



# **A Comparative Study on the Developmental Trends in the Contemporary Iranian Architecture; Case Study-Khosrawi Leather Factory of Tabriz**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Case Study**

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## **ABSTRACT**

Architecture and urbanization are representatives of our architectural and cultural histories. Many of the lost historical characteristics can come out of the back door citing such representatives. Reconstruction and restoration are a set of activities that deal with the body and spirit of a subject. The subject can be a city, a natural environment or an architectural structure. There are different approaches to reconstruction and restoration, which differ significantly in terms of the level of intervention in a historical subject. This is a technique that our archaeologists are not sufficiently familiar with. From an archaeological point of view on the historical subjects, any document could not be as consistent as the architectural works with the circumstances of the community. The nature of the art of modern history is to see which cases have not been addressed in historical documents. As the historical subjects' evidence, we were not so diligent in the preservation of such subjects as a documentary. The aim of this study is to investigate the heritage of contemporary architecture and to determine how to preserve such works, as well as to review the Khosrawi leather factory in Tabriz, which has now maintained its role as the Islamic Art University. The

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results of this research, which are obtained through a descriptive-analytical method, show that we can preserve the architectural structures by changing the application of traditional structures to the cultural or social ones.

*Keywords: Restoration; heritage; contemporary architecture; Khosrawi leather manufacturing.*

## 1. INTRODUCTION

From a common viewpoint among the architects, we have almost briefly focused on the influences of the architectures of the Islamic era and the architecture of modernism era. Thus, we now comment on them without any brief on them [1,2]. While, sometimes one has to look at a book with a brief interpretation, provided that a close-up view is considered just like a long-shot view. Practically, a brief look makes someone believe that a deep view is not required [2,3,4]. This is a challenge not only the modern architecture facing, but also the traditional architecture. Considering the differences between contemporary architecture and the traditional architecture, we point the traditional structures as a historical work. In the sense that it has a historical implication. This is like evidence, testifying about something. But, we don't have a historical look at contemporary architecture. The contemporary architecture is a kind of architecture which is used and its functional status matters. In fact, it has a short life from the beginning to the end, and it seems to be a consumable architecture. Before the modern era, we built a structure for a longer lifetime than ourselves, but we are now building for a lifetime shorter than ours. This is an imperfection of the contemporary architecture. It can be stated that the works of contemporary architecture to be a document of the historical architecture of the modernist era [5].

Today, in many countries around the world, old industrial complexes have become residential, administrative, cultural and exhibition spaces; while in Iran, despite the fact that the factories constructed at the Pahlavi era, are among the best and most beautiful examples of the industrial architecture around the world, more attention is paid to the destruction of such structures instead of the preservation and restoration. Only a few numbers of traditional industrial structures have been restored and have been subject to the use changes, such as Ighbal Factory of Yazd, Khosrawi Leather Factory of Tabriz, Beryanak Socks Factory,

Khorshid Factory of Kerman, and a few other examples. Meanwhile, these monuments have great potentials for use changes especially to the public and urban uses, due to their large dimensions, the deployment in the urban desirable places, the flexibility of the plans due to the modular structure, etc [6-8]. The use change of industrial historical monuments to the exhibitions, cultural places, public places with a combined use, local industries, etc. can lead to a dynamic urban area and the sense of historical and cultural continuity in the community, the creation of a source for the production of cultural, socio-economic values, in addition to the preservation of such structures. Buildings and historical monuments are the symbols of the cultural identity and rich civilization of the ancestor people in each country, which gives meaning to the current life of its nation today and provides the means for its dignity [8,9]. The historic or cultural-historical trait used today on these monuments points to the antiquity of the man-made structures, which belong to the ancient times. The significance and value of such structures are due to the fact that the factors of their construction are now largely lost and thus, are considered to be typically non-renewable. Therefore, every effort to represent and preserve such structures, in essence, contributes to the survival of the ancient culture and traditions of a land [10].

When expressing the evolutionary trends in the restoration of urban structures, some mysterious questions of this kind are always mentioned:

- Why and how the restoration of structures translates from one era to another?
- In the meantime, how the beginning and the completion of each era, are determined?
- Can the beginning and the completion of each era be determined initially and definitively by specifying the characteristics of that era?
- Do the manifestations or at least the thoughts of the preceding eras disappear, by entering a new one?

## 2. LITERATURE REVIEW

Table 1. Literature review

No.	Author(s)	Publication year	Source title	Conclusions	Publisher
1	Hamid Nouhi	2000	Reflections on the Art and Architecture	The attempt to link art, philosophy, and religion with the basic dimensions of life, namely architecture, urbanization and the environment, is a topic that should be given much attention in the present era.	Game Now, Tehran, pp. 142
2	Hossein Aali Shahram Tajik	2006	Restoration of Historical Structures and Textures	The architecture style of each era reflects the ways the people live and think in that era, while at the same time reflecting the social and cultural dimensions of that era. So far, the attempts to reuse of the historical elements are considered to be periodic and localized and is often limited to a simulation of the traditional architecture.	Jahan Jaam –e- Jam Publishing, Tehran
3	Behnam Esmaeilian	2008	A Criticism of the Contemporary Iranian Architecture	The urban planning and architecture of Iran, with respect to the architectural principles and the focus on the climate and the deployment of the works, have a broad variety and distinctions, each of which has its own uniqueness. The essence of such a value should lead us to a point where we can leave a trace of such work everywhere and every time.	Publications Center for Research on Urbanism and Architecture, Tehran
4	Mohammad Mansour Falamaki	2012	Restoration of Historical Cities and Monuments	Translating the architectural elements from past to today is one of the first necessities of intervention in every structure. Such an arrangement creates the necessary measures in the form and meaning of a structure in a specified time.	Tehran University Publishing, Tehran
5	Titus Burckhardt	1997	Principes et Méthodes de l'art sacré	Urban restoration has been a collection of rational acts. In this way, it seems that the process of urban restoration can be meant in terms of the relevant thoughts and	Translated by Jalal Sattari; Soroosh Publishing, Tehran

No.	Author(s)	Publication year	Source title	Conclusions	Publisher
				philosophy instead of the fundamental changes in the methods.	
6	Matthew Carmona	2003	Public Environments	The combination of structural materials and elements may make it difficult to accurately predict structural behaviour, but it provides the architectural and structural features for the designer.	Oxford University Press
7	Jamaleddin Mehdinezhad, Parisa Sadat Bashteni	2015	The Process of Determining the Use of Masoudieh Historical Complex in Tehran based on the Revitalization Principles of Cultural-Historical Complexes	The historical monument has distinct and unique features that play an important role in introducing its identity. These features can guide us in making basic decisions for the determination of the functions. According to Norberg Schulz, the places are basically what they are, because their unique identities are derived from the socio-cultural context and the historical events in which they occurred.	Scientific Journal of Maremat & Me'mari-e Iran (Biannual) Vol. 9, 2015.

### 3. METHODS

The method used in this study is in line with the research topics of a combination type. Library and descriptive methods were used in order to achieve the theoretical foundations of the research, including the information on restoration and revitalization, sustainability methods, environmental settings, and climatology; The field methods including an interview with the architects and experts on the issues related to historical places were used complementary studies; and finally the survey and comparative methods were used for the data analysis and desirable results have been obtained. The present study was carried out in three phases: Determination, explanation and elaborations. At the determination phase, all the available information about the topic are collected. To this end, the library and internet resources and documents on the restoration of texture and structures topics have been studied firstly, to identify the theoretical approaches in the field.

### 4. INDUSTRIAL ARCHITECTURE

However, the industry is different in its intrinsic sense with what today is called the industry –

which mainly refers to the modern industry. Industrial architecture is the term used to refer to the places that produce industrial products, in fact, the factories that manufactured industrial goods, regardless of the materials used for. The industrial architecture should not be confused with the industrialized architecture. The industrialized architecture mostly refers to the construction of a structure in an industrialized manner which differs with the industrial architecture in nature [11]. Industrial architecture covers metal melting and baking furnaces in the early civilizations to nuclear reactors and satellite launching stations in the contemporary era. Here, we'll notice the definition presented by The International Committee for the Conservation of the Industrial Heritage (TICCIH) for the industrial architecture: "The industrial heritage is the remnants of an industrial culture of historical, technical, social, architectural, and practical values. These remnants include buildings and equipment, repair shops, workshops and factories, mines, processing and refining centers, warehouses and reservoirs, manufacturing sites, energy conversion and utilization sites, transportation and all the infrastructures related, as well as the sites that are consensual for community-based activities related to the

industry, such as housing, worship and education". This international committee has been created as a global consensus to limit the temporal range of industrial heritage after the European Industrial Revolution.

## 5. INDUSTRIAL ARCHITECTURE IN IRAN

One can attribute the earliest examples of Iran's industrial architecture – which is part of the industrial heritage – to the late Qajar dynasty. Until the late Qajar, numerous factories were established in the major cities of Iran. Examples of sugar, porcelain, textile, matching, milling, glass making, ammunition, and even carriage manufacturing factories were available in Iran. However, the architecture of these industrial spaces is a continuation of the traditional architecture of Iran, following the same morphology. At the end of the first and second Pahlavi era, many Iranian architects who were trained either in Iran or abroad were involved in designing modern industrial spaces. Professor Karim Taherzadeh, Abdolaziz Farmanfarmayan, Hooshang Seyhoun, Heydar Ghiayee, and Sirous Bavar were among the famous architects who brought modern Iranian industrial architecture to the forefront. The main feature of the industrial architecture of this era was the general tendency of designers to adopt modern architecture at an international level. Anyway, Iranian architecture was influenced by modernity in all dimensions, and industrial architecture was no exception. However, the industrial architecture of this era was less influenced by the traditional architecture of Iran, and the continuity of Iranian architectural traditions was not very noticeable, but being synchronized with the global developments and the artistic and professional inclusion of modern architectural features in an international level, had given unique values to the industrial architecture. If we consider the industrial structures constructed between 1920 and 1940 as the Iranian heritage of industrial architecture, then the examples of industrial architecture constructed between 1940 to 1979 should be called a part of the world's industrial heritage [12]. The study of the factors influencing the continuity and immortality of an architectural work and the various relevant definitions presented is necessary for the sense that after two modernism and post-modernism artistic eras and their efforts to create a lasting and original artistic heritage, the lifetime of an artistic work had become very shorter compared to the past. As today, we are facing the emergence of some artwork, not only do not

have a place among the community of architects, but also among the general public, and have nothing to offer to the future. This results in the loss of capital of the country, as well as making the architectural art forgotten and worthless. In fact, such an architecture is getting away from the aspirations and suffers consumptive nature, and finds an expiry date like any other goods [13].

## 6. KHOSRAWI LEATHER FACTORY

The old Khosrawi Leather Factory is a beautiful example of the historical architecture of Tabriz. The architectural style of this collection is based on the German style. The Khosrawi Leather Factory was the third leather manufacturing factory in Iran after Mihan Leather and Iran Leather factories. Khosrawi Leather was established in 1931 concurrently with the Sedghiani Matches Factory and the Pashmineh Factory in the southern side of the Hakim Nezami crossroad and came into operation in 1932. The factory had its routine until 1968 but was shut down in 1969 and 1970 due to the bankrupt of shareholders, until its management was deposited to the industrial section by the permission of the Imperial Palace. Since 1979, Khosrawi Leather was a member of the National Industrial Group under the authorization of the National Industries of Iran. But in 1987, the factory got placed inside the residential texture, due to the development of the city, and thus, was transferred to the industrial city of Shahid Salimi for health reasons.

After transferring the equipment to the suburbs of Tabriz city, the monument was dedicated to the Sahand Industrial University to establish the University of Islamic Art of Tabriz. The total area of this complex is 36,000 square meters, comprising 8 three-story and one-story buildings. The restoration of the campus complex has begun since 1997 and, in the same vein, the worn-out buildings were changed to the amphitheatre, administrative building, gym, self-service, and library. Also, some turbines and generators remained in the leather factory plant were repaired to be used in an industrial museum. The complex consists of 8 buildings, four of which are three-story and the others are one-story. The combination of three-story and one-story buildings with two minarets (chimneys) alongside each other provides a beautiful landscape to the entire complex. This complex is numbered 2791 as the complex of Khosrawi Leather Factories in the National Heritage List.



**Fig. 1. A view of the Khosravi Leather factory (authors, 2017)**

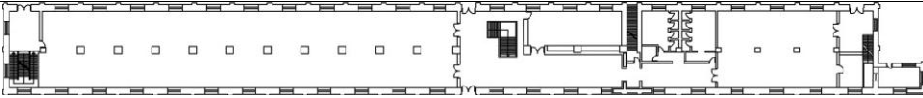
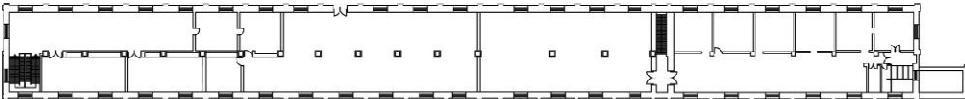
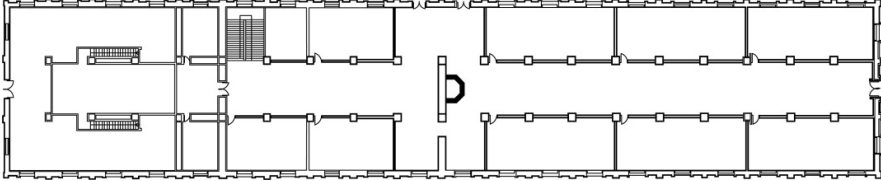
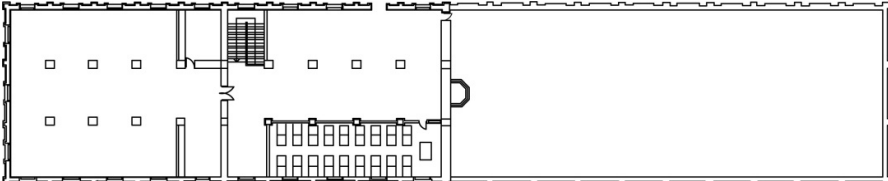


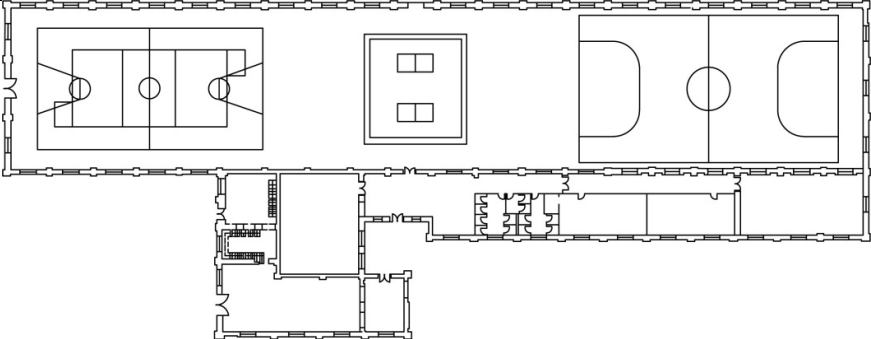
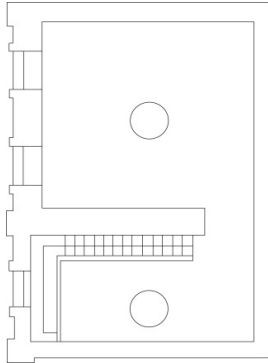
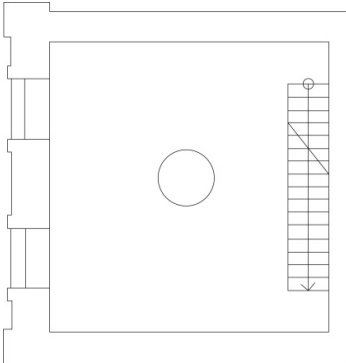
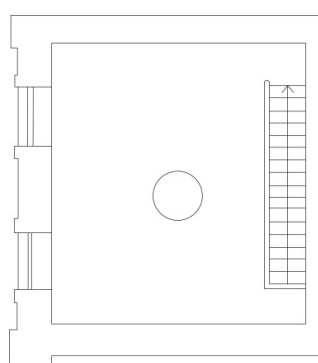
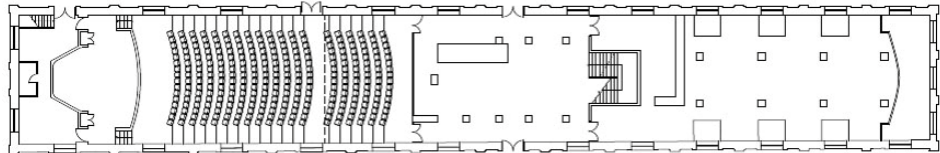
**Fig. 2. A view of the Khosravi Leather factory (authors, 2017)**




**Fig. 3. The Building and Perimeter of the Khosravi Leather factory (authors, 2017)**

**Table 2. Profiles of the buildings of Khosrawi leather factory**

Building name	Plan	Old usage	New usage
Building No.1 (Kamaleddin Behzad)	 <p data-bbox="359 532 625 557">Ground Floor story Plan</p>	Workshop saloon	Ground floor: Workshops First floor: Warehouse
	 <p data-bbox="359 683 590 711">First Floor story Plan</p>		
Building No.2	 <p data-bbox="359 898 625 922">Ground Floor story Plan</p>	Workshop saloon	Ground floor: Library First floor: Workshops
	 <p data-bbox="359 1141 590 1162">First Floor story Plan</p>		

Building name	Plan	Old usage	New usage
Building No.3	 <p data-bbox="359 719 625 745">Ground Floor story Plan</p>	Workshop saloon	First floor: gym, managerial offices, warehouse First, second and third floors: administrative places
	   <p data-bbox="386 1133 617 1159">First Floor story Plan</p> <p data-bbox="722 1133 989 1159">Second Floor story Plan</p> <p data-bbox="1142 1133 1373 1159">third Floor story Plan</p>		
Building No.4	 <p data-bbox="359 1320 625 1346">Ground Floor story Plan</p>	Workshop saloon	Ground floor: self-service First floor: amphitheatre



Building name	Plan	Old usage	New usage
	 <p data-bbox="359 537 590 565">First Floor story Plan</p>		
Building No.5	 <p data-bbox="449 922 716 948">Ground Floor story Plan</p> <p data-bbox="1016 922 1251 948">First Floor story Plan</p>	Administrative places, engineers' offices	Ground floor: administrative places and professors' self-service First floor: workshops
Building No.6	 <p data-bbox="386 1295 653 1320">Ground Floor story Plan</p> <p data-bbox="764 1295 999 1320">First Floor story Plan</p> <p data-bbox="1100 1295 1373 1320">Second Floor story Plan</p>	Cistern	Guest house of professors

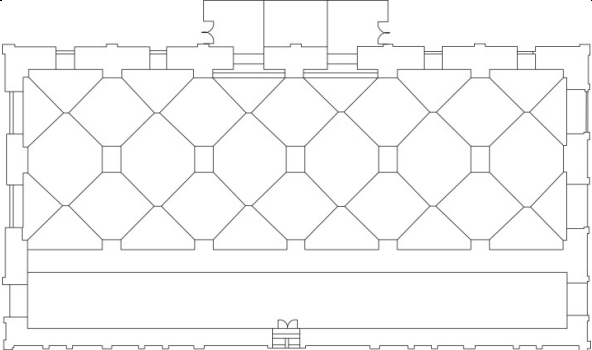
Building name	Plan	Old usage	New usage
Building No.7	 <p data-bbox="359 727 625 758">Ground Floor story Plan</p>	Warehouse	Ground floor: Prayer room and self- service



Fig. 4. The Pictures of Khosravi Leather Collection (authors, 2017)

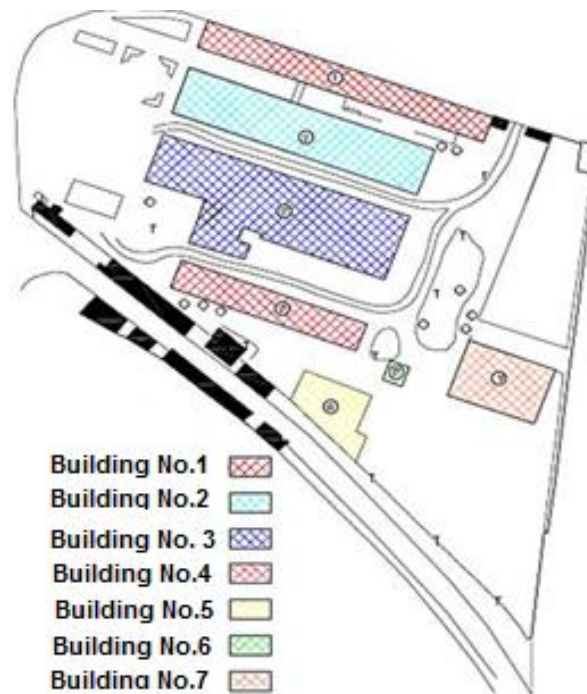
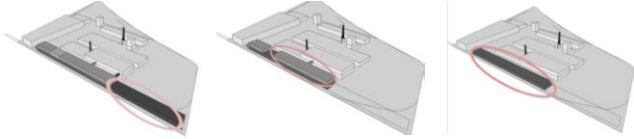
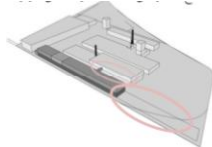
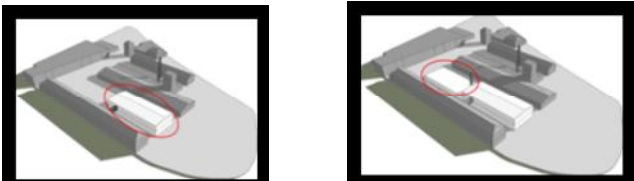
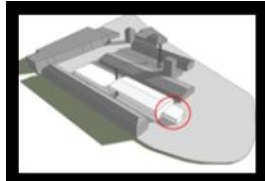


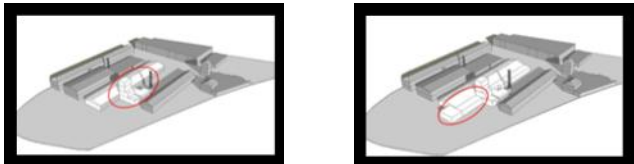
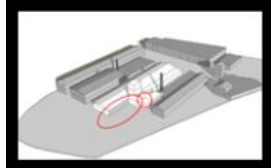
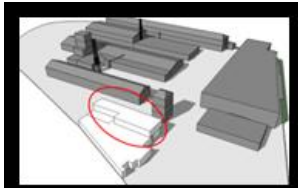
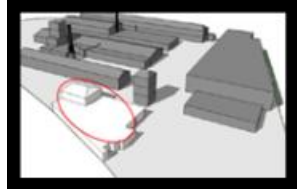
Fig. 5. How to locate collection buildings (authors, 2017)

## 7. RECOGNIZING THE PERIODICITY OF KHOSRAWI LEATHER FACTORY BUILDINGS

The stages of construction and completion of the buildings of this complex have been divided into two periods, during which major changes took place. In Table 3, the changes and extensions are briefly explained for each of the buildings.

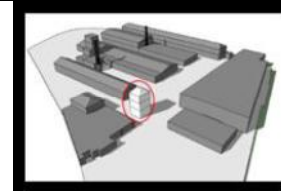
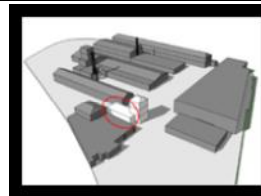
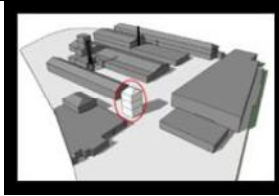
**Table 3. Periodicity of Khosrawi leather factory**

Building no.	First Period (Factory usage) 1931-1967	Second Period (University usage) 1975-2001
1	<p>What has been obtained from the review of aerial photographs and historical documentary evidence, suggests that the main body of the building in the time construction of the factory, was including the underground, ground floor, first floor and the bridging. In this period, the underground and the ground floor were first constructed, then the first floor was built in the eastern part and then the western part was added. At the last stage, the empty section between the eastern and western parts was subject to the construction, thus completing the first floor. During the next stages, the western part was built as a warehouse in one floor and added to the main building, and also a bridging was constructed at the western side due to the need for a connection between the first and second floors, and the first floor was developed along the buildings number Two to Four towards to the west.</p>	<p>During this period, building extensions were removed. In the first stage, the one-story warehouse was destroyed due to the passage of the Azadi Ave. In the second stage, a part of the two annexed floors of the building was destroyed, thus buildings One to Four were merged. At the same time, the western bridging was also destroyed.</p>
		
2	<p>The study of aerial photographs and historical documentary evidence suggests that the main body of the building was including the western part of the building (two-story part) in the first stage of the construction. The construction of these two floors was also within a small time interval. The eastern side of the building, as well as the chimney, was annexed in the next stage.</p>	<p>In this period, a small part at the western end of the building as well as a bridging was constructed between the buildings No.2 and No.3. However, after a short time, the western part and one bridging have been destroyed, so the extensions were removed from the main body of the building.</p>
		

Building no.	First Period (Factory usage) 1931-1967	Second Period (University usage) 1975-2001
3	<p>According to the historical documentaries, the primary building was including the main shed, the horn centre and the chimney. In the next stages, the southern part was added to the main shed with a flat roof.</p>	<p>In this period, the western and southern extensions of the building were removed and the ceiling of the chairmanship office was changed from a curvilinear shape to a flat one.</p>
		
4	<p>No changes or extensions have been made over time in this building. Most of the changes are of a restoration nature and have been done since 1999.</p>	
5	<p>What has been obtained from the review of aerial photographs and historical documentary evidence suggests that the primary body of the building was the ground floor (parallel to the site), and the first floor (on the street side), which was used as the administrative part of the factory.</p>	<p>In this period, the northern part of the first floor was destroyed and the southern part remained as a one-story building. During this period, there were also changes and extensions in the open area in front of the first floor (parallel to the street).</p>
		
6	<p>According to the historical documentaries, the primary body of the building consisted of a tower as a water reservoir. In the later stages, the western part is annexed on one floor.</p>	<p>In this period, the western part was destroyed.</p>

**Building no. First Period (Factory usage)  
1931-1967**

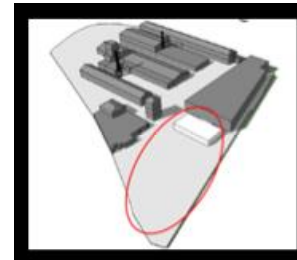
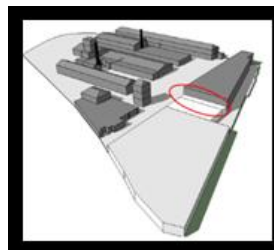
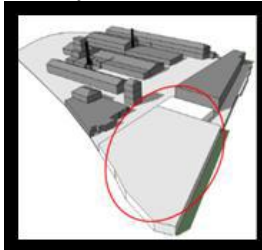
**Second Period (University usage)  
1975-2001**



7

The review of aerial photographs and historical documentaries indicates that the primary body of the building in the first stage was including the main building of the mosque in the form of a technical office and only with a window view to the west. During the next stages, the bridging was constructed between the mosque and the tannery house.

During this period, part of the building was destroyed and the entrance counter was designed and built in the northern side. Also, the southern and eastern sides of the mosque were excavated and the use of the building was changed from the technical office.



## 8. A COMPARATIVE STUDY ON THE PERFORMANCE OF KHOSRAWI LEATHER BEFORE AND AFTER THE REVITALIZATION

In this section, a comparative study is conducted on the performance of Khosrawi Leather, before and after the revitalization. The results of the study on the changes made to each of the studied buildings are summarized in the following tables.

**Table 4. Revitalization activities – building No.1**

Topic	Changes made	
Strengthening and facility actions	Execution of drainage canal in the vicinity of the basement for the transfer and guidance of shallow groundwater	
Corrective actions (Compatibility with the new applications)	Underfloor	To improve the flooring, to modify the brickwork of the pillars and arches, to add the lighting, to replace the entrance door, to remove the added partitions
	1 <sup>st</sup> floor	There is no activity on this floor.
	Ground floor	Executing the dropped ceiling in the western part (for humanizing), adding secondary walls, modifying the walls and openings
	Southern facade	Changing the frames of the facade from gypsum to brick, modifying the underground floor lighters, replacing wooden frames, creating an independent entrance for the metal workshop
	Northern facade	Modifying the structure and arrangement of the windows, painting the window frames, installation of window fence fenders, installation of the fence for increased safety and prevention of damage to the building
	Eastern facade	Changing the gypsum frames, removing the shadings, removing the entrance, removing the small lightning for the first floor
	Western façade	Changing the gypsum wall to the brick one, the entrance removal

**Table 5. Revitalization activities – building No.2**

Topic	Changes made	
Strengthening and facility actions	Changing the first-floor ceiling from the wood truss system to the metal beams, creating a flat-roofed dropped ceiling, (the wooden truss was then placed on this roof and a gable roof installed on it).	
Corrective actions (Compatibility with the new applications)	Ground floor	To destroy the concrete pillars, to remove the concrete floors of the building, to partition the interior space, to add a half-floor in the workshop space, to create a half-floor in the library, to modify the flooring
	1 <sup>st</sup> floor	To partition the interior space
	Facade	Replacing doorways, implementing new windows with the original design

**Table 6. Revitalization activities – building No.3**

Topic	Changes made	
Strengthening and facility actions	Reinforcement of faulty parts of the ceiling of the shed, reinforcement of the ceiling of the arch of the first floor for the chairmanship office	
Corrective actions (Compatibility with the new applications)	Shed	Destruction of concrete foundations on the floor, levelling the floor, covering the floor with gym covers
	Chairmanship office	Execution of wood dropped ceilings, changing the direction of the stairs, changing the ceiling from the semicircular arches to the flat roof

**Table 7. Revitalization activities – building No.4**

<b>Topic</b>	<b>Changes made</b>	
Strengthening and facility actions	Design of the openings in the collision point of the annexed floor with the lightning (creating a ventilation system)	
Corrective actions (Compatibility with the new applications)	Ground floor	Creating a wall between the entrance and self-service sections, creating the necessary facilities for dishwashing, sloping the floor and ceiling of the amphitheatre, creating a communication step
	1 <sup>st</sup> half-floor	Replacing the trussed ceiling with the dropped ceiling for the self-service, creating the projector room and the balcony section at the amphitheatre
	Southern and western façade	Changing the frames of the facade, the execution of openings in the form arches, the complete destruction of the ceiling and the execution of a gable roof
	Eastern façade	Modifying the central framing by replacing the openings from the windows to the doors

**Table 8. Revitalization activities – building No.5**

<b>Topic</b>	<b>Changes made</b>	
Strengthening and facility actions	Design of concrete structures in the eastern part of the ground floor (Administrative Section)	
Corrective actions (Compatibility with the new applications)	Ground floor	Interior spatial partitioning (disadvantages: the lack of independence of the spaces due to the sound transmission in different sections)
	1 <sup>st</sup> half-floor	Execution of wooden dropped ceilings, floor heating system, flooring with clay bricks
	Eastern façade	The addition of one-floor administrative department to the complex
	Northern façade	The addition of administrative section and WC, to construct a façade for the added parts

**Table 9. Revitalization activities – building No.6**

<b>Topic</b>	<b>Changes made</b>	
Strengthening and facility actions	_____	
Corrective actions (Compatibility with the new applications)	Ground floor	Execution of the ceiling of the arched vault, the addition of a new floor to the building, execution of metal stairs
	Western façade	Removing a small extension building, designing a semi-open space along the well

**Table 10. Revitalization activities – building No.7**

<b>Topic</b>	<b>Changes made</b>	
Strengthening and facility actions	Increased compressive strength of the complex, insulation against the moisture, increased lateral strength of the complex, lighter ceiling, implementation of the floor heating system	
Corrective actions (Compatibility with the new applications)	Ground floor	Revitalization of pillars and arches
	Eastern façade	The execution of the stone plinths, the implementation of refinement of bricks, the replacement of defective bricks and the removal of downpipes
	Western façade	To transfer the entrance to the northern side, and to turn it into a window
	Northern façade	The removal of downpipes,



## 9. CONCLUSIONS

The revitalization of historical works, especially industrial buildings within the urban areas is one of the most practical methods of urbanization used to prevent the abandonment of historical monuments. In this research, the restoration and revitalization of the Khosrawi Leather Complex of Tabriz to the Islamic Art University are reviewed. The results of this research indicate that:

The use change in this complex has been done satisfactorily because the Khosrawi Leather Complex has a great potential for conversion to the educational environment due to the appropriate location, and structural features such as large spaces, multiple buildings, and so on. In similar studies, it is recommended to revitalize the historical industrial complexes as an educational place.

The replacement of space usages in existing structures is best suited.

The revitalization activities carried out inside the buildings have been conducted to adapt the building with the new intended use.

The building No.6 is considered as the guesthouse for the professors. It is recommended that such an application be placed in a semi-private space, away from the educational environment.

In general, comparing the results of this research with the theoretical foundations for the revitalization of historical buildings, it can be said that the revitalization of Khosrawi Leather Complex is one of the most successful instances in this field. In line with this research, the functional adaptation of this complex from the perspective of user perception and their satisfaction rate can also be studied.

The main findings of this practical experience in the field of the revitalization of industrial complexes and adapting to educational use are as follows:

To implement the dropped ceiling to fit-out the height of the ceiling with the standard height of a human: The actions carried out at the ground floor of buildings No. 1 and. 9 (see Tables 4 and 9).

To implement a lighting system appropriate to educational use: The actions carried out at

the underfloor of building No. 1 (see Table 4);

To create openings in order to use the natural sunlight: The actions carried out at the shed of building No.3 (see Table 6);

To construct interior and exterior facades appropriate to the new use: The actions carried out in all buildings of the complex (see Tables 4 to 10);

Interior partitioning: The actions carried out on all buildings of the complex (see Tables 4 to 10).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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