LIVING (WORLD) HERITAGE CITIES

Opportunities, challenges, and future perspectives of people-centered approaches in dynamic historic urban landscapes

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Heritage Impact Assessment method in the protection of cultural heritage. Iranian cases

Hassan Bazazzadeh,
Seyedeh sara Hashemi safaei,
& Asma Mehan

Abstract

In recent years, we have been observing an increasing significance of industrial heritage in international heritage studies. Developed in response to urban development needs, industrial heritage is now considered a valuable part of the city. Such an approach has resulted in the adaptive reuse of industrial heritage in the developing countries. This is, indeed, a practical solution for sustainable development of cities and the subject matter of many academic discussions. In this respect Heritage Impact Assessment (HIA) seems to be a useful tool. This paper aims to study the role of HIA in adaptive reuse practice in industrial heritage sites in Iran. For that purpose, the authors have used a combined research method including historic study, analytical-description techniques and questionnaire-based interviews (with heritage managers and planners). The results indicate that HIA guidelines play a useful role in preserving the significance of historic cultural heritage and should be observed in the adaptive reuse practice in respect of the industrial heritage sites in Iran. Based on the analysed examples of successfully converted sites, this paper advocates using HIA as a useful tool in determining the potential of a given industrial heritage site for a successful reuse.

Keywords: Industrial heritage, adaptive reuse, HIA, Iran

Introduction

"Guidance on Heritage Impact Assessment for Cultural World Heritage Properties" (HIA Guidelines), published in January 2011, was developed to protect the Outstanding Universal Value (OUV) of World Heritage Sites and to counterbalance the adverse effects of planned development projects (ICOMOS, 2011b; Patiwael, Groote, & Vanclay, 2019). Such projects can pose a major threat to Heritage sites if they fail to account for the historical value of these sites. This means that such development projects should be evaluated within the framework of social (Vanclay, Esteves, Aucamp, & Franks, 2015) and environmental impact assessment (Bond *et al*., 2004; CUE, 1997). Social impact assessment (SIA) tries to

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reflect natural priorities and contextual needs to achieve effective management approaches such as participatory. However, lack of a comprehensive view in this method has impeled scholars to find a holistic approach for heritage sites (Pereira Roders & Van Oers, 2014).

Similarly, because the Environmental Impact Assessment (EIA) overlooks some important aspects such as economic and social, it required relevant changes. Before the introduction of the HIA method (Seyedashrafi, Ravankhah, Weidner, & Schmidt, 2017), certain irreplaceable assets and their values had failed to be adequately addressed in the assessments of the potential adverse impact of urban construction and infrastructure projects on cultural heritage. The following factors explain why EIA, and SIA needs to be comprehensively improved:

1. It comes too late in the planning process to lead to any meaningful action (Bond *et al*., 2004);
2. It omits the issue of heritage in the impact analysis (Jones & Slinn, 2008);
3. It uses inaccurate methods to determine the impact of development projects on cultural heritage (Lindblom, 2012; Masser, 2006);
4. It fails to account for any heritage management insights (Jerpasen & Larsen, 2011).

Therefore, to address the gap between urban development and cultural heritage sites and to assure sustainable development (Kloos, 2015), HIA was introduced in 2011 by ICOMOS. Many World Heritage Sites have been threatened with construction projects, for example Waldschlosschen Bridge was built in the Dresden Elbe Valley, Germany (Albrecht & Gaillard, 2015; Ringbeck & Rossler, 2011). Similar development changes also took place in the Imam square in Isfahan, Iran, and in Liverpool Maritime Mercantile City, England (UNESCO, 2012). On the other hand, industrial heritage, as a relatively new branch of cultural heritage, has not yet been adequately studied (Bazazzadeh, Mahdavinejad, Ghomeshi, & Hashemi safaei, 2018). Subsequently, the damage caused by urban development to these industrial heritage sites could be even more severe if we do not know what are their valuable attributes (Bazazzadeh, 2020; Bazazzadeh, Nadolny, Attarian, Safar ali najar, & Hashemi safaei, 2020; Bazazzadeh, Nadolny, Mehan & Hashemi safaei, 2021).

Iran saw the process of dynamic industrialisation under the rule of the Qajar dynasty (1795-1925). It underlaied the formation of a new civic society and brought about major changes in lifestyle, engineering methods and technological processes (Bazazzadeh & Ghomeshi, 2018b). Presently, the industrial sites and facilities dating back to the Qajar and Pahlavi periods (1925-1979), the testifiers of the dominant industrial culture in Iran and its advanced industrialization, are classified as the Iranian industrial heritage. The identified industrial heritage sites in Iran include 350 sites, of which more than 250 have been investigated. Most of them are located in city centres, which at present urgently need the development of urban infrastructure. This means that any development projects must be meticulously studied in order to properly address the issue of the industrial heritage in the planned designs (Mahdavinejad, Didehban, & Bazazzadeh, 2016).

Towards knowing Heritage Impact Assessment (HIA)

Defined by the IAIA (International Association for Impact Assessment) in 2009, Heritage Impact Assessment has introduced a comprehensive methodology to review, assess the impact and determine the value of different projects. Being originally based on EIA, HIA tends to stress the importance of cultural and natural heritage as part of the environment. IAIA has aimed to create a multidisciplinary environmental impact assessment framework since 1999, emphasising the role of intangible values, traditions, and culture. According to the definition of Cultural HIA (CHIA), it evaluates, predicts and, more importantly, identifies the probable effects of developmental changes on cultural heritage to implement its findings for decision making and planning (Sagnia, 2004). Although CHIA is primarily based on the EIA method, there is a wide gap between the two in terms of focus, standards and regime of their framework. HIA typically applies when a site is considered a red flag zone in view of the development process that may affect the heritage value.

Moreover, built heritage surveys, additional data acquisition, desk-based studies, archaeological investigations and local interviews can underlie a comprehensive identification of cultural significance of a given heritage site, its baseline and the current situation. This procedure involves the data on the type of the proposed development, which facilitates the assessment of possible impact on any significant aspect of the heritage in question. This assessment method, by combining predictive and rigorous matrix procedures, distributional and spatial data and by accounting for multiple scenarios and solutions applicable to the overall concept of heritage value, poses a chance to arrive at the right decision for the future of cultutal heritage (Rogers, 2011).

In 2011 a guideline for HIA was developed by ICOMOS, with a focus on Cultural World Heritage properties to be separately assessed as distinguished and unique characteristics (ICOMOS, 2011b). The document, furthermore, states that specific aspects of world heritage such as authenticity, Outstanding Universal Values (OUV) and integrity need to be particularly addressed within the framework of HIA.

Positioning HIA into the heritage management discourses

Due to the growing attention of the public sector to heritage, a number of discourse have emerged. Smith (2015) identified the authorized heritage discourse (AHD) as a response to "heritage as process" practice, to describe philosophical practices and positions. AHD was also followed up by Pendlebury (2013), who saw it as accommodating the assessment of the development of relationships between policies of economic development, regeneration and conservation planning. The general paradigm shift from positivism to constructivism has resulted in a corresponding shift in the management of heritage (Lixinski, 2015). Ashworth (1994, 2011) was of the opinion that by interpreting various aspects of the nature of heritage, we arrive at the relevant heritage-related, co-existing paradigms (conservation, preservation, and heritage planning). He argued that stakeholders could interact with other sectors within these paradigms and adopt interchangeable positions within each paradigm (figure 13.1). This multifaceted nature of the process can lead to serious contradictions and misunderstandings and this is where HIA guidelines can prove useful.

Indeed, inclusion of conservation in the heritage paradigms fosters the understanding of the HIA concept and its implementation into cultural heritage. According to Patiwael *et al.* (2019), using discourse instead of the paradigms could be more appropriate because the discourse fosters the organization of concepts, such as heritage for example, not just to define them but to give us recommendations on the acts to be undertaken in view of all the aspects concerned (Smith, 2006).

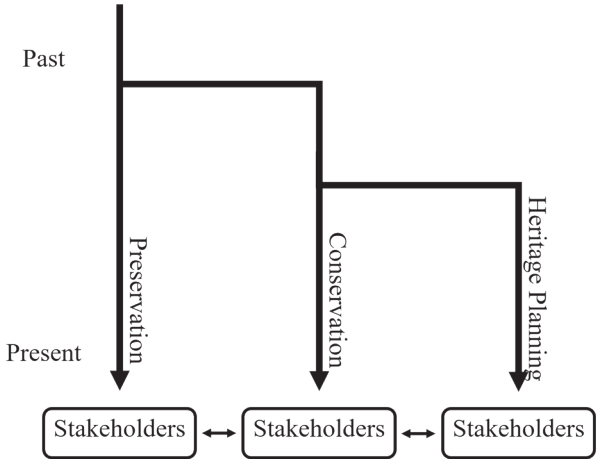

Figure 13.1. The relationship between stakeholders in different paradigms (Adapted from Ashworth, 2011; Patiwael *et al*., 2019).

Through the prism of the first discourse (Preservation), Ashworth (2011) sees heritage as a monument that encompasses universal, intrinsic and immutable values. These values necessarily need to be protected against any development attempts. As a result, material integrity of such heritage sites has been in the centre of experts' attention and consequently the heritage management as well. On the other hand, it must be noted that although conservation and preservation are often used interchangeably in the heritage research, they are not identical. Firstly, heritage planning is focused on a wider area than conservation discourse as it implies the restoration of the building appearance, and also adapts the interior to serve modern needs. As a result, the building continues its useful existence, which is of main priority in the conservation concept as compared to the preservation only (Burke, 1976). Finally, adaptation options for surviving old buildings to account for the current needs (Ashworth & Tunbridge, 1999) is the key concept of the heritage planning discourse. It widens the domain of heritage understood through the criteria of intrinsic authenticity or historical accuracy (Graham, Ashworth, & Tunbridge, 2000) and lays the foundations for polysemic, dynamic and subjective interpretations of the term 'heritage'. By changing the term 'expert' to the term 'facilitator', we can increase the involvement of local communities in the decision-making process and heritage management.

Process of implementation of HIA

Using the heritage impact assessment method, we have classified the urban development projects into the following categories:

1. Tourism facilities;
2. Change in land use, urban planning and other related policies (ICOMOS, 2011b).

Archaeological excavations were originally in the above category, but as it could be considered as a part of HIA process, then the modified version is without this item.

HIA is normally applied when cultural heritage is threatened as a result. Value assessment, based on a six level scale (very high, high, medium, low, negligible, unknown), is a vital step in the HIA process. Classification of impact into adverse or beneficial based on a five-level scale (no change, negligible change, minor change, moderate change, major change) of the severity degree is another important stage thereof. Different scholars view the implementation of HIA through two options.

According to Sagnia (2004), HIA process starts with identification of the type of the development project or action according to the EIA categories, followed by the identification of the cultural variables that might be affected as a result, i.e. cultural life, cultural organisation,

		Number								
Group	Function	Identified	Investigated	Adaptively Reused	Having original function	Partly having original function	Partly Abandoned Abandoned	Abandoned	Partly destroyed	Destroyed
Buildings	Factory	199	127	13	63	2	7	19	14	9
	Worshop	8	0	0	0	0	0	0	0	0
	Reservoir	3	3	0	0	0	0	2	1	0
	Wheat Silos	4	4	0	2	2	0	0	0	0
	Slaughterhouses	1	1	1	0	0	0	0	0	0
	Airports	12	12	0	11	0	0	0	1	0
	Train Stations	41	40	1	36	1	1	0	0	1
	Mills	3	3	0	1	0	0	0	2	0
	Fire Stations	1	1	0	1	0	0	0	0	0
	Customs Buildings	1	1	0	0	0	0	1	0	0
Sites	Oil Wells	2	2	1	0	0	0	0	1	0
	Refineries	2	2	0	2	0	0	0	0	0
	Brick Furnaces	14	12	2	3	0	0	5	2	0
	Lighthouses	1	1	0	0	0	0	1	0	0
	Dames	5	5	0	4	0	0	1	0	0
	Energy production sites	6	5	3	3	0	0	0	0	0
	Transmission sites	7	5	4	0	0	0	0	0	1
	Road tunnels	3	3	0	3	0	0	0	0	0
	Railway bridges	34	29	0	28	0	0	0	1	0
	Wharves	6	4	0	3	0	0	1	0	0
	Total	353	263	25	160	5	8	30	22	11

Table 13.1. Identification of industrial heritage in Iran.

and cultural resources or infrastructures. Subsequently, relevant stages of projects and policies, including planning/policy development, construction process/ implementation, operation/ maintenance, abandonment or decommissioning must be defined. In consequence, we will be able to create a matrix of significant impact assessment or cultural variables related to a given project type and its stages. Finally, we can arrive at the cultural heritage impact assessment report via designing a public involvement plan, a mitigation plan, a monitoring plan and via identifying significant types of impact.

On the other hand, according to ICOMOS, assessing the value of heritage attributes is the first step in the impact assessment process to be followed by defining the impact range of any possible changes. Next, the severity of impact is to be identified to design the matrix of significant impact assessment as suggested by Sagnia (2004). Finally, we will be able to define and undertake the necessary mitigation measures.

Industrial heritage

Originally coined in England in the 20th century, the term 'industrial heritage' has recently been in the core of heated debates of the experts. The term as such encompasses the examples of the remaining industrial structures of historical, technological, architectural and scientific value (TICCIH, 2003; Yang, 2012). Offering a variety of priceless virtues, industrial heritage sites should be conserved as an integrated system of intangible assets and the local culture (ICOMOS, 2011a). The buildings and structures included in the term 'industrial heritage' testify to the history of architectural and technological progress and demonstrate the social and cultural values of their times (Falser, 2001), yet,

Category	No.	Project	Location	Time		Function	
				Construction	Reuse	Original	Current
Factories	1	Shams Factory	Tehran	1931	1992	Beer factory	Enqelab cultural centre
	2	Pashmine factory	Tabriz	1935	1995	Wool blanket factory	Drug research centre
	3	Pashmbaf factory	Esfahan	1935	1996	Spinning and weaving	Broadcasting Building-
	4	Beryanak factory	Tehran	1922	1997	Sock weaving factory	museum of wildlife
	5	Khosravi factory	Tabriz	1931	1975	Leather factory	University
	6	Eghbal factory	Yazd	1931	2003	Spinning and weaving	Science and technology centre
	7	Qoorkhane	Tehran	1925	2004	weapon factory	Entrance of subway
	8	Shiraz textile factory	Shiraz	1938	2008	Spinning and Textile	Tar-o-Pud-e-Zaman museum
	9	Momtaz factory	Tehran	1980	2009	Spinning and weaving	Commercial centre
	10	Se setare factory	Zanjan	1940	2014	Match factory	Match museum
	11	Garmsar cotton	Garmsar	1925	2015	cotton factory	Science and technology centre
	12	Argo factory	Tehran	1889	2016	Beer factory	Institute of culture and art
	13	Pars Factory	Semnan	1932	2018	Spinning and Textile	City council building
Energy	14	Harandy power plant	Hamedan	1931	1998	Power plant	Museum of electrical industry
	15	Kerman power plant	Kerman	1933	2015	Power plant	Museum of electrical industry
	16	First gas station	Abadan	1927	2017	Gas station	Gas station museum
Oil	17	Oil well no. 1	MIS	1908	2018	Oil well	Oil museum
Transmission	18	Kurdi Radio	Kermanshah	1960	2005	Radio station	Artists Forum
	19	Pergola mansion	Tehran	1940	2009	Wireless station	The museum of radio
	20	Radio station	Tehran	1940	2009	Radio Station	Iran broad casting building
	21	Rasht post office	Rasht	1931	1994	post office	Post museum
Railway	22	The old railway	Tehran	1882	2019	Railway infrastructure	Public urban space
Slaughterhouse	23	Slaughterhouse	Tehran	1944	1991	slaughterhouse	Bahman Cultural centre
Brick Furnace	24	Rastegar moqadam furnace	Mashhad	1930	2014	Brick furnace	Park
	25	Kure milyuni	Dezful	1925	2016	Brick furnace	Park

Table 13.2. All the industrial heritage adaptive reuse practices in Iran.

they are now threatened with immediate destruction. Utilizing the potential of these sites as future sources of revenue under a new identity linking the future and the past (Del pozo & Gonzalez, 2012) has become a popular trend among the decision-making authorities. Conservation of heritage sites through adaptive reuse practice can improve the physical conditions of the environment and at the same time preserve their unique values (Cullen, 1995; Strange & Whitney, 2003; Swensen, 2012; Yung, Zhang, & Chan, 2017).

History of Iran's Industrial Heritage

Before the industrial revolution, the term 'industry' in Iran referred to small carpet or textile weaving workshops or small civil engineering structures like windmills and water mills. The 19th century brought about major changes in Europe, but over the time, their impact extended beyond the boundaries of Europe and "the Industrial Revolution" spread worldwide. In Iran the Industrial Revolution started during the reign of the Qajar dynasty (1795-1925) in response to the urgent need for the development of military technology and the establishment of modern schools. The quick process of industrialisation in Iran mostly affected the transport infrastructure and brought about the construction of more than 270 factories, government buildings and the national railroad system. It, further, underlayed the formation of a new civic society and effectuated important lifestyle changes (Bazazzadeh & Ghomeshi, 2018a). Therefore, almost all the industrial sites and buildings that date back to the Qajar and Pahlavi era, testify to the dominant industrial culture and give evidence to the industrialisation process in Iran and can be classified as Iranian industrial heritage.

According to a survey, conducted in Iran by TICCIH (The International Committee for the Conservation of the Industrial Heritage) in recent years, more than 350 industrial heritage sites have been identified, of which more than 250 have been investigated. Table 13.1 illustrates the classification of the industrial heritage structures in Iran with relevant updates.

Of all the industrial heritage buildings and sites in Iran that have been investigated, only 25 have been adaptively reused. These reused sites have been selected as case studies for the purpose of this work to evaluate their potential. Table 13.2 provides the specific information on these sites.

Industrial heritage and urban development

Over the years Iran saw a surge in urban population. This phenomenon brought about the changes not only in the urban development but also in the social and economic image of Iranian cities. We can classify modern history of Iranian cities into three groups:

1. Traditional Iranian city (1920);
2. Beginning of modern urbanisation (1940);
3. Urban restructuring (1960).

The rapid transformation, modernisation and industrialization of the Iranian cities took place in the period when the Pahlavi Dynasty ruled (1925-1979). The image of Iran changed from an agricultural to industrial country. The industrial structures assured prosperity to the cities. Considered as the axes of the urban development, they today delimit the most popular and expensive areas in the cities, whose major development dates back to the modernisation era in Iran. These centrally located lots attract the eyes of investors, offering high yield prospects. With high land prices, such industrial sites are a desirable location for modern development. The aforementioned economic factors pose a serious threat to the industrial heritage and, unless some protective measures are undertaken, we might witness its gradual destruction.

Assessing the impact of urban development on the industrial heritage of Iran

The impact of urban development on industrial heritage in Iran can be assessed based on the analysis of all the converted and reused industrial heritage sites in comparison to their overall number. Such an analysis commenced in 2010 by a group of experts led by TICCIH-Iran. Within its framework, each site is evaluated in view of the surrounding urban development. The group concluded that replacing old urban textures by new structures may have an adverse effect on the adjacent industrial heritage sites in particular (Fadaeinejad bahramjerdi, 2018). According to the aforementioned study, new urban development entails the following types of threat (classified into four groups):

1. Vibration effects: due to transportation of materials, excavation works and construction vehicles;
2. Noise: due to traffic and construction works;
3. Air pollution: due to the growing number of vehicles and increased traffic;
4. Incompatible urban development: due to different urban scenarios without any consideration for the industrial heritage attributes.

On the other hand, the attributes of industrial heritage sites in Iran are classified into five groups – in accordance with Seyedashrafi *et al.* (2017). To draw up a comprehensive assessment of the impact of urban development on cultural heritage, we need more than just a classification in view of the current status quo. In this respect, the Operational Guideline for World Heritage Conservation can be used to determine the key attributes of a given site, including decorative, structural and functional aspects that truly convey the heritage value. Their proper identification will enable us to determine whether the planned urban development can adversely affect these values or not. Such development may in particular threaten the authenticity and the integrity of a given heritage site. The classification of potential threats posed by urban development in respect of the converted (reused) industrial sites in Iran is followed by the matrix of adverse impact of urban development (table 13.3).

However, we must admit that not all types of impact of urban development on the industrial heritage in Iran are adverse. To be able to better manage the changes brought

Urban development impacts		Vibration effects	Noise	Air pollution	Incompatible urban plans
Industrial heritage attributes	Function	- Interupting the producting process			Disrupts industrial process
	Industrial culture		- Interupts the possible knowledge transfer		- Potential loss of original spirit of the place - Potential loss of industrial identity
	Construction technology	- Ambiguity of structural perception - negative impact on structural integrity		Causes Deterioration of decorative finishing	Makes the construction technology incomprehensible
	Structure and material	- Cause cracks - Damage masonry structure			Makes the design, material, and form partialy or entirely alian to the surrounding
	Form and design	- Cause the loss of aesthetic values - Reduce the authenticity of forms and design - Makes the decorative finishing collapse			
	Setting				Exerts adverse impact on townscape and visual integrity

Table 13.3. Matrix of identification of adverse impact on heritage attributes.

Impact	Negative/ benefitial	Magnitude of impact				
		No change	Negligible change	Minor change	Moderate change	Major change
I^1: Causing cracks in all elements	Negative				x	
I^2: Damaging masonry structure	Negative					x
I^3: Ambiguity of structural perception	Negative		x			
I^4: Negative impact on structural integrity	Negative				x	
I^5: Interruption of the production process	Negative		x			
I^6: Loss of aesthetic values	Negative			x		
I^7: Reduction of the authenticity of form and design	Negative				x	
I^8: Causing deterioration of the decorative finishing	Negative	x				
I^9: Interruption of the possible knowledge transfer	Negative					x
I^{10}: Potential loss of the genius loci of the place	Negative		x			
I^{11}: Potential loss of industrial identity	Negative				x	
I^{12}: Making the construction technology incomprehensible	Negative	x				
I^{13}: Making the design, material, and form detached from the surroundings	Negative		x			
I^{14}: Adverse impact on the townscape and visual integrity	Negative			x		

Table 13.4. Assessing the magnitude of urban development impact on the industrial heritage of Iran.

Attributes of industrial heritage	Severity of impacts				
	Negligible	Minor	Moderate	Major	Severe
Very high values. Setting/ function	Slight/ Minor	Minor/ Moderate	Modarate/ Large	**Large/ Very large**	**Very large**
High values/construction tech	Slight (I^8, I^{12})	Slight/ Minor (I^3, I^5, I^{10}, I^{13})	Minor/ Moderate (I^6, I^{14})	Moderate/ Large (I^1, I^4, I^7, I^{11})	**Large/ very Large (I^2, I^9)**
Medium values/form	Slight	Slight	Slight/ Minor	Minor/ Moderate	Moderate/ Large
Low values/industrial culture	Slight	Slight	Slight	Slight/ Minor	Minor/ Moderate
Negligible	Slight	Slight	Slight	Slight	Slight/ Minor

Table 13.5. Matrix of impact severity adapted from ICOMOS (2011b).

about by urban development and foster their positive impact on the surroundings, we first need to identify the types of beneficial impact to serve as a guideline for future urban development projects to exert desirable influence on the heritage sites. According to the field study (Bazazzadeh *et al*., 2018, vol.2, p.99), the following are the positive types of impact of urban development projects on the industrial heritage sites in Iran:

1. Development of tourism facilities;
2. Strengthening the tourism-related economy;
3. Rehabilitation of abandoned historical buildings;
4. Facilitation of traffic by expansion of the road infrastructure;
5. More open public spaces;
6. Reduction of urban density and having more public engagement.

Evaluating the severity of impact

This step consists of determining the magnitude and the nature of the impact type. The five-degree assessment for identifying the severity of impact proposed in the ICOMOS HIA guideline has been applied in this study to evaluate the magnitude of each relevant impact.

Figure 13.2 shows a simplified model of the severity of urban development impact on each attribute of the industrial heritage presented in table 13.4. It must be stated that in general urban development projects have significantly affected the function and setting of the converted (reused) industrial heritage sites in Iran.

Not only is it important to identify to what degree the impact of urban development is based on the assessed severity degree (see table 13.5) but also to define the attributes of the cultural heritage site concerned based on the value assessment. The majority of sites being the case studies herein are not registered as UNESCO World Heritage Properties, therefore, for the purpose hereof they are called the properties of high value.

According to table 13.5, the impacts of damaging masonry structure (I2) and interruption of the possible knowledge transfer (I9) on settning and function of the industrial heritage sites in Iran in average are large/very large; therefore, immediate mitigation measures need to be developed to avoid and minimise the impacts of the masonry structure deterioration and interrupting its functionality. The impacts with moderate/large significance include; causing cracks in all elements (I1), negative impact on structural integrity (I4), reduction of the authenticity of form and design (I7), and potential loss of industrial identity (I11). Besides, loss of aesthetic values (I6) and adverse impact on the townscape and visual integrity (I14) are reported to have minor/moderate impact on industrial heritage sites in Iran. The rest of urban development impacts have either slight/minor or slight impact.

Recommended strategies

HIA analysis helps decision makers to minimise the adverse effect of planned urban development projects by recommending relevant mitigation strategies aimed to improve the effectiveness of proposed management plans. Moreover, the proposed measures provide the guidance towards finding the balance between heritage conservation and the urgent need of urban development. Beneficial impact can be seen as a compensatory opportunity and a motivating factor for the decision makers to provide modern public facilities while preserving cultural heritage assets. According to the field studies (Bazazzadeh *et al*., 2021) and assessing the

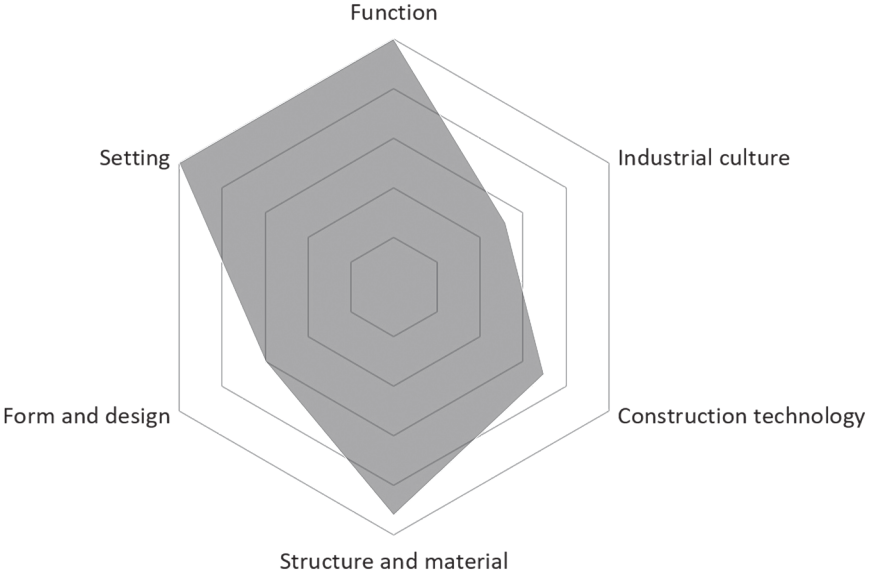

Figure 13.2. Impact of urban development projects on the industrial heritage in Iran.

magnitude and severity of impacts, the strategies that can be adopted in view of the conservation of the industrial heritage in Iran can be as follows:

1. Deployment of construction machinery characterised by low vibrations, low noise and low air emissions;
2. Restrictions concerning the function and design of new urban development projects in cultural heritage buffer zone;
3. Improvement of the industrial identity of the place as part of national heritage interesting to the public due to its educational values;
4. Strengthening of the architectural and structural aspects of heritage as far as it does not change building characteristics;
5. Drafting long-term and short-term management plans for each heritage site in view of the simultaneous need of heritage conservation and urban development, including annual updates;
6. Involving facilitators in relevant fields of industry during all the phases of rehabilitation;
7. Setting up a group of experts to regularly monitor site conditions;
8. Providing the area with cultural values with tourism facilities;
9. Assuring a pedestrian area to improve air quality and to reduce noise;
10. Raising public awareness of the significance of industrial heritage as part of national heritage through various educational initiatives.

Conclusion

This study attempts to review the HIA method and apply it in the analysis of the status of the converted (reused) industrial heritage sites in Iran to arrive at effective strategies to be adopted for the purpose of their conservation today. The majority of the sites involved are under threat of damage due to development projects. The application of the HIA method starts with the identification of the threats posed by the urban development projects. This step is followed by the assessment of the magnitude of each threat according to the ICOMOS guidelines. It has been found that the setting and function of these sites are the most susceptible to serious adverse impact of urban development projects. Consequently, strategies needed to mitigate such adverse impact shall be desgned based on the HIA analysis. The authors highly recommend the use of the HIA analysis for the purpose of evaluation of proposed urban developments in the vicinity of cultural heritage sites. Any changes proposed for historical places should be evaluated through the HIA method in view of their adverse or beneficial impact. This method can promote effective site management plans maintaining a positive balance between heritage conservation and sustainable urban development.

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