpour et al., 2019, 193) 	<ul style="list-style-type: none"> -The increasing sense of having society support (Atayi Hamedani & Fathi Azar, 2011) -Enhancing controllability (Kefayati & Mortarzadeh, 2015, 46) -24-hour services, improving the quality of night lighting (Sajadi et al., 2019, 25; Behzadpour et al., 2019, 193) -Holistic Management and Maintenance (Behzadpour et al., 2019, 184)
Sense of belonging and identity	<ul style="list-style-type: none"> -Considering the size, scale, components, diversity, distance, fabric, and decorations (Ghafourian et al., 2017, 35; Raeisi, 2010, 105) -Creating spaces with architectural identity (Negari & Javan Majidi, 2015, 7 & Kefayati & Mortarzadeh, 2015, 46) -Protecting local elements and symbols (Behzadpour et al., 2019, 184) -Increasing space legibility (Abdollahzadeh et al., 2013, 38 & Kefayati & Mortarzadeh, 2015, 48) 	<ul style="list-style-type: none"> -Paying attention to historical and cultural roots in plans and activities (Negari & Javan Majidi, 2015) -Symbolism (Behzadpour et al., 2019, 193) -Deleting incompatible uses (Behzadpour et al., 2019, 193) -Access hierarchy based on activity type (Kefayati & Mortarzadeh, 2015, 48) -Prolonging the stay time (Ghafourian et al., 2017)
Flexibility	<ul style="list-style-type: none"> -Multifunctional, adaptable fabric (Yousefzadeh & Sabaghpor, 2017, 7) -Increasing access points (Yousefzadeh & Sabaghpor, 2016, 9) -Using flexible architecture, and left buildings and fabrics (Nouri & Mahravan, 2016, 31) 	<ul style="list-style-type: none"> -Considering the diverse demands of audiences (Yousefzadeh & Sabaghpor, 2016, 7) -Enhancing quantitative and qualitative use of space (Kefayati & Mortarzadeh, 2015, 46)
Vitality	<ul style="list-style-type: none"> -High quality of buildings and routes (Nouri & Mahravan, 2016, 31) -Green space network (Behzadpour et al., 2019, 193) -Proper public space (Abdollahzadeh et al., 2013) 	<ul style="list-style-type: none"> -Livable for different social groups (Abdollahzadeh et al., 2013) -Adjacency to attractive uses (Nouri & Mahravan, 2016, 31) -Creating economic activities and job opportunities (Murphy, 2012,19)

environmental conditions are the most critical factors that increase flexibility and variety of activities. Finally, the vitality of a place depends on different physical, social, economic, and environmental dimensions. Accordingly, Fig. 2 was used as an instrument to analyze the case study and increase social sustainability in post-industrial landscapes.

Studying Case Study

District 19 is one of the marginal areas located in the southwest of Tehran, which appeared after the construction of barracks, industrial workshops, brick kilns, and worker residence places in the 1960s

(Movahedi et al., 2014, 542–558; Movahed & Ahmadi, 2018, 65). The inactive lands in this area have led to many problems, including economic recession, environmental and visual pollution, disfunction in services and access, a decline in penetrance and vitality, and insecurity for social growth (Movahed & Ahmadi, 2018, 59). The landscape seen on the brick kiln site represents the history and background of this area, which influence the surrounding environment and society. After brick kilns were closed, this issue was considered in the 2007 Master Plan of Tehran and the 2005 Detailed Plan Report, and then some measures were taken. According to available data, ten

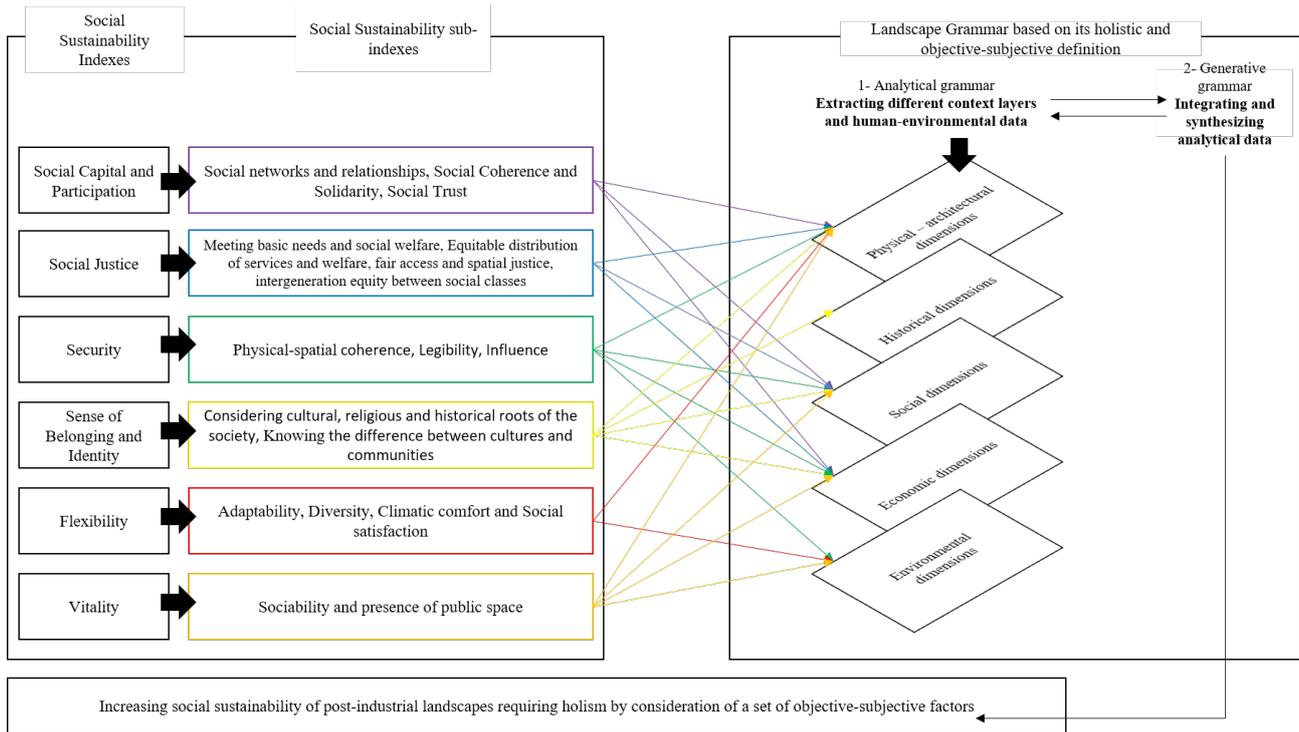


Fig. 2. Relationship between social sustainability indexes and different dimensions of landscape grammar. Source: Authors.

kilns out of 38 brick kilns were transformed and used as residential spaces, parks, sports complexes, and football pitches. However, this process could not only solve the problems but also intensify them. Therefore, reviewing other projects implemented in the area helps to find a way of dealing with the case. For this purpose, the mentioned projects are examined in addition to the description and analysis of the specifications of the studied area.

• **Investigating dimensions of the area’s landscape and measures of the 2007 master plan, and detailed plan report 2005**

-Physical-architectural

The fabric of the studied area, which resulted from the accelerated settlement formation time of the area, depends on the remaining elements, such as kilns and barren lands, and is multipartite, compressed, and unstable due to the land slope and lack of boundary and symbol (Naghsh-e Piravash Consulting Engineers, 2005). This physics with incoherent, illegible, and defenseless fabric has reduced security and a sense of belonging. It also has decreased social justice due to its unfair internal discipline. Moreover, this fabric has reduced social capital and flexibility by creating unusable spaces with an improper atmosphere for social activities.

The 2007 Master Plan recommended some solutions, such as organizing and preserving the area and Tehran’s area, improving communicational networks, securing

against accidents, improving the physical situation, and zoning the land use (Nahade motale’at va tahie tarh-haye tose’e-ye shahrie Tehran, 2007, 2–10). Moreover, this plan mainly suggests lengthening Shokufeh and Shaghayegh routes in the area where kilns exist. The detailed plan emphasizes adapting the area in the southern zone with the Azadegan Route, creating a connection between the eastern and western axes (Naghsh-e Piravash Consulting Engineers, 2005, 45). The Detailed Plan has expressed seven strategies that are mainly physical out of 17 strategies, which include expansion of east-west axes, reforming physical-spatial construction, rechanging the unconscious residential fabric, expansion of the transportation system, reforming the geometry of passageways, creating service centrality, and shaping hierarchies (ibid., 47–49). The wide streets designed in these two plans have intensified the problems of the studied urban fabric by creating insecure and useless spaces and reducing fair access.

In terms of architecture, many plaques, such as kiln shafts, are considered worn and destroyable fabrics; hence, renovation and restoration of worn fabrics are one of the underlying strategies considered by the Master Plan (Nahade motale’at va tahie tarh-haye tose’e-ye shahrie Tehran, 2007, 11), while the Detailed Plan recommends improving the physical stability and strength of the buildings (Naghsh-e Piravash Consulting Engineers, 2005, 49). However,

the mentioned strategies imply dense construction under the influence of modern urban development, which is against the architecture of kilns and ignores the architectural identity of these landscapes, causing illegibility and a lower sense of belonging and identity.

-Historical

This area was rural and agricultural until 1964. When barracks, industrial workshops, and brick kilns were created during 1964–1979, the population attraction process and growth of residential spots began in this area. This process led to the complete metamorphosis of rural fabric and the accelerated expansion of population and residential areas between 1979 and 1987. Following law stability, the establishment of service use, the reduction in population growth and construction rate, and the disclosure of kilns, many problems have appeared since 1987 (Naghsh-e Piravash Consulting Engineers, 2005, 49 & Baharloo, 2009). Therefore, as the first factor that shaped the area, brick kilns played an influential role in past periods in memorizing the past and identity of the area and its residents. However, what is observed today in District 19 is inattention to the identity of these post-industrial landscapes through destruction, decoration, and ignorance of kilns. This causes a decrease in the sense of belonging and identity. Theoretically, the 2007 Master Plan has approached “landscape as identity creator” (Mahmeli Abyaneh, 2011, 103). However, this plan has not paid attention to the industrial identity of the area by providing an organization and improving the strategy for the landscape identity based on Islamic-Persian architecture and urban planning (Nahade motale’at va tahie tarh-haye tose’e-ye shahrie). Tehran, 2007, 9). Although the Master Plan proposes a strategy for preserving the natural, historical, and cultural heritage of Tehran, it ignores the role of kilns in the identity of this area. It introduces mosques as the most critical factors that shape the identity of urban areas in Tehran (ibid.). The Detailed Plan introduces the transformation of District 19 into a place with regional identity and character as its first strategy. However, it only considers the physical land left from destructed kilns as the option in uses predicted for kilns and considers kilns as invaluable problems without paying attention to their history and background (Baharloo, 2009). Turning these large-area pits, which have an identity separate from the area, into only recreational-cultural atmospheres as a result of upstream projects has turned these lands into defenseless and abandoned areas.

-Social

Active kilns attracted immigrants from various cities, so this area does not have a homogenous social fabric.

The social structure of this area has been influenced by ethnic, lingual, and cultural factors (ibid. & Naghsh-e Piravash Consulting Engineers, 2005). Moreover, kilns involved all family members in work and prevented children from attending school, leading to a fixed working class with improper and poor social positions. Being a good place for immigration, the low quality of life of the working class, and insufficient rewards for staying in the area led to a temporary residence of inhabitants, which led to a lack of social communication, the non-formation of a population, and depopulation. This case can be seen in the depopulated fabric, leading to a decline in the sense of belonging and identity, social capital, security, vitality, and social justice.

Regarding social factors, the 2007 Master Plan proposes a strategy for developing and organizing the population settlement while pointing to population distribution and expansion of residential uses, modifying inequalities by organizing the service space distribution, and providing security through networks with appropriate access. The measures mentioned are all physical and objective actions. The last paragraph of this strategy suggests attracting public participation to improve the quality of life (Nahade motale’at va tahie tarh-haye tose’e-ye shahrie Tehran, 2007, 9). The Detailed Plan also highlights the promotion of residence quality, improvement of the relationship between residents and place, and public participation in realizing the project (Naghsh-e Piravash Consulting Engineers, 2005, 49). However, the presence of people living in kilns and addicts, the low quality of life of other people, and their dissatisfaction indicate that none of the mentioned nonphysical strategies could alleviate these problems. The reason is that the solutions have been mentioned theoretically but in practice, neither encouraging people to participate nor creating a sense of belonging between residents and place have been applied before the approval of the proposed strategies and models.

-Economic

At first, the brick kilns positively affected the area by creating a useful economic cycle, but their inactivation led to some problems, including preventing workforce activity in the kilns and their poor financial conditions. Now, most of the residents there have to work in urban services and groceries and have lower economic welfare than those in Tehran (Naghsh-e Piravash Consulting Engineers, 2005, 49 & Baharloo, 2009, 59). This issue leads to inequality between this area and other neighborhoods in Tehran, lower social justice in terms of inequality between social classes, and also causes a lack of residential growth. The residents deal with such serious economic problems that they do

not have the vitality and time for local participation; Therefore, vitality and social capital are declining in this area. While the Detailed Plan 2005 does not provide a strategy to cope with economic issues, the Master Plan 2007 points to the economic development of Tehran (Nahade motale'at va tahie tarh-haye tose'e-ye shahrie Tehran, 2007, 4). This strategy considers Tehran a city with global economic performance, and while providing some recommendations to replace medium- and small-sized industries with high-tech industries, it ignores low-income and illiterate individuals. This area has a marginal economy with prominent service specifications, and in terms of economic functions, most areas of the district have transregional, and pollutant uses (Naghsh-e Piravash Consulting Engineers, 2005). Only a few centralized commercial activities with local, administrative, and educational uses exist. Transregional activities that result in conflict between these activities, residential use, and depopulation, lead to lower social capital, a sense of belonging and identity, and social justice regarding access to welfare, facilities, and vitality. The Detailed Plan of 2005 provides strategies for eliminating uses inconsistent with residual fabric and coping with pollutant centers; on the other hand, this plan suggests using these lands for crises and establishing other transregional activities by neglecting the needs of residents (ibid., 47).

-Environmental

The existence of brick kilns has led to numerous issues, such as emitting dust in the air, affecting the audience

and fabric, creating environmental pollution, and reducing life security. Moreover, kilns have limited the natural growth of plants by interrupting the ecosystem and creating impermeable substrates. Furthermore, the pits with a 5-20m depth, which are empty of green space, create an improper atmosphere for spending leisure time, reducing flexibility and vitality. There are young trees, such as Platanus, Robinia, Ash, and Willows, in the current green space, which have been cultivated following strategies to preserve the environment and develop green and public spaces based on the 2007 Master Plan (Nahade motale'at va tahie tarh-haye tose'e-ye shahrie Tehran, 2007, 8 & 13) and improve the environment based on the Detailed Plan (Naghsh-e Piravash Consulting Engineers, 2005, 47). However, the mentioned strategies have been adopted in a centralized way without any regulation and social contextualism, resulting in defenseless spaces. Finally, the Master Plan approved in 2007 presents some documents, including a city area map, general spatial organization, and construction regulations (Nahade motale'at va tahie tarh-haye tose'e-ye shahrie Tehran, 2007) that emphasize physical aspects. The mentioned documents do not cover other nonphysical factors mentioned in Table 2 based on the experts' opinions. The Detailed Plan examines different factors in the area but finally summarizes the problems with the internal discontinuity of the neighborhood, the discontinued urban fabric model, and the lack of urban fabric discipline in terms of performance and services. The Detailed Plan does not go beyond the physical

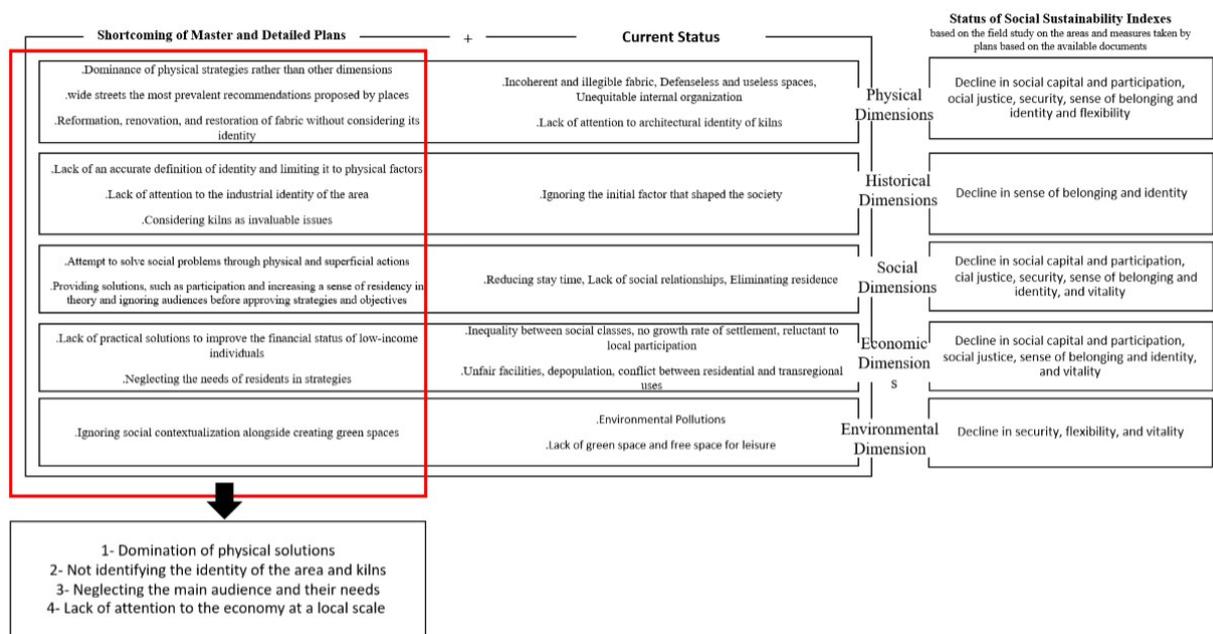


Fig. 3. Status of social sustainability indexes based on the different dimensions, current conditions, and measures taken in Master Plan 2007 and Detailed Plan 2005. Source: Authors.

measures by presenting documents on area borders, main passageways networks, and neighborhood centers based on physical divisions (Naghsh-e Piravash Consulting Engineers, 2005).

• Case study summarization

According to Fig. 3, reading different physical, historical, social, economic, and environmental dimensions of these post-industrial landscapes and studying measures taken by the two mentioned upstream plans indicate a reduction in social sustainability indicators and the cause of the problems. The strategies proposed by the two plans ignored the identity of these landscapes neglected the main audiences and their needs, and ignored the local scale in their strategies by adopting physical-based definitions. This has caused the nonphysical dimensions

effect of social sustainability to be considered superficially or only theoretically.

Results

In post-industrial landscapes, brick kilns play a significant role in shaping the identity of the studied area, which negatively affects social sustainability indicators. Investigation of various dimensions based on an accurate definition of the post-industrial landscape as an objective-subjective and holistic phenomenon, considering more than one dimension simultaneously, helps to detect the effects of the elements of the area on the social sustainability indicators and the cause of the problems. Suitable solutions can be adopted based on these elements to improve social sustainability indicators.

Table 3. Analysis of social sustainability of Case Study by reading landscape's dimensions and proposing recommendations. Source: Authors.

Index	Elements	Result and cause	Physical-based measures	Other measures	
Social capital and participation	Physical	-Multipartite fabric	-Useless and unavailable spaces	-Overcoming physical separation of pits	-Paying attention to the main audience's interests
	Social	-Temporary presence	-Lack of Communication	-Physical contextualization of the area based on the audiences' needs	-Creating participatory workshops
	Economic	-Poverty and low income	-No interest and no time for local participation	-Narrowing the width of streets	-Creating job and income
		-Transregional activity	-Depopulation	-Enhancing accessibility	-Establishing complementary services for residential use, such as day market
Social justice	Physical	-Multipartite fabric	-Unequitable internal order	-Increasing internal discipline using pits	-Constructing industrial units by consideration of residents' skills
	Social	-Fixed working class	-The unfair distinction among classes	-Eliminating movement barriers of kilns using stairs and ramps	-Establishing administrative units and creating jobs in the area
	Economic	-Poverty and low income of transregional activity	-Inequality between the area and other neighborhoods		-Formulating urban services
Security	Physical	-Dense and compaction	-Illegible physic	-Increasing physical controllability	-Creating 24-hour life
		-Multipartite fabric	-Defenseless spaces against earthquakes, crimes, and pedestrians	-Creating defendable space	-Creating green space to prevent dust
	Social	-Temporary presence	-Empty fabric	-Enhancing pedestrians' security	-Considering a police station
	Environmental	-Dust	-Environmental pollution		
Sense of belonging and identity		-Multipartite fabric	-Illegible fabric		
	Physical	-The conflict between the architecture of buildings and kilns	-Lack of attention to architectural identity	-Using brick and relevant elements in architectural design	-Motivating people to live in the area
	Historical	-Neglecting the importance of kilns	-Inattention to the historical identity of society	-Keeping kilns and using them as a museum to increase their legibility	-Establishing ethnic and guild markets to provide products
	Social	-Temporary presence	-Reduced residence time		-Creating a museum used to introduce the history of kilns and increase public awareness
	Economic	-Transregional activity	-Depopulation		

Rest of Table 3.

Index	Elements	Result and cause	Physical-based measures	Other measures	
Flexibility	Physical	-Dense and compaction -Multipartite fabric	-Useless and unavailable spaces	-Increasing access and influence -Creating a flexible urban fabric	-Creating flexible, interactive uses by involving social classes in different seasons and times, considering the Variety of demands -Considering transregional and extra-local uses
	Environmental	-Brick pits	-Lack of leisure space for action diversification		
Vitality	Social	-Temporary presence	-Elimination of residence	-Creating residential units	-Creating recreational use for residents
	Economic	-Poverty and low income	-Lack of residence growth	-Creating motivation for residents and encouraging them to live in the area	-Creating tourism functions to keep and attract employment and residence
		-Transregional activity	-Depopulation	-Creating green space	-Creating functions for children and adolescents
	Environmental	-Brick pits	-Lack of space for leisure activities		

Table 3 reports the cause of the reduction in social sustainability indexes based on the field study of the area and measures taken in upstream plans. Finally, some suggestions are provided to solve the problems in the case study based on the measures required for enhancing social sustainability, considering the experts' opinions reported in Table 2.

Conclusion

As a result of the interaction between humans and the surrounding environment, the post-industrial landscapes of the brick kilns located in District 19 of Tehran are multifaceted, objective-subjective, holistic, and subsequent audience-centered, dynamic, and relative phenomena. These landscapes have caused many problems in recent years, requiring comprehensive solutions and the inclusion of various factors. Due to their permanent connection with the surrounding environment, various dimensions of post-industrial landscapes consist of urban fabric properties, including physical, social, historical, economic, and environmental issues.

The study of documents and analysis of various dimensions of the case study regarding the social sustainability indicators have shown a decline in the social sustainability of the studied area, which links the social problems of this area to nonphysical factors, including the needs of residents, financial and economic poverty, service poverty, and social and cultural (identity) issues. The reviewed upstream plans point to some dimensions affecting social sustainability, in most cases they only considered the organization of physical elements of the area, relying

on a physical-based definition of these landscapes. However, they ignore the identity of these landscapes, their surrounding areas, key audiences, their needs, and their local scale. They provided some strategies regardless of other nonphysical dimensions of the landscape but could not propose a suitable objective-subjective multidimensional solution for social sustainability indicators. Therefore, a complete definition of landscape and accurate landscape grammar, holism, and the simultaneous objective-subjective nature of post-industrial landscapes must be considered in managerial and operational contexts to deal with these landscapes. For this purpose, information and data on all different dimensions of these landscapes must be collected, synthesized, and read concerning their effects on each other. This reading, if done in addition to studying and criticizing other approaches and attitudes toward the issues, can help detect problems and provide solutions for them. According to the mentioned points and Table 3, it seems that the key audiences of the brick kilns area are those who have lived near this area and experienced many issues. Therefore, solutions for enhancing social sustainability must be provided based on an accurate perception of the area to meet the needs of current audiences, from children to older adults. Therefore, the second priority for increasing social capital and social justice in management plans is setting goals to link these audiences with other areas. Regarding the location of District 19 as the southwest gate of Tehran, the final landscape can be a perfect platform for the implementation of cultural, social, and economic goals at a transregional scale, intermittently and seasonally.

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