Engineering Technology Open Access Journal

Juniper Publishers key to the Researchers

Case Report
Volume 4 Issue 5 - February 2023
DOI: 10.19080/ETOAJ.2023.04.555646

Eng Technol Open Acc

Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces)

P. Zolghadri[1]* and M Kazemi Demneh[2]

[1]*MSc in Landscape Architecture, South Tehran Branch, Islamic Azad University, Tehran, Iran*

[2]*PhD Student in Kansas State University, USA*

Submission: January 13, 2023; **Published:** February 14, 2023

***Corresponding author:** Parisa Zolghadri, MSc in Landscape Architecture, South Tehran Branch, Islamic Azad University, Tehran, Iran

Abstract

Aim: The purpose of this paper is to achieve a technique that can be used to help reduce the number of abandoned industrial regions and the sustainable adaptive reuse of industrial settings. Moreover, this paper aims to highlight the industrial heritage with a focus on establishing a decent relationship between audience and industrial heritage by defining sustainable activities developing the social, cultural, economic as well as peripheral quality of the area.

Methods: The approach to this statement will be through an overview of related case studies and theoretical investigation into the notion of industrial heritage together with a precedent study of Dolatkhah brick furnaces to explain the subject. The conceptual framework of the research is based on a combination of the architectural theory and local economy and culture.

Findings: The paper introduces a framework for abandoned industrial surroundings to incorporate within the modern cultural context as industrial heritage museums or socio-cultural facilities with reference to Biophilic architectural patterns. The findings offer a reflection on approaching similar case studies as a tool for their conservation, management and promotion to create new tourist destinations as a form of sustainable urban regeneration leading to local culture and economic prosperity.

Conclusion: This research bridges the gap between practice and theory in terms of green adaptive reuse strategies within the Industrial settings; furthermore, it contemporizes Dolatkhah brick furnaces with transformation into a museum of the industrial architectural heritage with the aim of booming local cultural and economic status by launching proper schemes as an initiative for sustainable development.

Keywords: Sustainable Adaptive Reuse; Dolatkhah Brick Furnaces; peripheral quality; Cultural and Economic Status

Introduction

In pre-modern architecture, due to the slow process of changes in building technology, architecture and building or technology have been linked and integrated. But in the period after the Industrial Revolution and with the intensification of technology and science, followed by construction techniques and their rapid developments, the connection and integration of architecture and building was broken. Throughout the nineteenth century, the advent of the Industrial Revolution in England led to the production of equipment and structures required by industry. Today, around the world, there is a great variety of ridges, structures, complexes, cities and settlements, regions, landscapes and roads that contain evidence of human activity in the field of industrial production and action. In many areas this heritage is still in use, and industrialization is still an ongoing activity or a continuing historical feeling, while in other places the only historical evidence of industrial activity, which has now been abandoned site exposed to destruction as it is located in the middle of the urban context. Historic sites are increasingly threatened by new developments. The impact of new constructions can be seen not only on important national sites but also on local areas where small changes can be very effective and decreasing the landscape and local differentiation.

Therefore, a new framework is needed to protect and highlight the industrial heritage, because history has already played a prominent role in people's lives. The concept of cultural heritage clearly means different things that various groups of scientists as well as people interested in traditions and the natural environ-

ment present as a common part of the past. In 1949, Statute of the Council of Europe [1], adopted in London, states: "In order to achieve greater unity, the protection of cultural heritage, the establishment of economic facilities and social progress shall be a force for good." (URL1)

Recent years studies have shown that the protection issue of the natural environments is one of the most important issues facnig communities. Since then, various legal instruments have been adopted to protect these values in the cities of Bern, Granada, Valletta, Lugano, Strasbourg and Florence. The birth and development of a city history must be discovered and revealed in order to preserve, refine and emphasize the hidden values of that place. This analysis of society and this perception of an area leads to a social understanding of the place, so people show more tendency to live in that place. Industrial landscapes show us our connection to our land over time. It should be noted that industrial heritage is also part of our culture and history.

De Gregorio et al. [2] looks at adaptive reuse in the context of industrial heritage, which represents an excellent test benchmark because of its intrinsic architectural characteristics and its localization in the city area. The paper puts forward a methodological approach, verified through the application of a case study, which analyzes both the peripheral context and the building. This study concludes: using the data led to an adaptive reuse project by which a multitude of positive repercussions for the community and the local economy can be a decent solution.

Bazazzadeh et al. [3] aims to introduce the concept of flexibility in industrial heritage sites, and evaluate its criteria among adaptive reuse practice, and make a comprehensive flexibility model for it. Indeed, the final goal is to determine the condition that based on the flexibility model, the adaptive reuse practice would be a proper way of encountering these sites. A historical-interpretation research method and analytical-description techniques are applied in this research. Results indicate that flexibility has genuinely been considered in this practice. Analysing flexibility techniques, this paper suggests a valuable framework to achieve the flexibility of industrial heritage as the presupposition of successful adaptive reuse in these sites.

Sattar Jabbara et al. [4] are considered sustainability in industrial locations obstructs them as they are one of the most important pollution sources in the environment, so the research dealt with the concept of modern sustainability, which is expressed by the cost of environmental degradation (environmental costs) and how it affects the selection of the appropriate industrial site to reduce the levels of increasing deterioration with economic, social, and environmental impacts.

Problem Statement

As Moore and Whelan, put it: "To preserve a place uniquely, one must preserve the memories of that place, traits that recall the past in the present." Benton-Short [5]. In this sense, it is necessary to continue studying the city as an evolutionary being, and look at its culture and heritage. For this reason, the revitalization of post-industrial landscapes should be part of the larger and more ongoing processes of urban architecture and design, which are more common in the case of abandoned symbolic factories. This revival includes all the signs and structures associated with industrial activity.

Politicians, developers, stakeholders and professional urban planners know that the protection of urban design is one of the most crucial issues that must be considered to preserve the cultural identity of a city. In this way, preserving and reviving industrial heritage is much more important and valuable than celebrating the past, and in fact this revitalization process is part of building the future. Thus, the preservation of industrial heritage connects people, place and history, and strengthens the sense of place and is a force for the renewal of society.

As Stan Allen [6] puts it: "working with the site, not against it, is producing something new that is being recorded with existing complexity."

Since 2007, more than 50% of the world's population has become urban Annez et al. [7]. This urbanization growth has resulted in more natural green space destruction in cities. Urban environments can cause mental fatigue and stress, or conversely, interaction with desirable natural environments can maintain mental health.

Methodology

The aim of this research is to introduce a framework for abandoned industrial surroundings to incorporate within the modern cultural context as industrial heritage museums or socio-cultural facilities. Furthermore, it tries to bridge the gap between practice and theory in terms of green adaptive reuse strategies within the Industrial settings. So, the strategy is to use case studies and extract design requirements that can apply to similar circumstances. Therefore, at the beginning, writhen sources about biophilic reactions are reviewed and successful case studies have been selected. Finally, the extracted design requirements are applied to Dolatkhah brick furnaces as an example of an abandoned industrial site.

Similar Case Studies

Concrete Plant Park Bronx River bet. Westchster Av and Bruckner Blvd. NYC

Site of a concrete plant from the late 1940s through 1987, the land that is now Concrete Plant Park was acquired by Parks in 2000. In close partnership with community organizations and public agencies, the Parks Department and the Bronx River Alliance began the revitalization of this formerly abandoned industrial site through re-establishing salt marshes on the riverbank once strewn with trash and tires, as well as reintroducing the public to the site through organizing community festivals and leading hundreds of residents out on the Bronx River to canoe and kayak.

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

The waterfront park, completed in September 2009, contains facilities supporting and linking existing and planned multi–use pedestrian greenways with other off–road, on-road bicycle/pedestrian routes. Construction of a new canoe/kayak launch provides an access point to the Bronx River Corridor along the park's shoreline. The park was also enhanced through the creation of a waterfront promenade, a reading circle, and inviting park entrances at both Westchester Avenue and Bruckner Boulevard (Figure 1).

Figure 1: SitePlan of Concrete Plant Park (source:google earth).

Design goals

i. Converting an old and unused industrial site into a prosperous public park.

ii. The decision to maintain the structure of the concrete factory for several reasons.

iii. The decision to reuse and adapt existing elements to new needs.

iv. The association sought to use this linear park as an educational laboratory, a quiet space for thinking, a destination for free and creative games, and a memorial to the past and preserving the history of this place.

Design challenges

During the design and construction stages of the concrete factory park, the group faced the challenge of limiting the materials on site. The dominant materials of the site were dictated based on the history of the site and what was already available in the industrial site. Sand, concrete and pebbles in the industrial site were included in the design to use available materials and minimize the impact of them on the environment.

The 1,900-foot linear waterway in the park provides an opportunity for visitors to enjoy the presence of the river visually and physically. The students at Fanny Lo School (near the park)

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

mainly use this place as a teaching laboratory to test water quality and survey the river (Figure 2).

Figure 2: Bronx Concrete Factory before and after being converted into a park (source:URL2).

Analysis

Concrete Factory Park did not suffer much damage during Hurricane Sandy because the project was a relatively perfect work of landscape architecture. The designers considered the floodplain of the place and made the adjacent lands in the upper areas of the park less exposed to artifacts in order to protect the lower parts by preventing flooding. The park is part of a larger network of walking trails and public open spaces along the Bronx River. In other words, this project is one of the connecting links along this network. Another point is the efforts of local associations to create a healthy environment for living, working and recreation.

The mentioned project was welcomed by social groups and visitors from the beginning and is very prosperous, Because it is the prototype of "participatory design". The design approach of the above park was not formed by one person or a specific group but was the product of the joint efforts of all stakeholders.

Boca do Rio Hotel Resort Arade River, Algarve

This post-industrial landscape is located on the left bank of the Arad River in the municipality of Lagoa State, Algarve, Portugal. This view reminds the landscape of the shores of the Mediterranean Sea (Figure 3). These photos are representative examples of the reclamation of post-industrial buildings in the Algarve during the last decades. The designers opted to destroy the buildings completely, leaving the chimneys as if they represented the entire value of the building. LOURES [8]

Moreover, they are often realized to isolated buildings, which are a mistake Aguilar I [9] , as the analysis and intervention in these landscapes should never be directed to a single building, but to the entire industrial landscape. When planning professionals analyze and redevelop these landscapes, need to realise that postindustrial, typically part of ordinary or vernacular landscapes, incorporate the passage of time, representing multiple layers of time and cultural activity therefore being part of the identity of a people and a place. In this sense, those landscapes should be seen as assets, once as historic sites they enhances the possibilities of creative practice in preservation, design, and planning, given that they are by definition: unique, resulting from the combination of natural landforms and buildings defining a particular place or region. Those changes in perception contributed to increase the relevance of industrial landscapes and to highlight the need to study and protect the material and immaterial remains of our industry from a different perspective (Figure 4).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Figure 3: Boca do Rio Hotel Resort (Source: LOURES:2008).

Figure 4: Boca do Rio Hotel Resort (Source: LOURES:2008).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Boca do Rio Hotel Resort is a good example of this policy, representing the conversion of a former industrial building into a hotel located right in the margin of the Arade River, where the chimney was the only element that lasts from the former structure. LOURES [8]

Design goals

i. Providing a platform for public participation to ensure that the community can play an important role in shaping and implementing redevelopment proposals.

ii. Ensuring that the development is responsive to both dimensions of the environment and context and strengthens the sense of place and local distinction.

iii. Improving, adaptability and diversity in the development process that can respond to social changes and technical and economic conditions.

iv. Promoting multifunctional spaces that interact with industrial buildings and the streets in front of them. and encouraging the use of modified spaces and promoting local access and permeability.

v. Reuse of previously developed sites or unused buildings and ensure further development that promotes access, affordability and peace.

vi. Enhancing the readability of the environment through redevelopment that provides well-known roads, intersections and signs.

vii. Ensuring that the design of Kojab creates a place that has diversity and choice through the combination of different uses and activities.

viii. Ensuring that all renovations of industrial buildings and spaces have a human scale and appropriate details.

ix. Development should be aimed at protecting the quality of the environment, which is achieved by avoiding inappropriate changes in areas with environmental value and cultural values.

Question

The main questions that arise in this research are:

i. How can design in the field of adaptive reuse of urban waste recycling with a biocompatibility approach change the design methods of abandoned industrial spaces in urban residential areas?

It seems that biocompatible design in the field of restoration of industrial waste landscapes can be a suitable model for the design and restoration of other abandoned industrial sites and create a change in the design of these spaces in urban residential areas.

ii. Can the revitalization of brick kilns with a biophilic design approach be a suitable response to compensate for part of the degraded green spaces caused by urban growth?

It seems that the revival of abandoned brick kilns in the form of a park, which is now used.

Have been moved out of cities and away from residential areas, can be one of the solutions.

Suitable to compensate for the per capita shortage of green space in urban residential areas.

iii. How can designing an industrial growth Center in the form of a park with a biocompatibility approach improve the mental disorders caused by crowds and urban congestion?

It seems that design with a biocompatibility approach, the main emphasis of which is to identify the psychological problems of people living in crowded cities, can be a good solution to achieve solutions to improve these disorders.

Purpose and Renovation

Biocompatible design has been discussed more in theoretical topics, especially in urban psychology studies, and the examples implemented with this approach are very limited and based on a limited number of principles discussed in theoretical topics.

The practical and main purpose of this research is:

1. Achieving a practical model for biocompatible design (biophilic).

2. Analysis of theoretical parameters and extraction of a set of practical models for design.

3. The use of abandoned industrial sites that have been moved out of cities, in order to compensate for the per capita shortage of green space in the regions.

4. The results of this study can provide a practical model for the restoration of post-industrial waste landscapes to compensate for the degraded green spaces caused by urban population growth for green space designers and urban planners.

1-5 Research variables: The variables of this research include parameters such as hazard and safety in the studied landscape, which is currently very unsafe due to the abandonment of furnaces, and the necessary safety should be created for biocompatible design (biophilic). Be considered.

Finding

We must keep in mind that adverse urban environments can have detrimental effects on public health. This is where biophilic design can come in handy. But how can we move from theoretical research to practical implementation in a way that can effectively improve health and well-being, and how can this impact be measured and judged?

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

This study aims to bridge the gap between theoretical and practical proceedings. The target audience for this study is interior designers, architects, landscape architects, urban designers, planners, health professionals, employers, and developers, as well as those interested in better understanding biophilia patterns.

14 Patterns of Biophilic Design Nature in the Space Patterns: Browning et al. [10]

1. Visual Connection with Nature
2. Non-Visual Connection with Nature
3. Non-Rhythmic Sensory Stimuli
4. Thermal & Airflow Variability
5. Presence of Water
6. Dynamic & Diffuse Light
7. Connection with Natural Systems Natural Analogues Patterns
8. Biomorphic Forms & Patterns
9. Material Connection with Nature
10. Complexity & Order Nature of the Space Patterns
11. Prospect 12. Refuge 13. Mystery 14. Risk/Peril

These 14 templates cover a wide range of applications for both indoor and outdoor environments and give meaning to both the concepts of compatibility and flexibility for proper implementation. Finally, this study uses these patterns in a general sense in order to address global issues of human health and well-being (e.g., stress, visual acuity, hormonal balance, and creativity) in built environments rather than planned spaces. For example: health care facilities on urban sidewalks). In this way, focusing on nature patterns that are desirable to reduce stress or increase quality can be used across different sectors and scales. Browning et al. [10]

Case Study

This research is in line with promoting human relationship with nature and how to use biocompatible design patterns as a tool to promote health and well-being in built environments. Therefore, a 55-hectare area of Iran's industrial heritage located in a 180-hectare park, located on the south side of Shaghayegh Boulevard in Dolatkhah neighbourhood in District 19 of Tehran, whose lands have now been acquired by the government, has been selected. In this park, there are 7 brick kilns of which 6 kilns are located on the selected 55-hectare site. These furnaces purchased by the government and are now owned by the municipality and abandoned. In the detailed plan of Tehran, the brick kilns are to be turned into flower markets. This proposal has been approved by the Article Five Commission. The reason for choosing this site is to revive abandoned post-industrial landscapes to compensate for part of the lost green space due to the increase in construction due to the growth of urban population, especially in Tehran (Figure 5).

Figure 5: Shaghayegh park - The furnaces are marked in red and the 55-hectare area is marked in black. (Source: Google Earth).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Solutions

Biocompatibility is a concept that shows that humans are instinctively dependent on all other living systems. Biocompatible design relies on the concept of biocompatibility with sustainability and includes environment, architecture and urban design. The concept of "sustainability" is at the forefront of urban design criteria. Sustainability in landscape architecture has several concepts, which range from deciding to use urban land, on a micro and macro scale, to find a solution to create psychological, physical and social comfort for people in landscape architecture. The discipline of landscape architecture is only practical when they combine nature and natural processes in their design process with the aim of sustainability and sustainable design, which is possible with the concept of bio-compatible design.

Sustainability can reconnect people with the natural environment. Sustainability can be defined as ensuring continuous productivity for many years under favourable conditions. The concept of development is also used to introduce a general framework of what should be in our lives and what should be sustainable. However, for the whole to be stable, all the components (parts) must be stable. To ensure the sustainability of cities, not only environmental problems must be solved, but also the quality of life of the current population must be increased and spaces for a better life must be created for future generations. (Antil et al 2005)

In the concept of biocompatibility, there is no place for destruction, but instead it is a substitute. The love of life or death is a fundamental choice that every person faces in life. The biocompatibility hypothesis states that humans have an attraction based on biocompatibility, which depends on certain aspects of the natural environment and their well-being and is related to the natural world around them to achieve perfection. (Wilson:1978)

Design criteria

The first criterion is in the field of materials. In the construction of the building and the area, the materials used in it are considered compatible with the city's climate and compatible with temperature and light, materials such as wood and brick. The second criterion is to pay attention to the ecology of the area, a simple question that every citizen should ask himself is what kind of natural ecology this area had before the city was established, it should be known what things our urbanization has destroyed in this neighbourhood and How can we reduce the dimensions of this destruction and find a solution to compensate for the losses we have caused to the region's ecosystem. It should be considered what measures have been taken to deal with the erosion of natural resources in our neighbourhood. We must preserve natural landscapes.

The third criterion is urban design and development, which, in short, topics such as materials used in buildings and landscaping, prioritizing the maintenance of old buildings instead of demolishing and building new buildings, and such topics should be taken into consideration. The fourth criterion of preserving chimneys is an important step in preserving our contemporary industrial heritage, preserving the identity of the neighbourhood, and passing it on to future generations. The strategic location of this area in the neighbourhood doubles the importance of the project. The special and valuable feature of the brick kilns with the greatness and dominant area of this complex in the neighbourhood gives it a trans-regional function and becomes meaningful for the city from now on. Choosing a suitable user will largely solve the problems of the project. The fifth criterion is the use of the element of water, proper lighting at night and the use of appropriate elements in line with the criteria of bio-compatible architecture.

Design planning

i. In fact, some people look at this area from the point of view of an economic enterprise, and therefore, it should be tried to change its use in a way that is not economic and profitable for a certain group of people.

ii. We are facing a weak local and organizational management in this region, and councilors, organizations and institutions do not properly use the elite and educated local population living in the region.

iii. At the moment, the change of use in the furnaces is being done, but we must note that these changes of use are purposeful and in line with creating employment for the people of the region, as well as eliminating the insecurity in the region, especially in the areas of the furnaces and during the hours of darkness. It is not to generate income for a certain number of people.

iv. Due to the many security problems in this area, it is proposed to create a recreational-cultural space with the purpose of daily use by creating an observatory to the Alborz mountains in the north of the site, as well as improving the night architecture by creating a light shell that will be used during conferences to present images and In other times, it can be used for advertising images in the direction of advertising and industrial growth, and also this light space will make the area known and become an indicator at night, as well as create security.

v. One of these kilns will become an "industrial growth center". A cultural center with the approach of teaching the industrial history of Iran on a regional and extra-regional scale by holding cultural conferences in a space similar to an open amphitheater with centrality and emphasis on brick chimneys and the arrangement of platforms for sitting in the places that the shell deems appropriate. would have existed.

Introducing and presenting the plan

Compared to other known heritages, industrial heritage has a relatively new field. While industrial heritages are under the pressure of reconstruction, destruction, and redevelopment. A

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

wide social consensus has not been reached in confirming industrial spaces as heritage, so the best option for protecting industrial heritages is to inject a specific use that Be more sensitive to the defense of the values in the site of the brick kilns and public participation.

Undoubtedly, the historical background of the work and the way it was used both during construction and over time is a guide for the restorer in defining the role of the historical building today. According to the studies carried out on the site of brick kilns with the aim of identifying the potentials and spatial analysis of the site, the following things have been taken into consideration in the design of the Shagaig Industrial Growth Center:

i. The design area has an area of about 14,600 square meters around the second chimney on the site from the west side.

ii. According to zoning and checking the features of the zones, the index point of the site is for the design of the area around the furnaces in the western part of the site.

iii. In the western part, a good view of the northern mountains of Elbez, the west wind and a gentle slope to create a space for an open amphitheatre, has created a suitable platform for design.

iv. Merz-oriented design centered on the brick kiln, by creating a shell around the chimney where images are displayed at night on that shell, which is in line with industrial growth and holding related conferences.

v. The main use of the complex is manifested at night, which is achieved with special lighting that is emitted from the shell around the chimney and acts like a media facade.

vi. Based on pedestrian principles, a pedestrian and bicycle lane has been designed around the site. Below the entrance to the design area, there are two cabins for security and bicycle rental.

vii. The main material used in the design is wood, which gives a beautiful effect to the shell in the outer part of the shell with a parametric design during the day, and during the night, the light overshadows the interior of the shell of the design site.

The Complex Function

Physical revitalization and change of functional structure, adaptation of industrial heritage to the needs and requirements of the post-industrial society, as well as economic revival through the injection of new uses for the benefit of industrial buildings are issues that have been raised in connection with industrial heritage. It is very acceptable that the revival and change of use of industrial heritage has a positive effect on the living environment of the residents of the surrounding areas. The reuse of industrial facilities, especially cultural use, is a real challenge in reflecting and preserving the values of the industrial complex.

At the same time, the topic of reuse means showing and highlighting the cultural and architectural features of industrial buildings. This challenge also includes the following.

i. The method of reviving the abandoned post-industrial sites and turning it into an outstanding cultural space as a green landscape by using the open amphitheatre to hold cultural programs in order to promote the historical and industrial culture and familiarize people with the industrial history of Iran.

Design goals

i. Introducing and introducing industrial architecture and raising awareness to communicate with the concept of industrial heritage.

ii. Preservation of the equipment and works on the site of the brick kilns as equipment values of the collection.

iii. Familiarity with the process of brick production through educational workshops for those interested.

iv. Association of memory and nostalgia for the old generation of neighbourhood residents.

v. Improving the level of urban services and green space in this area, along with the cultural use of the complex.

vi. Holding cultural, social, and economic conferences.

vii. Revival of the historical axis of the Dolatkhah region.

viii. Introduction of brick kilns as a recreational and cultural complex.

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Drawings and design documents (Figures 6 -13)

Figure 6: The location of the project in Iranian Bostan - the second furnace from the west side (source: Author).

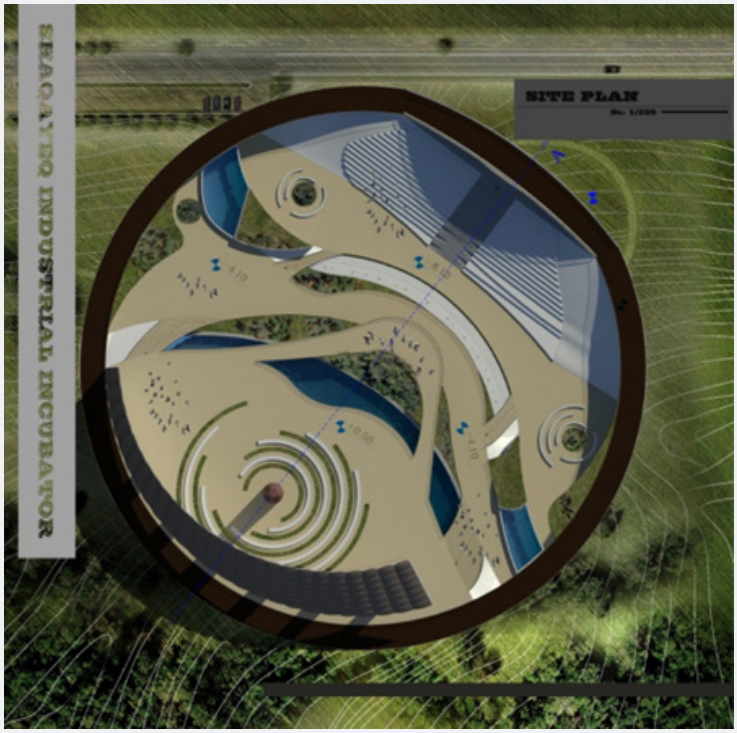

Figure 7: Dolatkhah Industrial Development Complex Plan Site (Source: Author).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Figure 8: The northern Elebation of Dolatkhah industrial complex - seen at night (source: author).

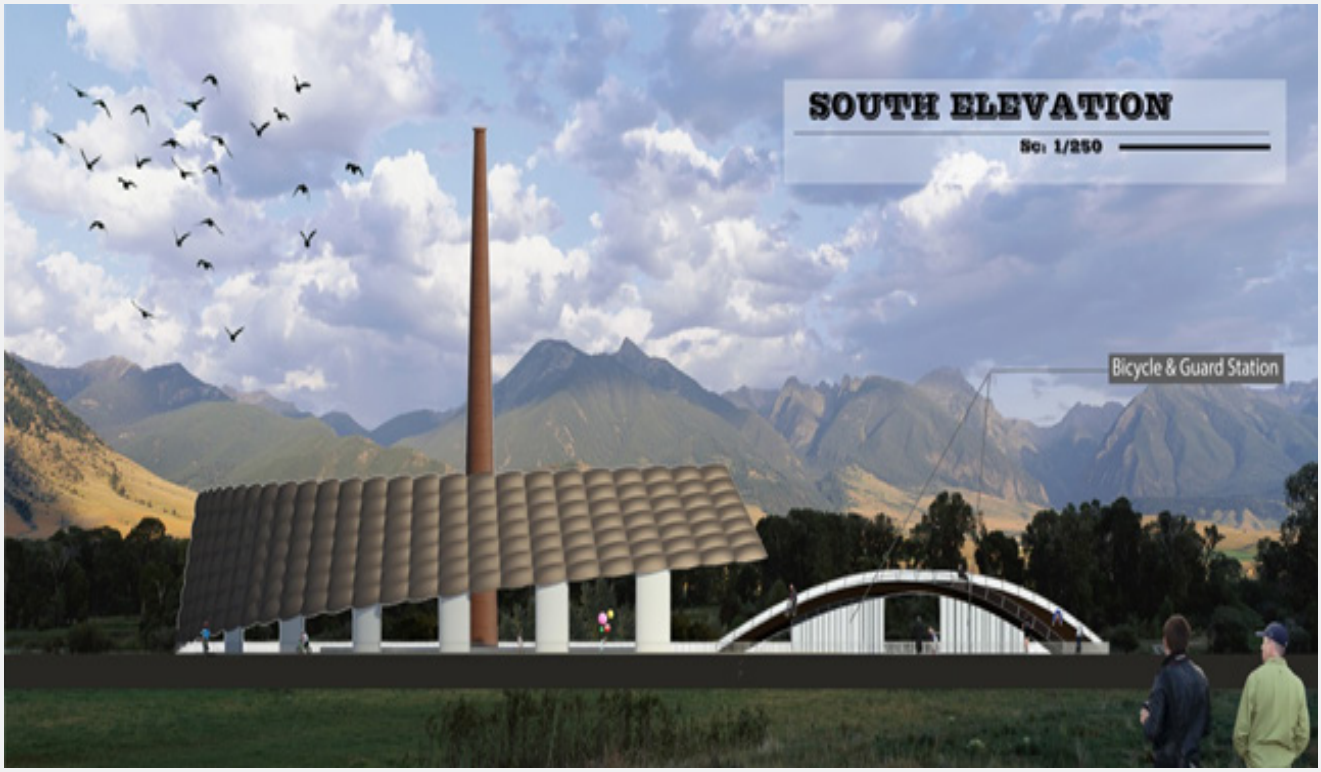

Figure 9: South view of Dolatkhah industrial complex - daily view (source: author).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Figure 10: Longitudinal section A_A of Dolatkhah industrial complex (source: author).

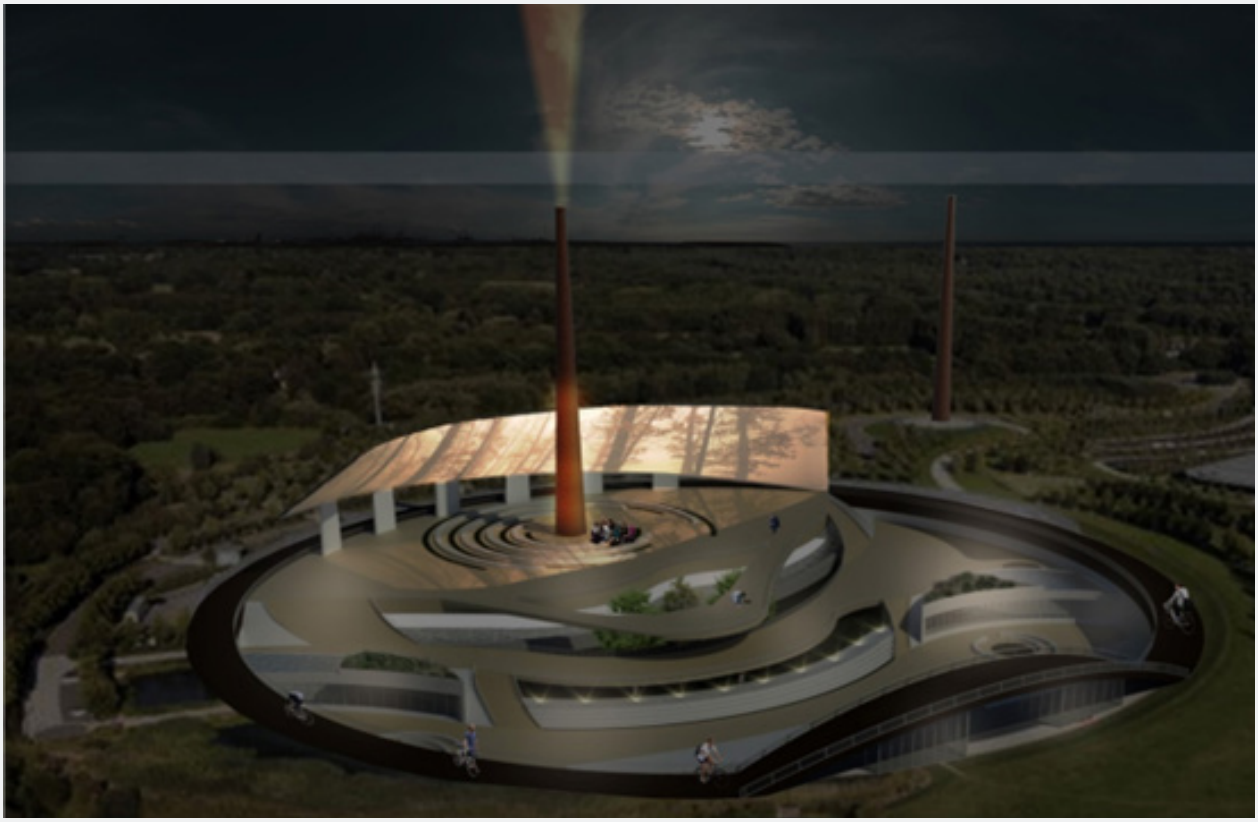

Figure 11: A bird's view of Shaghaig industrial growth complex (source: author).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Figure 12: An observer's view from within the site of the Shagaig industrial growth complex (source: author).

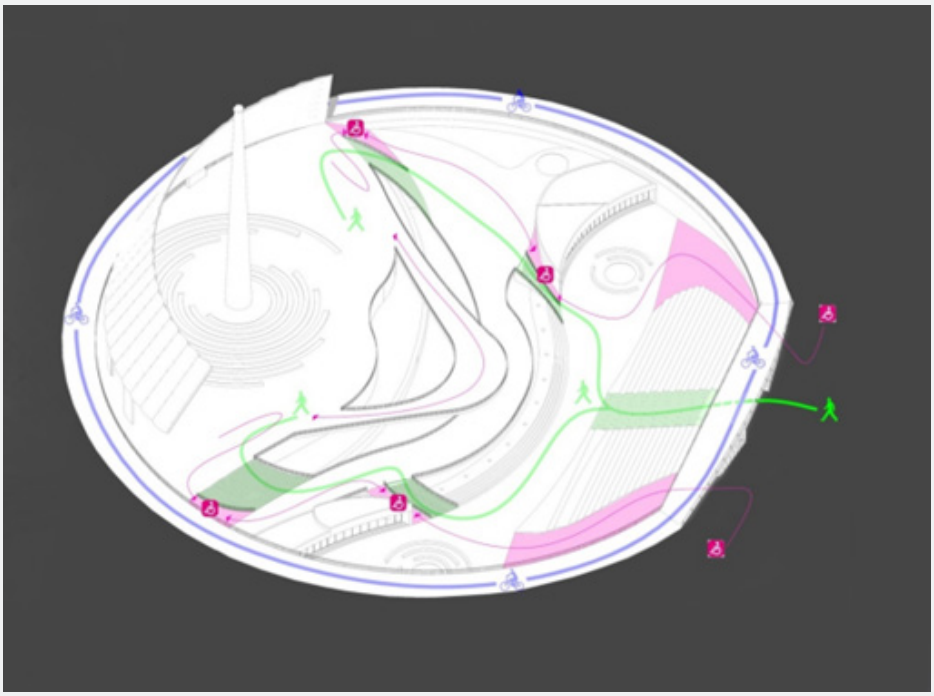

Figure 13: Pedestrian, handicapped and bicycle movement path in Shaghaig industrial growth complex (source: author).

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646

Conclusion

During the study of various landscapes and trying to understand them, I have concluded that beauty is not a simple aspect, but its nature is a landscape, and that beauty is due to the presence of human beings. "The beauty we see in the indigenous landscape is a reflection of our shared humanity" Feifan [11].

This quote from Jackson fully states that industrial landscapes that have unique intrinsic values must be properly protected and highlighted, because they are part of our heritage. The basic premise of the need to protect industrial heritage is that these signs are not only related to history but also narrative and linked to memories.

As Moore and Whelan put it: "To preserve a place uniquely, one must preserve the memories of that place, traits that recall the past in the present."

In this sense, it is necessary to continue studying the city as an evolutionary being, looking at its culture and heritage. For this reason, the revitalization of post-industrial landscapes should be part of the larger and more ongoing processes of urban architecture and design, which are more common in the case of abandoned symbolic factories. This revival includes all the signs and structures associated with industrial activity.

Politicians, developers, stakeholders, and professional urban planners know that the protection of urban design is one of the most important issues that must be considered to preserve the cultural identity of a city. In this way, preserving and reviving industrial heritage is much more important and valuable than celebrating the past, and in fact this revitalization process is part of building the future. Thus, the preservation of industrial heritage connects people, place, and history, and strengthens the sense of place and is a force for the renewal of society.

As Stan Allen [9] puts it: "We need to know that working with the site, not against it, is producing something new that is being recorded with existing complexity.

References

1. Statute of the Council of Europe (1949) London.
2. De Gregorio, Stefania, Mariangela De Vita, Pierluigi De Berardinis, Luis Palmero et al. (2020) Designing the Sustainable Adaptive Reuse of Industrial Heritage to Enhance the Local Context. Sustainability 12(21): 9059.
3. Bazazzadeh, Hassan Nadolny, Adam Mehan, Asma Hashemi Safaei, Seyedeh Sara (2021) The importance of flexibility in adaptive reuse of industrial heritage: learning from iranian cases. International journal of conservation science 12(1): 113-128.
4. Shmoos Abd Al Sattar Jabbara, Said Jassim Mohsena, Ameer Kamel Juwadb (2022) Sustainability in industrial sites. International Journal of Nonlinear Analysis and Applications 13(1): 3653-3665.
5. Benton Short Lisa (2007) Heritage, Memory and the Politics of Identity. In: Niamh Moore & Yvonne Whelan (eds.), Aldershot, VT: Ashgate, Burlington, UK 98(1): 263-265.
6. Allen Stan (1999) Points and lines: Diagrams and projects for the city. Princeton Architectural Press, USA.
7. Annez Patricia Clarke, Buckley Robert M, Spence Michael (2009) Urbanization and Growth. In: Spence Michael, Annez Patricia Clarke; Buckley Robert M (eds.).
8. Loures Luis (2008) Industrial heritage: The past in the future of the city. WSEAS Transactions on Environment and Development 4(8) : 687-696.
9. Aguilar I (1998) Industrial architecture. Concept, method and source. Valencia: Diputacion de Valencia.
10. Ryan Catherine O, William Browning D, Joseph Clancy O, Scott L Andrews, Namita B Kallianpurkar (2014) Biophilic design patterns: emerging nature-based parameters for health and well-being in the built environment." ArchNet-IJAR: International Journal of Architectural Research 8(2): 62.
11. Feifan Xie Philip (2005) Developing industrial heritage tourism: a case study of the proposed jeep museum in Toledo, Ohio. Tourism management 27(6): 1321-1330.
12. URL1: CVCE Website
13. URL2: https://fa.wikipedia.org/wiki

DOI: 10.19080/ETOAJ.2023.04.555646

How to cite this article: P. Zolghadri and M Kazemi Demneh. Sustainable Adaptive Reuse of Industrial Heritage with Reference to Biophilic Architecture (Case Study: Dolatkhah Industrial Brick Furnaces). Eng Technol Open Acc. 2023; 4(4): 555646. DOI: 10.19080/ETOAJ.2023.04.555646