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In the Name of God

Dear Readers,

I, on behalf of the editorial board, am proud to present this issue of the *International Journal of Applied Arts Studies (IJAPAS)* under the sponsorship of the Islamic Azad University, Yazd Branch. We were driven to found the *IJAPAS* by a noticeable lack of journals, in the Islamic Republic of Iran in particular, devoted to architecture, urban design, urban planning, architectural conservation and restoration, painting, art history, graphic, digital arts, fashion design, performing art, industrial design, aesthetics and semantics. Although the academic world is increasingly driven by cross-disciplinary visions and models, we seek multi-disciplinary views, an attempt to inform researchers, graduate students, and professionals about the trends, ideas and innovations being put forward in applied arts. To this end, in addition to standard articles, in every volume of the *IJAPAS* we hope to provide a special issue related to a respective field with innovation.

We are also sending out a call for papers related to *Applied Arts* to appear in the next issue of *IJAPAS* in Nov – Dec 2021.

Finally, I should mention that we are committed to a speedy refereeing process for every article submitted to us. We effort to reply to all papers submitted within five weeks' time with a response about acceptance or rejection. We also do not require formatting for submissions in our style until *after* the paper has been accepted by us for publication.

I would like to thank our Editorial Board for their work so far in helping to establish the *IJAPAS*. And, finally, I would like to extend my deepest gratitude to Dr. Ali Boloor, the assistant editor of the *IJAPAS*, for all of his hard work to ensure the timely completion of the issue.

I am delighted to invite you to visit us at www.ijapas.org.

Sincerely,

Dr. Abolfazl Davodi Roknabadi
Editor-in-Chief
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Assessing Sustainable Local Identity in the Commercial Centers with an Emphasis on Biophilic Design (Case Study: Shiraz Enghelab Bazaar)

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Abstract

The innate tendency of humans towards nature has made them pay specific attention to this issue in different fields, and particularly architecture. This study was conducted to recognize common components of biophilic architecture and local architecture and analyze their impacts on helping designing something with sustainable local identity. As the local identity of an architectural work can play a key role in creating new works, emphasizing common components of local and biophilic design can help not only the sustainability of work but also the physical and mental health of individuals. In this applied research, research questions were answered using architectural design models in combination with biophilic design components affecting space localization. Data collection was done using the library method, field observations, and using a questionnaire. After analysis of the questionnaires, common components of local and biophilic architectures were introduced. Then, the data were measured in Shiraz Enghelab Bazaar as a sample business center the results showed that in terms of the effect of all common components of local and biophilic architecture on the local identity of a business center, three components including nature-environment harmony, natural facilities of the environment, and climatic conditions had the most effect on the sustainable local identity of a business center respectively.

Keywords: Local Identity; Business Centers; Biophilic Design; Shiraz Enghelab Bazaar

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1. Introduction

Environment design based on similarity to natural elements is known as biophilic architecture. Biophilia is the reflection of human's enthusiasm to communicate nature. The relationship, especially in the current world due to modern and urban life, has been distorted severely. The concept of biophilia explains the interests of humans to watch natural landscapes, hearing the sound of sea waves, seeing birds and wildlife, and so on. The basic hypothesis in the biophilic architecture is on the said basis. The hypothesis expresses that creating architectural spaces in such a way that reminds content of natural components can leave positive effects on the mind, emotions, feelings, and mental health of humans (Söderlund and Newman, 2015).

In the present study, library investigations have paved the way first to discuss the issue and make a research question. In this field, the references are specified after determining the research objective. Then, the statistical data and field references have measured the research hypothesis on the identity of local architecture in Shiraz Enghelab Bazaar based on biophilic design components.

This study aimed in achieving some components of the biophilic architecture, which can affect the sustainable local identity of a business center, so that they can be used not only to design an architectural work with local identity with environment-friendly components, but it can also emphasize mental health of the users.

The statement of the problem in this study helps going beyond physical forms of local architecture and identify other dimensions of architecture, such as biophilic architecture, in terms of identification of public spaces to create local identity in the business centers.

Also, this study tends to answer the following research questions:

- What are the common components of biophilic and local identity approaches in commercial centers?
- How much common biophilic and local components effect on domestic identity of commercial spaces?

According to the research questions, the hypotheses are:

- It seems that measurement of biophilic components in the localization of a business center can help the achievement of common components for local architecture and biophilic architecture for space identification.
- According to the field investigations and statistical analysis, the effect of all common biophilic local components can be seen and measured on domesticizing the Shiraz commercial centers such as Enghelab Bazaar.

2. Literature Review

Human has been depended on nature for all his needs hence there had been a deep connection between human and nature. However, in modern days, when industry has spread its influence on human life mainly after industrial revolution, this connection has been weakened. Human was leading to depend on man-made industry in industrialized cities rather than pure nature; hence he had been gradually alienated from nature.

No one would reject the fact that human have been completely dependent on nature throughout the history of his life on the Earth (Mohammadi Moghadam, Singh, and Yahya, 2015).

Growing body of scientific study, beside nature and human beings, increasingly reveals that most of our inherent tendencies to affiliate with nature continue to exercise significant effects on people’s physical and mental health, performance, and wellbeing (Kellert and Calabrese, 2015).

Today, regarding the various settings and experiences of our lives, we should be able to find characteristics that would have improve our chances of survival. The natural world keeps us healthy and helps promote the physical performance as well (Almusaed, 2011).

Biophilic architecture is a part of an innovative view in architecture, where nature, life and architectural estimation merge to create a lively habitable structure fit to satisfy the demands, restrictions and respect for both people and the environment (Almusaed, 2011).

The innate tendency of humans towards communicating the nature and considerable effects of communicating the natural environment on the soul and body of humans has made people seek a logical and appropriate relationship between inside and outside spaces. Today, the physical and mental need of humans to communicate nature has made all societies be considered as cultural heritage (Mahdinejad et al., 2015).

2.1. Biophilia and Biophilic Design

The term "Biophilia" was used for the first time by a psychologist called Eric Fromm and was generalized later by a biologist called Edward Osborne Wilson. The word, which is originated in biology and psychology, and is evolved in neurology and architectural sciences, refers to the tendency of humans toward nature and natural systems (Aref and Taheri, 2015).

Stephen Kellert has introduced biophilic design as an updated innovation, the structure of which is designed over history (Kellert, Heerwagen, and Mador, 2008) (Fig 1).

In summary, biophilic design is the identification of the innate need of humans to communicate nature, along with sustainability and international strategies of designing environments to enhance the quality of life (Pollack, 2006: 37).

One of the main objectives of biophilic architecture is returning man to nature. This kind of architecture tries to eliminate the conflict between man and nature. Biophilic architecture wants not only to connect man to nature physically but also is aimed at connecting man to nature mentally. This is design and construction based on the nature in the mind (Taheri and Tahmasbi, 2015).

Biophilic design is an effort to remove the gap between modern architecture and the needs of humans to communicate the natural world. Biophilic architecture is a heuristic approach emphasizing the significance of maintaining, enhancing, and restoring the useful experience of using nature in manmade environments (Pollack, 2006).

Biophilic encompasses two approaches of direct and indirect use of nature (Kellert, Heerwagen, and Mador, 2008). The two approaches have been classified by Kellert et al in 6 ranges including natural patterns and processes, natural forms and shapes, environmental features, light and space, place-based relations, man-nature relationship evolution, and biophilic design elements (Bitaraf, Habib, and Zabihi, 2017) (Table 1).

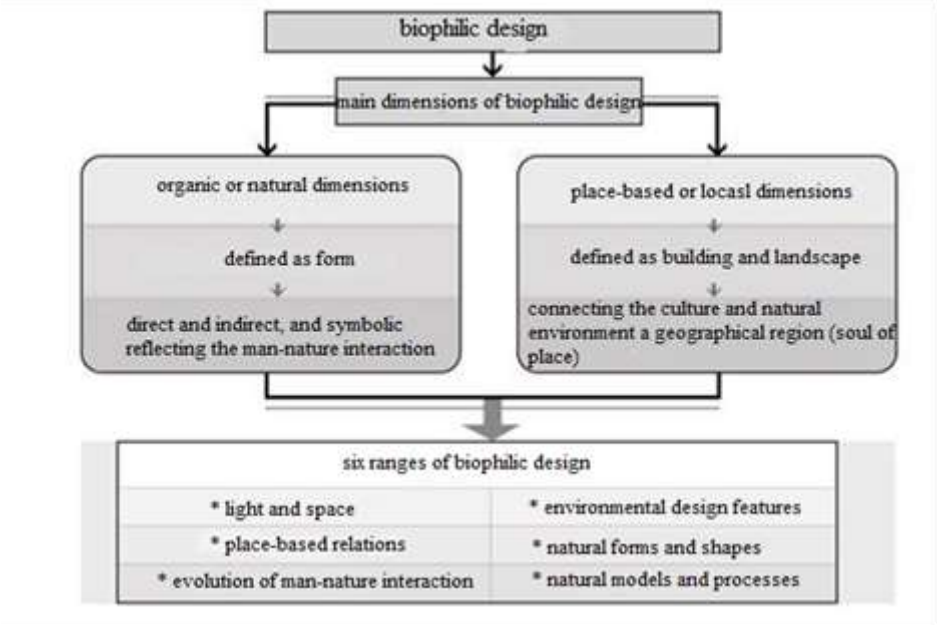

Fig 1 Biophilic design (Source: Authors)

Table 1 Biophilic variables (author with a focus on kellert biophilic elements)

	Biophilic features	Main characteristics of Biophilic Architecture
1	Environmental features	Light, air, water, plants, animals, fire, natural materials, …
2	Natural shapes & forms	Images of nature, natural colors, animal and plant motifs, arches, domes, simulation of natural features, biomimicry, …
3	Natural patterns & processes	Sensory variability, age, change, patina of time, growth, transitional spaces, dynamic, balance, fractals connection of properties in nature with the built environment
4	Natural spatial relationships	Spaciousness, spatial variability, space and shapes and form, spatial harmony, inside-outside spaces, …
5	Place-based connections	Geographic connections, historic connection, ecological and cultural connections to place and local materials, landscape ecology, no place lessness, suitable for geographic context
6	Human-nature connections	Prospect and refuge, order and complexity, affection and attachment, attraction and beauty, focus on aspects of the inherent human relationship to nature, …

2.2. Local Identity of Architecture

Concerning the nature-based approaches in architecture, one can refer to multiple cases such as reference to habitat wisdom (Bitaraf, Habib, and Zabihi, 2017). According to the approaches towards local architecture in various references, and definitions of these approaches for the local architecture, four determinant factors for local architecture can be considered as the same generators of sustainable development: nature, humans (society), construction, and model. Hence, according to the degree of significance of each factor in different approaches towards local architecture, different definitions can be provided for the local architecture (Akrami and Damyar, 2017).

The investigations on local architecture show that titles such as identity, tradition, and structure are the most underlying factors in the field of local architecture, and using that in contemporary architecture. Although local architecture has been changed a lot over history, it has preserved its special identity (Mulanaei and Soleimani, 2016).

The local architecture is sometimes defined on this basis that has been created by humans, and experts have not interfered. Hence, local architecture speaks about a certain local culture, which has been created by the people of the same region, and has been grown and has been affected under difficult events. Although popularity and popular construction and language in local architecture is the common point of the majority of definitions, two different types of definition with different uses are created in terms of communicating the nature, and that material aspect or conceptual concept of the natural facilities are preferred (Akrami and Damyar, 2017) (Table 2).

Table 2 Vernacular architecture (Source: Author)

	Vernacular features	Main characteristics of Vernacular Architecture
1	Cultural characteristics of societies	Compatible with local culture of society
2	Relevant with climatic conditions	Wind, light, solar radiation, humidity, air movement, temperature, rain, …
3	Local materials	Using local materials, using accessible materials
4	Social and economic facts of the community	Compatible with economy and culture of its society
5	Coordinate with natural environment	Topography, easily integrate with nature, low environmental impacts
6	Bringing back the reflection of events to life in social memory	Let the social occurrence to be kept on mind
7	Durability &versatility	Durable materials, durable designs, easy and functional designs

As local architecture is qualified to be interconnected to nature, it can gain timeless quality, which is attributed to nature with the timeless man-nature connection. In the local societies, there is deep harmony between the man and buildings. Falamaki has referred to the popularity of local architecture, and has counted two types of environments as the main characteristics of local architecture:

"Connection to the cultural environment or cultural values, with cultural behaviors, and with the implicit regulations in it on one hand, and connection to the natural environment or the dataset provided for human by the land on the other hand" (Akrami and Damyar, 2017).

When the features of vernacular architecture and biophilic design parameters are reviewed, it is clear that there are common values in terms of design criteria. In vernacular architecture, the building and its environment is designed to meet all human needs by using the opportunities and the possibilities offered by nature. The designer/constructor/user tries to eliminate every single detail that could adversely affect his life. As a natural result of this process, vernacular buildings involve the values of today's concept of sustainability (Murakami and Ikaga, 2008) (Table 3).

Table 3 Common Features of Biophilic and Vernacular Architecture (Source: Author)

Common features of Biophilic & Vernacular design	**Architecture**	
	Characteristics	**Examples**
Environmental features	Lights, air, water, plant, animals, fire, etc.,	Using natural light, water pond and fountain, pools, natural greenery and plants, domestic animal (fish, birds, …)
Natural materials & colors	Local and natural materials, accessible materials, natural colors	Using, natural materials such as wood, clay, brick, stone, natural colors which comes from nature
Relevant with climatic conditions	Geographic connections, wind, light, solar radiation, humidity, air movement, temperature, rain, ...	Sustainable design, using natural energy and sources, design based on climatic conditioned trying to use natural controlling Systems
Coordinate with natural environment	Topography, integration with nature, low environmental impacts, landscape ecology, suitable for natural context	Contextual thinking, harmonized with the site, protecting and preserving the land
Durability & versatility	Durable materials, durable designs, easy and functional designs, age, change, growth, patina of time	Using durable and local material, using different natural textures, materials with age showing features such as Copper, brick, ….
Natural forms & patterns	Arches, domes, simulation of natural features, natural motifs	Forms which come from natural system and patterns, using natural motifs with nature ideas
Economic facts of the community	Compatible with society's economy	Using local materials and designs, designing with cultural look to the context
Social & cultural connections	Compatible with local culture of society, let the social occurrence to be kept on mind	Focusing on cultural look of the society, upgraded look to the traditional design of the context

2.3. Commercial Centers

Commercial centers play various roles such as political, social, religious, relational, economic, and cultural roles, the combination of which gives soul to this space. The commercial spaces play a key role in the creation of new urban spaces as one of the most important urban uses, along with urban economy development (Sarvar, Salahi Sarikhan Beiglu, and Mobaraki, 2017). These spaces have been considered as one of the emerging and growing phenomena in Iran (Azizi and Asadi, 2017).

Not only gaining income and economic issues should be considered in commercial spaces, but also different approaches and continuous plans should be taken to be responsive to a wide range of the society. These spaces are used by different age groups, can play a key role in growth, prosperity, and generation of culture, and pave the way for the mental health of citizens (Bahmani Kazerooni, and Pourjafar, 2014).

Bazaars of different cities were not equally important. Some of the cities which were located alongside trading routes (like Silk Way) had a greater bazaar, and the others which were distant from these routes had a weaker bazaar. Therefore, some act as an international bazaar (Moosavi, 2004) (Table 4).

Table 4 Bazaar Types (Source: Moosavi, 2004)

Types of Bazaars in the cities of ancient Iran	
Periodic Bazaar	-With no special architectural space. -Organized everywhere and in known intervals (weekly, monthly etc.). -Could be done in every part of the city or village. -Usually, an outdoor space Note: This kind of bazaar has lost its importance by the passage of time and the change of social conditions
Urban Bazaar	-Accommodate commercial activities as well as social and cultural activities of people -A covered public passageway which is surrounded by shops and stores in two sides. -A place for shopping, walking, social dialog, and cultural interaction of people.
Local Bazaar	-Smaller type of urban bazaar -Allocated to a particular area or district of the city or town -Its architectural characteristics were similar to urban bazaar -composed of fewer shops and stores

2.4. Case Study: Shiraz Enghelab Bazaar

The common biophilic and vernacular variables were studied in Shiraz different commercial spaces, and from those spaces Enghelab bazaar was selected as it had more than half of the variables.

Table 5 Features of biophilic & vernacular variables in Enghelab bazaar (Source: Author)

	Environmental features	Natural materials & colors	Relevant with climatic conditions	Coordinate with natural environment	Durability & versatility	Natural forms & patterns	Economic facts of the community	Social & cultural connections
Enghelab Bazaar								

Enghelab Bazaar is located in the distance between Bagh Safa bypass and Meshkinfam Street in the southern dimension of Shiraz Azadi park. One of the clearest characteristics of this bazaar is its special location. The main purpose of the establishment of Enghelab Bazaar has been to provide a local market for the residents of surrounding neighborhoods. Hence, Enghelab Bazaar is located in limited spaces near the Khoshk River (Askari, 2019) (Fig 2).

Fig 2 Place situation

Although a small space is considered for this bazaar, the place was changed into a large market over time and following the considerable welcoming by local people. Through creating an additional section in front of the bazaar, space was provided for business and wide expanded commerce. As it was mentioned, Enghelab Bazaar was activated as a neighborhood market at the first. Hence, urban planning to build different stores of the bazaar was done on this basis. Therefore, the architecture of the bazaar is like a local market; although it has wide expanded dimensions. This has resulted in the most underlying aspects of differentiation of Enghelab Bazaar from other shopping centers in Shiraz (ibid).

According to the field investigations, it seems that the studied bazaar has been established under the supervision of the municipality and by the bazaar cooperation with not predesigned architecture in the said place for the welfare of retailers of the region. The stores in this center have been formed in network form. The semi-roofed corridors of the bazaar, along with the pause paces specified by gardens, have created special variety in the space. Despite the weaknesses including urban pollution, lack of appropriate infrastructures, lack of rich architecture, and inadequate materials, the complex has some strengths, which can make a hopeful future (Fig 3). According to the mentioned

characteristics of the Shiraz Enghelab Bazaar and analysis of common biophilic-local components in this space, it seems that some components are neglected; although they are capable to be used in this space. This issue has been investigated in the rest of the paper (Fig 4).

Fig 3 Enghelab bazaar aerial view (Source: Google map)

Shiraz Enghelab Bazaar		
Functional components	Aesthetic components	Environmental components
• Suitable roadway access • Flexibility of urban edges • Existence of major green space (Azadi Park) • Existence of river • Active and live fabric in daytime • Multi-storey car parking	• Existence of spatial openness • Almost similar dimensions and proportions of uses (Dardasht Daneh)	• Wide and sustainable vegetation • Shading by pedestrian crossings as a result of wide vegetation • Existence of visual landscapes
• Using local patterns • Adjacency to Homa Hotel • Trans-neighborhood uses in the main street edge • Possibility of pedestrian axis empowerment	• Adjacency to greenspace and river, and modeling them as natural contextualism • Fabric renovation	• Adjacency to major greenspace, such as Azadi park • Adjacency to river • Allocating some part of each adjacent use to greenspace

Fig 4 Enghelab bazaar Components (Source: Authors)

3. Methodology

This study is an applied one and aims in identifying the architectural design models affecting space localization in combination with biophilic design. Then, field and survey studies were used in form of a questionnaire for the data collection and analysis. Before the collection of the main data, an experimental study was done to determine the readiness, ease, and comprehensiveness of the items designed in the questionnaire. The questionnaires were distributed by meeting in place, and some explanations were provided for 35 users in Enghelab Bazaar in the age group above 18 years old.

The investigations showed that 10-30 participants were qualified to confirm the reliability and validity of the instrument. Based on the feedback of participants in the experimental study, the time of filling out the questionnaire was appropriate, and questions were easy. Hence, nothing was changed in the final questionnaire.

After experimental analysis, 140 questionnaires were distributed. As this study was aimed at analyzing the opinions of the users of the designed space, the sampling method in this study was simple random sampling. The sample size was considered at 140 people based on the target population and based on an average number of daily users.

According to the research hypotheses, an appropriate statistical test was used in SPSS-24. Statistical analysis of mean value, correlation, Friedman ranking, and Cronbach's alpha were the tests used in this study. The results were analyzed at the error level of 5% (p-value=0.05).

To test the research hypothesis, 21 items were designed in the frame of 8 variables. These items were confirmed by the masters and experts in the field of architectural and environmental psychology theory. Finally, the results were analyzed using SPSS-24.

Cronbach's alpha obtained for research variables and whole questionnaire showed that the research instrument has high reliability, and the results are reliable. Table 2 has presented the reliability scale obtained in this study.

Table 6 Reliability statistics of a research instrument (Source: Authors)

Component	Cronbach's alpha
Environmental facilities	0.852
Natural materials and colors	0.814
Climatic conditions	0.813
Nature- environment harmony	0.849
Durability and flexibility	0.892
Natural form and shapes	0.840
Economic realities	0.835
Social and cultural relations	0.838

3.1. Participants

The demographic information for participants has presented in Table 3. 140 citizens and visitors of Enghelab Bazaar participated in this study including 91 females (71.7%), and 36 males (32.8%). All participants were local people of Shiraz, and the majority of the participants (n=88, 26.4%) had a BA degree. 94 (47%) participants were in the age range of 18-35 years old. 13 participants didn't answer the demographic items.

Table 7 Descriptive statistics of the participants (Source: Authors)

Interviewed groups		Frequency percent
Gender	Male	28.3%
	Female	71.7%
Age	18-35 years old	74%
	36-50 years old	26%
Education	Diploma and lower	2.4%
	Post-diploma	4.8%
	BA	62.4%
	Higher	30.4%

4. Results

What are the biophilic components affecting the localization of business centers?

As the root of the term "biophilia" or "biophilic" returns to the positive emotion and innate connection of man and other live species (Ziyari and Ajza Shokuhi, 2018: 3), the components are defined about the live, dynamic, and natural environment.

Biophilic design on this basis aims in a creative combination of green design with the participation of outside life and gaining investment from the direct and indirect advantages of using nature as functional and conceptual design indicators in daily life (Mirghlami, Medghalchi, Shakibamanesh, and Ghobadi, 2016).

The main patterns of such planning are based on patterns and forms, visual and nonvisual relations, adjacencies, stimulants, and attachment to nature (Ziyari and Ajza Shokuhi, 2018: 5). The patterns are adaptable to local architecture structures of Iran, and the concept of localization.

This study aims to achieve components of the biophilic architecture, which can affect the local identity of a business center so that they can be used not only to design an architectural work with a local identity but also work with nature-friendly components, along with providing mental health for the people. In the questionnaire designing step, and to achieve the best data collection instruments, the introduced components were analyzed in previous studies, and the same scale and type factors were classified. The identification was done based on the repetitiveness of components in the existing references and proposed structures in modeling local design patterns. Table 8 presents the common local and biophilic architecture components, which have been the basis of designing items.

After identification of the main research components, a correlation test was used to understand the correlation of these elements. The correlation test was used to test the significant correlation between two variables. In this test, the type, intensity, and direction of correlation between two variables are measured. If the significance level is lower than 0.05, two variables are not independent and are correlated. However, if the significance value is higher than 0.05, the hypothesis based on the independence of two variables is not rejected, and the variables are independent.

The result of the correlation test showed that considering biophilic design components, and preservation of attachment to the natural and social environment has a significant effect on the local identity of a complex.

Among the introduced factors, durability and flexibility (r=0.788), and harmony with the context and surrounding environment (r=0.708) have shown the highest correlation and direct correlation with local identity. The economic realities and financial situations are less correlated to the localization of architectural environments (r=0.035).

More simply, the financial status and positions play a fewer role in users' understanding of a localized environment compared to other objective characteristics including facilities (r=0.720), materials (r=0.805), and so on. This result is expectable according to the biophilic architecture approach, and biophilic design models. This is because; nature and living things play a vital role in biophilic design.

How much the biophilic components can affect the local identity of Shiraz Enghelab Bazaar?

Shiraz Enghelab Bazzar was analyzed to measure the status of using local-biophilic components in available samples. The reason for choosing this space was its characteristics such as natural elements, the live soul of the environment, considerable daily activities, urban places, and locating micro spaces in harmony with the existing nature and designing regular and complicated routes in combination with natural elements.

Table 5 shows a confidence level of 95%, and the significance level obtained for the majority of variables was lower than 0.05. As significance level of the 5 factors (environmental facilities, materials, climatic conditions, harmony with nature, economic realities, and social-cultural communications) is lower than 0.05, and the mean value is higher than 3, and as the minimum and maximum values are positive, these factors have affected research hypotheses positively. In other words, these components have been used at a desirable level in the studied sample. The component of natural materials and colors, durability and flexibility, and natural forms with a mean value below 3 have not desirable situations from the perspective of the users (Table 9).

Table 8 Common biophilic and local architecture components (Source: Authors)

Common biophilic and local architecture components							
C1	C2	C3	C4	C5	C6	C7	C8
Environmental conditions	Natural materials and colors	Climatic conditions	Environment-nature harmony	Durability and flexibility	Natural form	Economic realities	Social and cultural relations

Table 9 Correlation statistics of biophilic-local architecture components (Source: Authors)

		Environmental conditions	Natural materials and colors	Climatic conditions	Environment-nature harmony	Durability and flexibility	Natural form	Economic realities	Social and cultural relations	Environmental conditions
Local identity	Correlation coefficient	0.720**	0.809**	0.805**	0.870**	0.887**	0.669**	0.530**	0.798**	
	Sig	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

The existing situation of these factors doesn't mean insignificance of these components, but also it shows the necessity of considering these factors in the idea-making processes in executive steps to choose applied models. For a better understanding of the status of biophilic architecture components in this complex, box chart in Fig 5.

This schematic is one of the most useful exploratory schematics to compare the mean value of two or more societies. The line dividing the box into two parts is the median. It means the value that distribution of 50% of the data is higher than it, and distribution of 50% of the data is lower than it. As it is observed, the median in the box relevant to harmony with nature is higher than others, which means more satisfaction of users with this factor in the Shiraz Enghelab Bazaar. Also, more kurtosis and distribution of the data in the box relevant to climatic conditions show different ideas of the users. Although the component has gained an acceptable level of users' satisfaction, the value of the satisfaction for some users has been lower than the medium level. Although the majority of users had a satisfaction level higher than the average level in terms of environmental facilities, the majority of them were dissatisfied with the natural form, and durability, and flexibility. It should be also noted that participants were satisfied with social-cultural relations in

Enghelab Bazaar at the level of 100%. The median value in this diagram for this factor was obtained at 3. All data gained value equal to or higher than 3. Finally, the maximum value was obtained by durability and flexibility. Contrary to other factors, it was obtained below the maximum level (5). In other words, no users in any age group and gender were satisfied with this factor at the level of 100%.

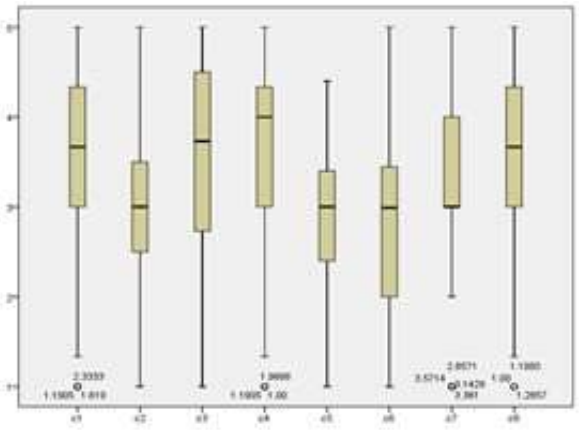

Fig 5 Distribution of the average rank of domestic–biophilic components observed in Enghelab bazaar

4.1. Analysis of Prioritization Factors and Components

The Friedman Test was used to test the sameness of prioritization of some dependent variables by the participants. The results of the test were obtained in form of two data groups. The first one is descriptive statistics showing the mean ranks of every variable. The second one is the Chi-square test, DF, and significance level (Table 10).

As the significant level is below 0.05, the claim on the sameness of rank and priority of variables has been rejected. The results obtained from the Freidman test showed that the priorities in Enghelab Bazaar have been relevant to harmony with nature and environment, environmental conditions, climatic conditions, and social-cultural relations, and other factors have possessed next priorities (Fig 6; Table 11; Table 12).

Table 10 Test the mean value of variables (t-test) (Source: Authors)

	Mean	SD	variance	t-value	df	sig	Mean diff.	Confidence level	
								min	Max
Environmental facilities	3.56	1.07939	1.165	6,175	139	0.000	0.56335	0.3830	0.7437
Natural materials and colors	2.96	0.91385	0.835	0.493-	139	0.623	0.03810-	0.1908-	0.1146
Climatic conditions	3.58	1.07637	1.159	6,389	139	0.000	0.58121	0.4013	0.7611
Nature-environment harmony	3.64	1.01436	1.029	7,523	139	0.000	0.64492	0.4754	0.8144
Durability and flexibility	2.91	0.77260	0.597	1.336-	139	0.184	0.08723-	0.2163-	0.0419
Natural forms and shapes	2.68	1.01317	1.027	3.771-	139	0.000	0.32291-	0.4922-	0.1536-

Economic realities	3.32	1.19360	1.425	3,132	139	0.002	0.31599	0.1165	0.5154
Social and cultural relations	3.57	0.98602	0.972	6,785	139	0.000	0.56542	0.4007	0.7302
Local identity	3.58	0.93206	0.869	7,327	139	0.000	0.57717	0.4214	0.7329

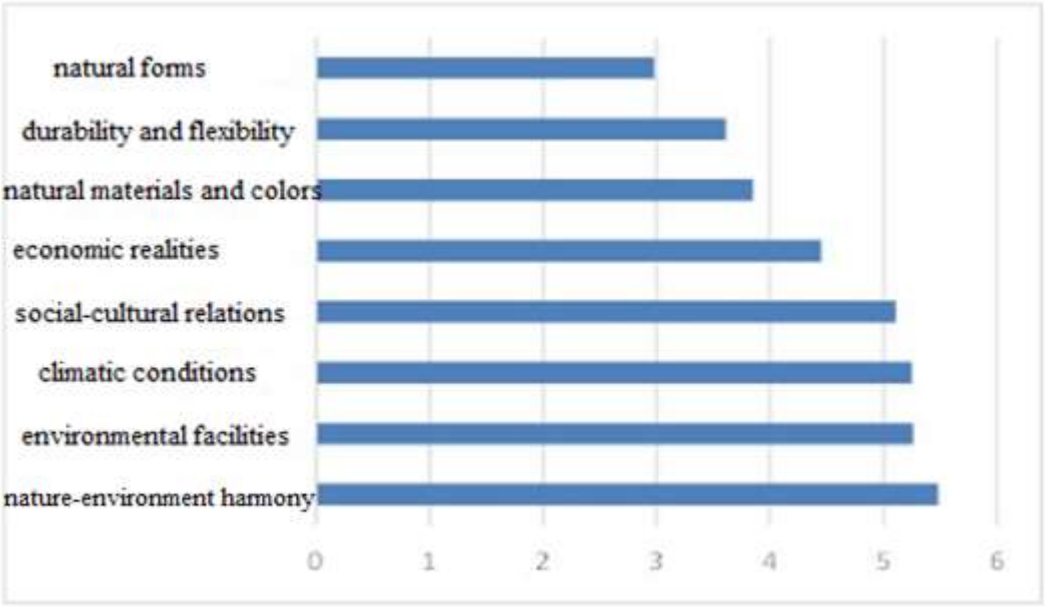

Fig 6 Prioritize the average rank of domestic-biophilic components observed in Enghelab Bazaar

Table 11 Prioritization of the components (Source: Authors)

		Mean rank	X2	df	Sig
Components	Environmental facilities	5.26	151.527	7	0.000
	Natural materials and colors	3.85			
	Climatic conditions	5.25			
	Nature-environment harmony	5.48			
	Durability and flexibility	3.61			
	Natural forms and shapes	2.98			
	Economic realities	4.45			
	Social and cultural relations	5.11			

Table 12 Common biophilic and vernacular architecture components in Shiraz Enghelab Bazaar

Common features of Biophilic & Vernacular design	Architecture Characteristics
Environmental features	Lights, air, water, plant, animals, fire, ... 
Natural materials & colors	Local and natural materials, accessible materials, natural colors 
Relevant with climatic conditions	Geographic connections, wind, solar radiation, air movement, temperature, rain, ...  
Coordinate with natural environment	Topography, integration with nature, low environmental impacts, landscape ecology, suitable for natural context

	
Durability & Versatility	Durable materials, durable designs, easy and functional designs, age, change, growth, patina of time 
Natural forms & patterns	Arches, domes, simulation of natural features, natural motifs 
Economic facts of the community	Compatible with society's economy  

5. Conclusion

The present study has analyzed the responses to determine models of biophilic design in the commercial complexes that can be implemented from the perspective of users and based on the

components introduced by the experts. The literature introduced 8 components as common components of biophilic and local architecture. The results of the correlation test showed that the 8 components have a direct and significant effect on the promotion of sustainable local identity in the commercial centers. To test the status of using biophilic-local components in the existing successful samples, Shiraz Enghelab Bazaar was investigated.

The results of analysis of the users' opinions showed that:

Environmental facilities have been provided in this space in the best way, and natural resources such as light, shade, and plants have been used properly. These factors are the most available and the most cost-effective factors as tools for the designers.

Natural materials and colors have shown significant correlation based on the results of the correlation test; although they have not been used properly in the studied space.

Climatic condition: based on the type of design, urban localization, and space contextualization of micro spaces, this feature is one of the most underlying factors of biophilic architecture, which has been implemented in Shiraz Enghelab Bazaar properly, and has satisfied the users. Feelings of users about the local identity of a neighborhood are significantly dependent on the conditions of environmental comfort, and especially in combination with context characteristics. Shiraz Enghelab Bazaar has applied this component successfully.

Environment-nature harmony: this factor has possessed the highest level of satisfaction of the users. Adaptability and harmony with the existing fabric, and respecting natural elements in the context have created a sense of the nearness of the manmade environment and natural environment in this space. Users can't imagine the separation of the two spaces. According to analyzed opinions, this factor has significantly affected the localization of the manmade space and creating a significant connection between the two spaces.

Durability and flexibility: durability and flexibility of materials have been almost neglected in the case study. This has been because of a lack of appropriate design.

Natural form: natural forms and shapes such as arch and dome can play a key role not only in local identity but also in strengthening biophilic design. According to the weakness of the designation of this space, this issue has been neglected.

Economic realities: according to the results of the correlation test, based on research objectives, and analysis of field and survey-based collected data, this factor was significantly correlated to the localization of commercial space compared to other factors.

Social-cultural relations: this factor was insignificantly correlated to the research hypothesis, and obtained a high mean value in the studied area. This factor can pave the way for the achievement of biophilic goals as much as possible through strengthening the activity and presence of users in the environment. This is because; the main use of patterns of this type of design is preservation and strengthening of the human relationship with natural elements. Therefore, giving social-cultural soul to the environment and preservation of existing natural structures can affect the achievement of research objectives.

According to the evaluations of this study, it could be found that the measurements taken on common biophilic-local components of Enghelab Bazaar can be revised. It seems that making changes in materials, appropriate colors and materials can help local identification of this space. Regarding the measured local components, the Bazaar can be a good model to design an urban commercial center.

Purposeful designation for the business centers with lots of audiences can affect the culture and identity of a society significantly. Spaces like Enghelab Bazaar can be formed just like the old bazaars and spaces. These spaces can not only be successful in terms of commercial, but they can

be also a good context for other social activities. Also, they can create a good connection between the place and the urban space.

This study recommends further studies on other public spaces (educational or cultural spaces) for local architecture identification. Through this, a suitable model for urban design can be obtained. Also, the mental health of the society can be provided using biophilic architecture in these spaces.

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Tall Buildings Preliminary Deign Criteria for Architects

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Abstract

Tall buildings, according to the progress of human societies are increasing dramatically in different parts of the world. The point that distinguishes a high-rise building from the other ones is the prominent role of structure in the tower design. So, the structure in the design process and architectural final design not only heading its main task, means bearing and transmission forces, but also accepts other roles to cover other design criteria including aesthetics, energy and etc. The reason for combination of these roles is in a high-rise building due to the reduction of the weight of the building in order to bear lateral and gravity forces, structure must accept multiple roles to reduce additional elements. In this paper, by studying effective measures in designing of tall buildings and identifying the characteristics of each one, suggestions are offered towards appropriate integration of these measures in order to design a high-rise building. These suggestions can help architects at the beginning of the way of designing a tower. In fact, considering these measures lead to create options that other design teams (like structural team) will not face the great problems in the rest of the way.

Keywords: High-rise Buildings; Design Criteria; Structure; Aesthetics; Energy; Urban Design; Skyline; Design Process

1. Introduction

These days due to the fact that population has been increased, countries tend to build tall buildings and this tendency increases day by day. There will be, of course, those who oppose such developments arguing that tall buildings are unwelcome intruders that drain the financial resources of a city. They also argue that these tall buildings are the product of the greed and grandiosity of

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wealthy developers and power-hungry politicians (Kheir, 2011). This particular debate has been going on for a long time with no end in sight. One thing is certain: people who criticize high-rise developments have no alternative credible solution to the problems of overpopulation and overcrowding of future cities.

In tall buildings because of gathering numerous items inside the building, they have many complexities in design and construction. Different criteria have effects on the process of designing a high-rise building. These criteria, sometimes are aligned and some other times they are opposite. That is the reason that responding to one of them needs violating the other one. The main goal of the design team is concentrating on criteria and make a priority of them and then making responses for all or at least most of them according to designing priorities. The most important thing is getting to know features of each criterion to have the most integration with other design principles.

In this article, we are going to check out different criteria in designing tall buildings in five categories; Aesthetics, Energy, Structure, Urban and Other criteria. After that we will talk about interactions between criteria and at last, we will suggest what to do to have all criteria together peacefully.

1.1. The History of Tall Buildings

A series of tall buildings that were tall and big at the time of their construction were built at the turn of the twentieth century. These included the Wainwright Building of 1890 in St. Louis, the Guaranty Building of 1895 in Buffalo, New York, and the Reliance Building of 1895 in Chicago. This trend continued in New York with the Flat Iron Building of 1903, continuing to the Chrysler Building of 1930, and the Empire State Building of 1931. Following a pause in construction during the Great Depression and the Second World War years, tall building construction re-appeared in Chicago (Beedle et al., 2007).

In 1926 Frank Lloyd Wright developed a series of drawings called “Skyscraper Regulation,” after his visit to New York (Schipporeit, 2000). In these drawings, he offered his concept of accepting the grid and planning several cities blocks together. He created a second-level bridging over the streets for pedestrians and provided landscaped gardens and terraces on horizontal surfaces. Parking and commercial and retail services were placed within the base of the towers that were integrated with vegetation. This was an attempt by him to make sense out of the city before he embraced the idea of spreading the city out (Kheir, 2011).

Immense progress was made in the development of tall buildings after the Second World War, first in the United States and then by the Pacific Rim countries, parts of Europe, and the Middle East. Although technology has advanced and the architectural style of tall buildings has changed, their architectural planning concept of stacking a series of floors vertically and achieving spatial efficiencies by increasing the net-to-gross floor area has remained the same (Kostof, 1995). Despite architecturally ambitious thinking and technological and structural innovation, the focus of these buildings has remained on economic viability, and technological and constructional capabilities (Yeang, 2002).

1.2. Literature Review

About tall buildings designing there are several reference books and lots of papers. Most papers talk about just one or two criteria that seemed more important to writers to search about. In the paper, In Evaluation of Parental Satisfaction of Children’s Spaces within High Rise Apartment Environments (Sharghi et al., 2014), the authors have examined the importance of outdoor spaces

and playing space for children in high-rise buildings, and by examining a few examples of high-rise buildings, the level of satisfaction of parents and adults living in the building has been measured by a questionnaire asks about the available facilities in the building and the highest marked deficiency was open spaces. At the end of the research, suggestions were made to locate these spaces on the site. In another research, A Causal Analysis of the Sense of Community for High-Rise Residents in Bangkok Metropolitan Area (Rujibhong and Upala, 2017), the authors examined the sense of community in high-rise buildings, particularly in a high-rise neighborhood in Bangkok, and a group of people was selected as the test population, using a survey form in which sense of community in that area was asked. The results showed that in the neighborhood with tall buildings, the sense of community is far less in other areas. There are many articles about having a sustainable system and structure in tall buildings. One of them is, Observance of the principles of environmental sustainability in tall buildings (Mohammad Hosseini and Yousefi Tazakor, 2016), in which the authors after introducing tall buildings, stated the necessity of energy sustainability, and at the end, it offers solutions to make tall buildings more sustainable from an energy perspective. About the reference books some most important ones are Tall Building Guidelines City of Toronto (adopted by city council, 2013), Designing Tall Buildings Structure as Architecture (Sarkisian, 2011), The Tall Buildings Reference Book (Parker and Wood, 2013) and London Borough of Tower Hamlets Tall Buildings Study (Assembly and Parliament, 2017). Sarkisian in his book "Designing Tall Buildings Structure as Architecture (Sarkisian, 2011), this book is a comprehensive guide to what is important in the design of tall buildings. In this book, he talks about one of the criteria in each chapter in order to provide the reader with enough knowledge to design tall buildings. Sarkisian is a structural engineer, and this book is the result of his personal experience in designing and building tall buildings. Due to the fact that the main field of the author is related to structure, this book examines tall buildings and its design criteria more than the aspect of structure and construction, and no attention is paid to the impact of these criteria on architectural design. Dave Parker and Anthony Wood have also written a reference book for designing tall buildings. In this book, The Tall Buildings Reference Book (Parker and Wood, 2013), they discussed the importance of tall buildings and the need to use them in modern cities and studied high-rise buildings about their social, human and urban criteria. They have also addressed future high-rise buildings and provided solutions to the sustainability of these buildings. But while this book is a comprehensive guide to the design of tall buildings, it was not mentioned anything about designing limitations in design process. In another reference book, London Borough of Tower Hamlets Tall Buildings Study, which was published in London in 2017, authors decided to write this book due to the expansion of the use of tall buildings. They pointed out the important criteria in the design of these buildings in London. In a separate chapter, the authors discussed the architectural design criteria of these buildings and mentioned some points to be done and not in general. In the book published by Pontarini on May 2013 named Tall Building Design Guidelines, the authors mentioned most urban criteria that affect the architectural design. Site organization and context are the first two chapters in this book. It started with urban criteria because of its large scale and then by reviewing more criteria it got closer to architectural criteria. In this book it had been tried to give some advice which are not only conflicted with city discipline, but also make the most communication with it. As studied and mentioned some of references briefly, there are not many articles and also books in which the requirement of structure, Architecture and MEP are examined at the same time and try to solve contradictions between them and be a reference to help the designers the most in design process. For this reason, we decided to write this paper and gather the most effective and important

criteria and explain them literally to start the way that will make tall buildings a better place for its habitats and other users.

1.3. Research Aim and Question

This research by reviewing some tall buildings' design provides design principles for assessing the design guidelines for tall buildings in a more productive way for designers and users. The main objective behind this research is to provide a framework for tall buildings' designers to avoid unnecessary and repetitive design process during the design process. However, considering that we could not measure all design criteria in one research, we finally decided to find the main and the most effective criteria. The main question addressed in this paper is: How can we design tall buildings in a way that the final result be able to solve most problems? To answer this question, some sub-questions should be answered: a) What are the main criteria; and b) How to answer these criteria?

1.4. Research Methods

To clarify the main factors affecting the design of tall buildings, we use contents analyze method, based on our research question. After reading the articles and consulting with specialists and experts in the field of high-rise buildings, the criteria used in this research for content analysis were selected. Next, by an analytic network process (ANP) based assessment model was constructed to assess the effectiveness of tall building design criteria. We defined the units and categories of analysis and then the number of keywords that were the most related to the tall buildings' design criteria were counted and the first five of them which were the most used ones in the selected researches were chosen. The results indicate that the most critical factors that have the most impact on tall buildings' design are: Aesthetics, Energy, Structure, Urban, and other criteria. As the use of the fifth to the tenth criteria is close, we gathered them in one group named "the other criteria". Later, by using library research methods we reached the information about how to answer problems for each criterion and what is the appropriate way to combine them in the design process.

Finally, it should be noted that since the five categories examined are all important and none of them can be considered insignificantly, we have reviewed these five criteria without considering the ranking obtained from the ANP method. We used ANP result ranking to reach first 5 ones that are more important among 30 items.

2. Designing Criteria

2.1. Aesthetic Criteria and its effect on the Skyline

Designing of high-rise buildings is a comprehensive process, and it is impossible to consider feminine or aesthetic features apart from technological requirements and structural improvements. To examine high buildings, we divide them into three sections, the tower top and the ceiling, the middle or the shaft and the base building.

The base building is a part of the building, which is 40 degrees from the level of view of the pavement in the cone. It has a little impact on visions and the construction of a city landscape, and its greatest impact is on the scale of the pedestrians and the vision that they have close to the building. In fact, the most important task of the base building is to coordinate with the site and its neighbors, and create a human scale to link with the context and interaction with the audience better.

The middle part or the shaft that starts from the base and goes up to the upper part of the building. This section has a significant impact on the interaction with surrounding environments. The most important thing is how to guide the wind stream in this area. In fact, the shaft is designed as a stem for the upper part.

The tower top must not only be used in conjunction with environmental conditions and wind flow, but also has a great impact on the skyline of the city. For this reason, among the various sections of the high-rise buildings, the last section has the opportunity to display architectural and aesthetic ideas for architects (Fig 1).

The aesthetic quality is not taken too seriously by professionals, but evidence suggests that from the perspective of workers and urban residents, aesthetic elements are the most important factor in the assessment of the cities (Karimimoshaver and Winkemann, 2018). The impact of the aesthetic dimension of architecture, especially for cities (e.g., Sydney and Kuala Lumpur) that intend to upgrade their universal positions, is inevitable (Charney, 2007). Buildings are divided into three main parts including top, shaft, and base. The top of tall buildings is related to social values, and are an important component in studying the aesthetic role of tall buildings in the city (Sev, 2009). The relationship between the top and the base of the tall building is like a dialectical discourse in which the top has a greater opportunity to express the aesthetic role (Ali and Armstrong, 2006). However, the height, top, and color of tall buildings are the most important physical features, respectively (Samavatekbatan et al. 2016).

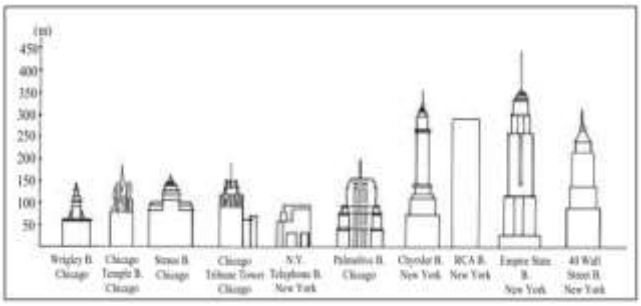

Fig 1 Around line of tall buildings in the Art Deco period (1920-1940) (Source: Sev, 2009)

In the International Style, the buildings were made of simple cubes, but the main reason was the economy and also the performance of the building (Figure 2). In fact, in each era, buildings were built in response to the circumstances of that time and they were leading in the field of beauty and technology. As a result, the definition of beauty, regardless of other conditions affecting the construction of the tower, is not accurate.

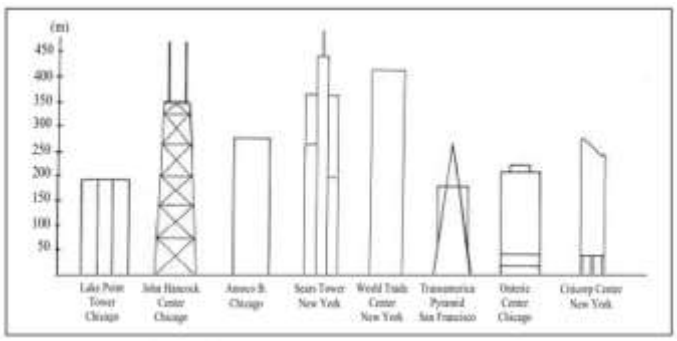

Fig 2 Around line of tall buildings in the Art Deco period (1965-1980) (Source: Sev, 2009)

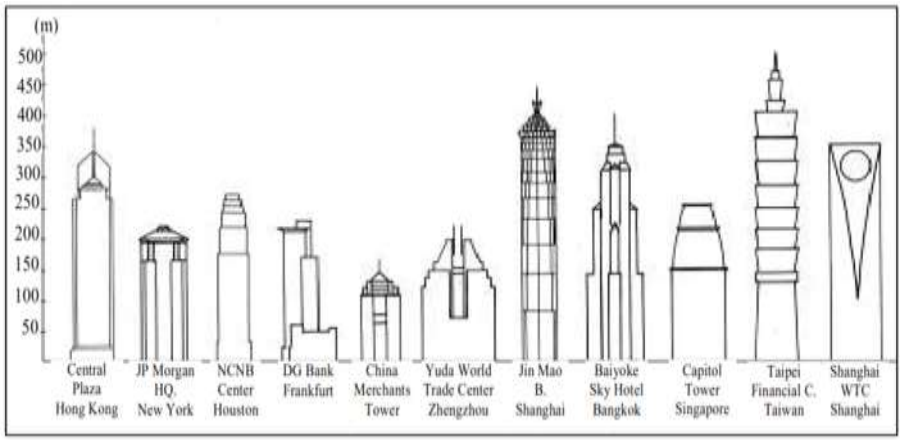

Fig 3 Around line of tall buildings in the Art Deco period (after 1980) (Source: Sev, 2009)

Of course, where there are only economic issues, in some cases, simple tower designs with simple cubes can be the right answer. A tall building without having a specific idea on top section and just having a simple and flat roof has less impact on the environment and the skyline from the point of view of aesthetic criteria. Most of the early skyscrapers had a flat roof, and over time, the necessity of paying attention to the upper part of the building was raised (Sev, 2009). Finally, the upper part of the tower has the greatest impact on the scale of the city and in fact, it is the connection between the tower and the sky. As you can see, in Figures 1, 2 and 3, over time, the attention to the upper part of the buildings was raised.

Finally, regarding to the aesthetic criteria, although there are not any clear standards, by examining the buildings that are most considered it is possible to mention the following issues. Here we suggest some design technics to improve aesthetic diversity in tall buildings. However, the following may conflict with the structural criteria that should be considered.

Lack of symmetry in plan and in height, the column-free plan, requiring wide openings with wide entrance areas on all floors and especially on the ground floor, and in some cases, straight-line forms with non-90-degree angles.

Morphogenetic planning of the future tall building will consider weighted parameters for design beyond individual buildings. Form, building material, embedded and operational carbon, daylight, use efficiency, site placement, and other important parameters will be considered even on the district or city scale at early conceptual stages (Sarkisian, 2016).

In tall buildings the connection between the building and the city is quite important. The height of a tall building is often dictated by economics. Research shows that the economic height for most tall buildings' ranges between 40–50 stories. Within this range, tall buildings are most energy efficient in a residential typology and can be built with advanced construction technology in a minimum time schedule. However, the height of a tall building is also dictated by market-driven real estate considerations; environmental and aviation factors; ego-driven prestige and a sense of competition; as well as practical considerations such as elevators, fire safety, energy demand, structure, etc. (Kheir, 2011). In tall buildings we have a large height instead of width; so, these kinds of buildings have poor communication with their adjacent urban space around them. So, designers have to try hard to improve this connection by heightening gradually from the base part of the tower toward the center of the site.

Optimum height depends upon pragmatic considerations of which the market economy is the most important. The economic height reflecting optimality is a dynamic value depending upon a city: its construction infrastructure, labor cost, etc., and the time of construction. As building height increases, wind forces control the structural design of tall buildings and the energy demand also increases. As a result, the cost per square foot will increase (Kheir, 2011).

As we mentioned before, it is important to have a base part in designing tall buildings. The minimum height of the base building should be 10.5 meters or 80 percent of the length of the adjacent street, the maximum height should not exceed 24 meters and the minimum height of the ground floor should be 4.5 meters (Pontarini, 2013).

Considering the practicality of all these factors, the 2,000 ft (610m) height limit seems to be a reasonable one for the present and foreseeable future. This may, however, change with the intervention of unpredictable circumstances (Kheir, 2011).

Understanding and utilizing the tall buildings environment conditions are two essential factors to have a self-sufficient building. Winds at the site can be used to generate power or control the behavior of the building or the both. Holes introduced into the tower along the height of the building can also (Sarkisian, 2016):

1. Allow winds to pass through the building lessening the surface area subjected to winds while minimizing across-wind dynamic effects.

2. Allow power to be generated at each opening location. A reduction in the opening diameter within the structure increases wind velocity and power generated.

3. Incorporate an airfoil concept where forces can be developed to counteract overturning by generating upward forces on the leeward side of the structure.

4. Incorporate windcatchers to funnel air into cooling systems where air is moved over a reservoir of water.

2.2. Energy Related Criteria in the Design of High-Rise Buildings

About energy and sustainability criteria, the following issues are recommended, by following these issues having a sustainable building at the end of the design process is more possible.

It is better to place important spaces in both the North and the South facades and the less important areas on the East and West. We should also try to have the fewest views on the eastern and western sides. Therefore, the ground floor plan can be a square, a circle and etc. but when it goes to the upper part gradually stretches along the east-west direction (Fig 4).

Fig 4 Proper shape of the tower according to the direction of the appropriate light (Source: authors)

Soft edges provide a better and easier wind flow control and help the building to reduce the compression of structural members that are resistant to lateral force (Kareem, 1999) (Fig 5).

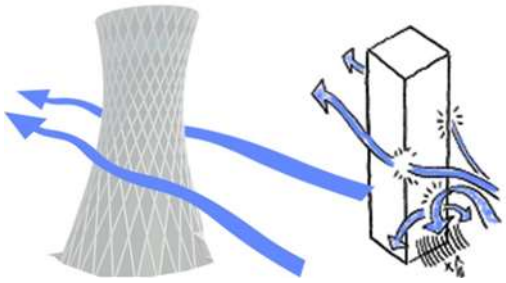

Fig 5 Proper shape of the tower to create the least effect of wind on the structure of the building (Source: authors)

In hot areas in the southern and western facades, the heights of shading and the amount of that should be increased. Having a circular form to reduce the disturbing light, also reduces the surfaces which attract sunlight and the heat (Rezazadeh, 2014). Also, in cold areas, high-capacity walls are good choices that can be used to save the heat for more hours and it is better to be used on the western facade. In general, live spaces that have permanent or semi-permanent use are located on both the northern and southern fronts and other spaces on the western and eastern facades. Orienting more than 25 degrees to east or west reduces the effect of horizontal shading (Rezazadeh, 2014).

Placing short buildings in south part of the site and tall building in north causes more light to be penetrated into the interior spaces. Note that this point can be used in the Northern Hemisphere.

Another factor which is related to energy is Photovoltaic Cells. About how to use them and the impact of them on the form of the building, it can be said that sloping down the place and also the cells to the south can be effective in absorbing the energy of the sun. A wide view of a tower is a great opportunity for maximum sunlight usage.

Generally, the organization of the main and broad areas of the building towards the north and south (East-West stretching) is greatly beneficial in reducing the insulation rate and as a result the effect of ventilation would be better. It should be tried to reduce the number and the surface of the windows in eastern-western walls as much as possible. And if this is not possible, the windows should have retreat and awnings.

Whenever the wind blows at the 45 - 90-degree angle to the front side of the building, it has a significant impact on the air flow. The impact of the wind which blows at a 25-to-45-degree angle to the front side of the building is negligible. And if it blows at less than 25-degree angle it has no effect on flowing the indoor air. On the other hand, although the best angle of wind blowing to have the best ventilation is 90-degree, vertical blowing of the wind imposes a large horizontal force on the structure of the building. One solution to organize this contradiction is designing some holes on the surface of the building to have a better leading of wind-flowing. These holes help the ventilation system of the building and also, they can be designed in a way to place a turbine in them.

In designing the form of the building, after determining the proper height for the turbine, it is necessary to place the installation and service spaces around it. The most important point about the form when we have turbines is that the form should be concave to direct the wind to the turbine and reduce the turbulence of the wind stream (Rezazadeh and Balador, 2014). The difference in designing the views of a tower is the answer of the sun's movement directions. The degree of

transparency of the facade, the location of the balconies and the arrangement of interior spaces are all organized according to the direction of the sunlight and to increase the amount of passive solar power.

Mechanical, Electrical and Plumbing (MEP)

Mechanical, Electrical and Plumbing (MEP) also known in the industry as Building Services that are the active systems in a building that makes the buildings livable by providing electricity, communication, heating/cooling and ventilation, supply and disposal of water (Barton, Fryer, and Highfield, 1983). Tall buildings inherently require infrastructure within strumentation and automation to support basic activities such as; vertical transportation, building services, and communication systems. They have unique scale and role in interacting with infrastructure systems that are built to support them (Burton, 2017).

In tall buildings, the best specialists in different fields (architecture, structure and MEP) are gathered and cooperated together. Specialists are basic resources for this operation. In order to have an eligible design all relevant specialists must be joint from the beginning to the end of the project and during the design, they must pay enough attention to the maintenance after the construction of the project is finished (Aminmansour and Moon, 2010).

MEP's (Mechanical, Electrical and Plumbing) work in high-rise construction can be very challenging due to the different crews involved during the installation. Conflicts between the crews generally cause delays in project schedule and result in additional cost due to rework (Samarasinghe et al, 2017). Besides technical issues, there are some challenges those tall buildings are involved with. These challenges include stacking, mechanical systems, stack effect and heating and cooling systems. For stacking in high rise buildings, we need MEP engineers to work collaboratively with the architect and also with the vertical transportation consultant to organize the building into independent, vertically stacked zones (Fig 6). In mechanical systems It is common for a single technical floor to support between 15-20 floors, either above or below its location. Technical floor spacing beyond these parameters will increase losses from friction and gravity forces, which diminish energy performance and give rise to ongoing operation and maintenance issues. Stack effect is another challenge that displays itself in the movement of buoyancy driven air flow and it can create some issues like door closing at the base of the tower, uncontrolled moisture ingress, excessive noise, discomfort and difficulty in controlling temperature from airflow through elevator lobbies. The last challenge that the building is involved with is heating and cooling systems. Distribution of chilled water/condenser water and/or heated water from the basement, midrise technical floor or rooftop, along the height of the tower is planned to minimize overall system pressure and typically requires the use of heat exchangers located at technical floors to transfer energy and separate hydronic zones (Burton, 2017).

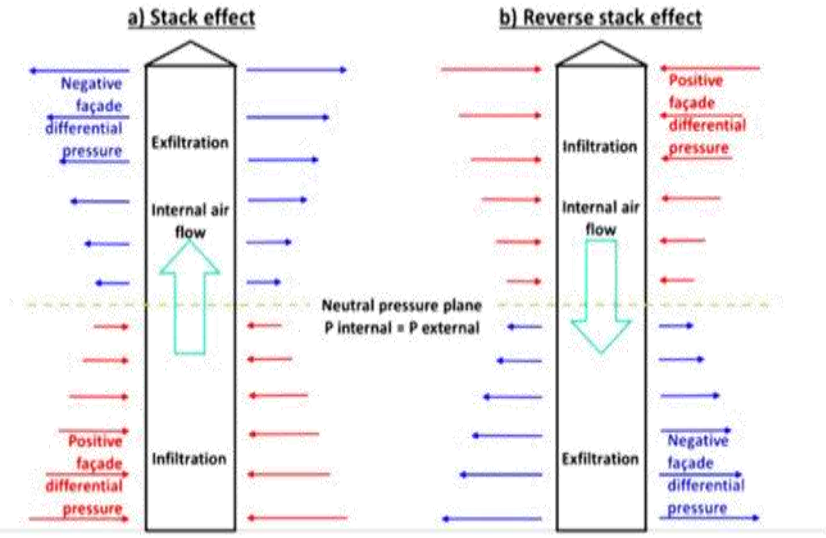

Fig 6 Principle stack effect diagrams (Source: Mijorsky and Cammelli, 2016)

2.3. Structural Criteria

Here are some suggestions on how to design an architectural form from a structural perspective. Circular buildings have a higher resistance than angular buildings and smooth surfaces to the wind. In fact, it is better to have a circular shape at high altitudes where the wind flow is stronger; and in the lower floors according to the shape of the site and functional requirements, the plan can be determined.

Having a cone form (or the one which is similar to the cone) is another factor that is compatible with structural principles.

In the part that the building connects the ground, we have the most possibility of shearing and bending forces. Therefore, it is better to have the strongest shape in that part. On the other hand, in the upper floors of the building, the less obstacles to the wind will cause the least force to the building. That is the point that the area in the plan in lower levels is more than the upper ones.

Another principle is that at the bottom of the tower, the percentage of the openings should be less than the upper floors. It is because of the most shearing force at the base of the tower. In fact, the tower's view, which has a structural function, has to be more congested in order to transfer lateral forces better (Rezazadeh, 2014). Thus, ground floors of the tower require a wide range of transparency to invite people and it is possible with collector columns.

As we approach the top of the tower, due to the increase in the intensity of the wind, the tower form should approach aerodynamic forms in order to create the least barrier against the wind force. Round and curved shapes with soft corners are considered as aerodynamic forms (Burton, 2015).

The insertion and percent of cores, shear walls and basically, the supporting structures in the two perpendicular directions in the plan should be symmetric (Charleson, 2012), even if the form or plan is asymmetric. In fact, if we had to create an asymmetrical shape according to the requirements of architecture, the method of locating the structural members against the lateral forces should be symmetrical in both perpendicular directions.

Tower cylindrical shape, makes a real tubular structural system which has 3D structural behavior against lateral forces. Cylindrical tower shape besides structural advantages has fewer facade areas

against perpendicular wind load direction, so in comparison with a triangular tower, the wind pressure will be decreased. Oval plan shape tower acts like the cylindrical one against wind lateral forces. Prismatic tower shape is the other optimal structural shape against wind forces that by increasing the height to length portion, its lateral tolerance will be decreased .

The other factors that will be desirable for the structural team are: near columns and lower span (especially in the ground area), symmetrical plan and façade (will act equal against lateral forces and prevent torsion), for conduct the wind flow with the least effect, the conical, narrowing and curved shapes is desirable.

By reviewing the above, we understand that the structural ideas lead us to a symmetrical plans, facades, volumes, and structural elements, while cubic forms, from an aesthetics point of view, are not acceptable. The concept that can be expressed here is the desirability factor (Heristchian, 2010).

The desirability factor of a design is the ratio of its aesthetic to its structural efficiency. In other words, sometimes architects design an extraordinary form that is not acceptable by structural principles, here the question is that how important or beautiful this form is; Is it worth building exactly this idea or we should make some changes to it to make it logical to build? Despite the fact that some extraordinary designs have additional costs, it is worth to be built. But in some other projects, although the designer designed an unusual form which is certifiable from an aesthetic point of view, the profit is not worth to be paid.

Structures will become self-reflective, capable of undergoing state changes of materials where component properties can be temporary altered to efficiently resist abnormalities in loading. Ultimately structures will exist in a true state of equilibrium in which umbilical reliance on services from other sources is eliminated and regeneration of resources is possible; structures will contribute to the environment rather than challenge it. This goal will only be achieved through innovative processes of collaboration, invention, and integration. Structures in tall buildings of the future should be designed to have two or more purposes. For instance, the structural system could be a conduit for fluids that can be used for heating and cooling buildings. Structures can be carefully integrated into the exterior wall systems where superficial enclosure elements are eliminated (Sarkisian, 2016).

2.4. Urban Criteria

For the multifunctional towers, it is recommended to make a difference between the residential and commercial entrances. The location of the entrance should be designed due to have an access to the public transportation stations; Moreover, to save the privacy of the entrance (in residential parts), it could be placed upper than the pedestrian realm or it can go in to the building. In private entrances, using garden in front of the entry can preserve the privacy.

The maximum surface area for each floor in towers is 750 square meters. This limitation includes all closed spaces of each floor and the open spaces (such as traces and roofless parts) can exceed this limitation (Pontarini, 2013). These limitations are proposed because of two reasons, first, if we have more surface area than 750 square meters, we will miss the access of natural light as we have a long depth. The Second, by having larger area in each floor, we have bigger shadow and as a result the neighborhoods will be deprived of natural light most of the day times.

The distance between each tower and its own land boundary line should be at least 12.5 meters. For towers were located in one land this number changes to 25 meters from each tower (Pontarini, 2013). This distance is measured from the outer walls of the two buildings. Balcony lines are not included in this measurement. By keeping the minimum distance between the two towers, the

undesirable effects of each tower, such as shading, creating an unfavorable wind flow and wind turbulence, decreased visibility to the sky, lack of privacy (due to vicinity), are minimized.

The width of the pedestrian realm could be at least 6 meters (Fig 7).

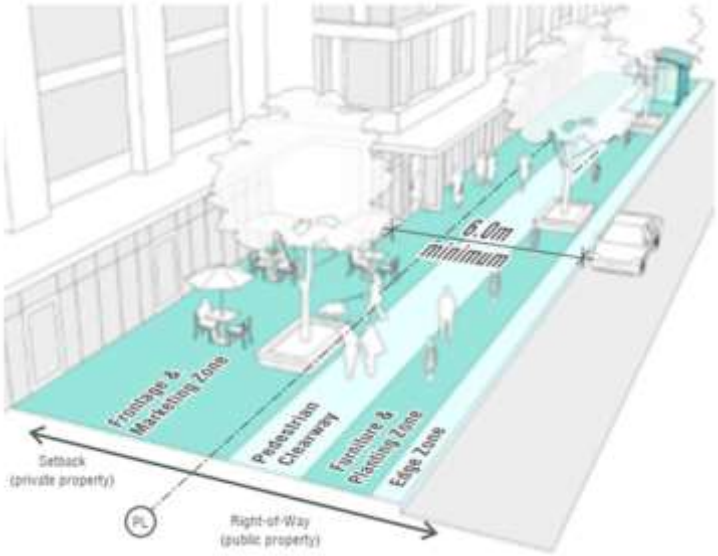

Fig 7 Pedestrian realm requirements in tall buildings (Source: Pontarini, 2013).

2.5. Other Criteria

To consider other criteria, we mentioned some important clues that knowing them can improve the design quality.

The green space presence for each floor or each unit brings a positive effect and a sense of vitality for residents. The minimum portion of open and green spaces in tall building sites, to be satisfied with the green space, is 25 percent. The appropriate location of green spaces in tall buildings' plan is east and west since green spaces in these areas will decrease the adverse effect of unwanted east and west lights. Proper lighting and fresh air are other factors that increase the quality of life in the space.

In tall buildings, it is necessary to provide at least two separate exits as far apart as possible for each floor.

The maximum length of exit access in tall buildings is 30 meters, in special cases where the building or structure has been approved against fire, this length can be increased to a maximum of 45 meters (Pontarini, 2013).

It should be considered that stairs and elevators should be designed in such a way that not cause torsion around the vertical axis (Golabchi and Masteri Farahani, 2013).

The appropriate interior height range for administrative-commercial tall buildings is 2.6 to 2.75 meters. The level height range is 4.1 to 3.8 meters that the floor's mechanical fixtures and wirings are hidden in the suspended ceiling and floating floor in the level (Pontarini, 2013).

Balconies with a rectangular shape and a depth of more than 1.5 meters are suitable to be used as dining room. Opening balconies provide a better privacy and visual security for users.

In fact, it should be seen to what extent the asymmetry in the plan, the facade, the long cantilevers, and the forms that is against the wind (such as the straight lines) contribute to the

beauty of the building and its other needs. Finally, in a situation where it has a great impact on improving the design and performance of the building, spending money on such projects may be justified. In general, it is necessary to try as much as possible to consider the common characteristics of the contradictory cases, for example: creating large openings on the ground floor with high floor height (about 6 meters) is an architectural and functional needs of the design. However, large openings reduce the number of columns and do not properly transfer the gravitational and lateral forces to the ground. On the other hand, by increasing column height and span length, we provide soft floor condition which is vulnerable against lateral forces. To solve the large span problem on the ground floor, we can use the gathering column and the reinforced column. Although these techniques need more expenses, architectural desirability compensates these expenses (Fig 8). Moreover, using a base building and connecting columns at regular heights will help to solve this problem.

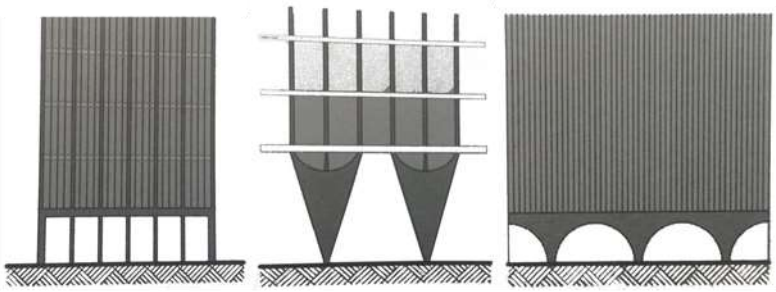

Fig 8 Methods of transferring the power of the upper floors and reducing the columns in the ground level in the tower; From left to right: main beam, columns and retractable arches (Source: Schueller, 1977)

3. Conclusion

Tall buildings, in combination with other low-rise and mid-rise buildings, can become an integral part of urban planning as they provide the opportunity for the large-scale creation of open space and views, and simultaneously reduce the collective cost of the built environment through agglomeration and clustering (Kheir, 2011).

The first step in each project is studying and recognizing. Afterwards, the design of a tall building is based on five main categories; these five are: Structure, Architecture and Aesthetic criteria, MEP (Mechanical, Electrical and Plumbing), Energy related criteria, Urban criteria and other criteria which is consisted of criteria we should consider them during the design process. Although architecture starts and ends the design process, the importance of the role of all five branches is equal. Indeed, by creating an appropriate architecture, these three branches can be coordinated. It should be considered that all these five topics must be considered at the same time in order to prevent facing a major problem in the project. It is an important point in designing high-rise buildings as we have a large scale of structure and MEP.

3.1. Architecture and Aesthetic Criteria

The architecture of a high-rise building has a direct relationship with the form, facade, cover, programs and needs of the project, green space and finally the structure and installation. For example, although the main core shape of the building is defined by the architect, this shape must

be the location of the MEP arteries and bearing structural forces. So, it is necessary to consider the structural and MEP requirements in the design of the core form. It should also be noticed that in a short building, the structure can be hidden with decorations, but in towers, it is not acceptable to impose more forces, which will be caused by using decorations in order to hide the massive tower structure. Moreover, according to the formula (F = MA†), we can conclude that by increasing the weight of the building, the forces on the building will increase. As a result, we should try to eliminate the elements that can be removed as much as possible and give their role to non-removable elements such as structures and installations. With this trick, the finished weight of the building will be greatly reduced.

3.2. Structure

The cases that affect the structure of the building include foundation, formatting, core, thickness, and the form of the members that tolerate lateral and gravitational forces in the facade, inside the building, in the architecture and in the MEP. Although the high-rise building facade shaping pattern is exposed to the vision, it must be chosen in a way that it plays an effective role in tolerating all the forces. Therefore, the best case is structure acts as architecture and architecture acts as structure.

3.3. Importance of MEP and Energy related Criteria

The MEP in a tower is like its vessels. The entry of light, air, water, etc., and the disposal of sewage and garbage have made MEP as an important organ during the life of a tower. MEP is directly involved with cooling, heating, air conditioning, electrical and mechanical equipment, plumbing, cores, elevators, water resources, structure and architecture. It should be considered that designing the MEP in parallel with the design of structure and architecture increases the life of the building. The way of providing the basic needs of the MEP and its consumption should be in a way that the consumption of water and other energies is optimal. Due to the large scale of the building, this wasting repeated in all units in the tower and the small wasted amount becomes larger. Moreover, designing the MEP equipment should be in a way that repairing and replacing them cause no damage to the building and no disturbance to the residents.

The concept of sustainability is usually introduced in the form of MEP issues. This is because of the most of the sustainability requirements depend on the installations in the building. For example, the supply of light, water, the use of new energies, and also the disposal and use of wasted water depend on MEP equipment.

To achieve a sustainable building, many things must be considered in different areas. The possibility of energy production in tall buildings due to the large surface area in front of sunlight and the intensity of wind flow at height is a matter that should be considered in tall buildings. Moreover, as mentioned before, we should try to involve other areas of design, including structure and architecture, in order to achieve sustainability goals.

In closing, it should be noted that each criterion is used to perform especial tasks and at the beginning, each criterion must be considered independently. The more we give a criteria different role, the more successful we are in providing a proper answer. As mentioned before, architecture,

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† Newton's second law of motion describes the relationship between an object's mass and the amount of force needed to accelerate it. Newton's second law is often stated as **F**=**ma**, which means the force (**F**) acting on an object is equal to the mass (m) of an object time its acceleration (a).

structure and MEP are the basis of designing a tower. In the combination of these three criteria, we should try to establish a good interaction between the tasks of each organ. For example, the facade of the tower must withstand the horizontal forces caused by wind and earthquake and can also have architectural and aesthetic roles. Researching on finding a pattern for the facade which has a good performance against forces and also is aesthetically significant that can help to optimize the facade of the building and reduce the load caused by additional elements.

Beyond sustainability in tall buildings, resiliency also can propel designers to design environmentally sensitive buildings perhaps consist of recycled materials and can adapt itself with climate change. Systems in these buildings require a design based on performance in which each component has multiple uses: structural systems capable of heating and cooling, exterior wall systems capable of absorbing and storing energy, and building systems capable of operating with site-based water collection, power generation, and distribution. Buildings should be completely self-sufficient, not relying on their neighbors. Advances in energy storage will be provided to bridge periods of limited or lack of solar power, while on-site water reclamation, purification, and reuse will reduce demand on our most important resource.

So, to achieve a self-sufficient tall building we should combine structure, architecture, and MEP systems (Fig 9). Considering the aforementioned criteria and points, as some systems have conflicts with each other, according to the project priority, we should balance them in a way to have the most interaction with each other. Next to these criteria, there are some more criteria which are local that because of different climate in each zone, it should be analyzed specifically for each project according to its site.

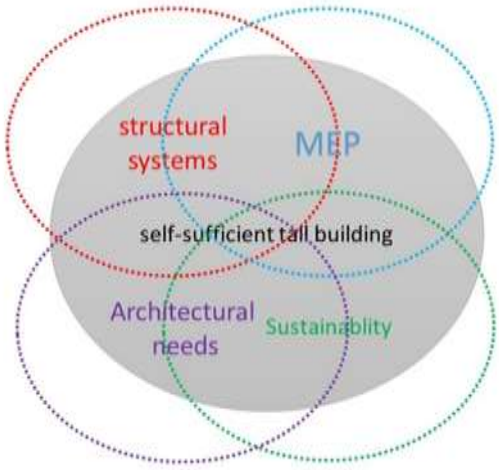

Fig 9 Self-sufficient tall building factors (Source: authors)

3.4. Urban Criteria

As a designer you should make a difference between the residential and commercial entrances. Access to the public transportation stations, minimum distance between each tower and its own land boundary must be considered as an important factor to locate tall buildings. The unwanted impacts of each tower, for example, shading, producing an unwanted breeze stream and wind turbulence, decreased the visibility to the sky and lack of privacy, can be minimized by providing the appropriate distance between the towers. To determine maximum surface area for each floor,

besides practical and economic matters we should assume maximum space depth for access of natural light and the tower's shadows effect in our neighborhoods that may deprive them from natural light most of the day times.

To sum up, a tall building in the city must pay attention to the privacy of historical zones, the skyline and the neighbors' rights, to access natural light, the sky and the city visibility, to have the best constructive interaction with other tall structures.

3.5. Other Criteria

Local small gardens convey lots of opportunity for preserve the privacy, refreshing air, balancing sunlight and act as filters for interior spaces. Having an access to green space for each floor or unit has a positive impact and a sense of vitality for the residents. The optimal place for green spaces in high-rise buildings' plans are east and west sides of the building, as green areas in these places would mitigate the detrimental effects of unnecessary western and the eastern rays. Natural light and natural ventilation are other variables that make life better in tall buildings. The structure as well as its Framework must be certified against fire. Stairs and lifts should be constructed in such a manner that they do not twist the vertical axis. Simply, the basic characteristics of conflicting situations should be considered as far as possible. For instance, by increasing column height and span length, we have a soft floor state that is sensitive to lateral forces. We will use the series of columns and reinforce them to overcome the wide span problem in the base building. Although these strategies lead the project to extra costs, architectural desirability balances these expenses. In addition, the use of base building and connected columns in a standard height are efficient to cope with this issue.

However, it should be noted that in addition to these criteria that we have mentioned here as the main criteria, there are many more that is not possible to review them in an article. These should be put together in the high-rise buildings guide line for each city. Finally, the lack of information and rules about criteria in designing tall buildings does not bring freedom for designers and they are responsible for our design and its costs brought to the project and the city and they should reduce it.

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Color Education in Technical-Vocational High Schools through Visual Sign (Experimenting with Models) and its Impact on Students' Academic Success

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Abstract

The purpose of this research is to determine the effect of teaching color knowledge on student's educational success in visual arts' course in private schools and governmental ones –affiliated with technical-vocational colleges. The objective is not only to increase efficiency in educational activities, but also, would be a framework for other educational activities.

The 11th grade students from technical-vocational high schools in Tehran was selected as the case study. The color knowledge of visual arts course was the subject instructed for this population through two different methods; one as experimental group, another as control group, which both was selected at random. The color knowledge taught with the materials supports in experimental group, and through classical method in control group. In order to determine the effect of teaching methods in students' academic achievement, Pre and post testing designed for the control group. As a result of applied tests on the experimental and control group before and after teaching the subject. It was found that the success of the experimental group using materials, was greater than the control group taught through classical method. Therefore, it was found that teaching the subject of "color knowledge" using materials contributes to students' academic success.

Keywords: Art Education; Color Knowledge; Visual Arts; Visual Design

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1. Introduction

In principle, the purpose and necessity of art education is striving to glorify the human soul, to liberate human beings, to satisfy spiritual needs of individuals, to create a sensitive, modern and balanced society (Erturk, 2013). In art education, accordingly, the goal is to strengthen the cultural structure of society, adopt cultural values, create spiritual satisfaction and make available the people who are environmentally sensitive. It has been seen that individuals or communities who have received good art education have fewer mental issues or show greater sensitivity to what is happening around (Zor, 2008).

Because the visual art (painting program) is one of the fundamental courses affecting the student's success, it is mandatory to consider this course as a multidisciplinary art and use the materials to increase efficiency. In another words, in art learning models, it seems that learning centered around topics which are absorbed by means of more than one sensory organ (Coruhlu, Nas ve Cepni, 2009), and learning by seeing is more efficient than learning by hearing.

According to research from the University of Texas, when the time variable is kept constant; most people only can remember 10 percent of what they've read, 20 percent of what they've heard, 30 percent of what they've seen, 50 percent what they've seen and heard, 70 percent of what they've seen, heard and read, and finally, 90 percent of what they've seen, heard, read and touched (Demirel, 2006).

This program is based on empirical comparisons, and much agreed with sensory-based learning, relies on data from Edgar Dale dale's life cone. As it's widely believed in society, art teaching is not a luxury thing, and it is not just for educating talented people, but it's part of personal development necessary for all. The purpose of art education here is beyond Nurturing artists, means construction of aesthetic taste in individuals (Buyurgan and Buyurgan, 2007). A child or young person, through art education, learns to see instead of looking, understand instead of hearing, and feels instead of touching. In short, they learn to be aware, because art education means training of being sensitive. A person who has studied art is both more sensitive and tolerant towards events and the environment around him (Yılmaz, 2007).

In art education, we mainly aim to inform and use this information, when necessary, think critically, and unlocking the creativity power. To this goal, instructors who carry out educational programs have a great responsibility. First of all, they are expected to bring efficiency in teaching and make it more enjoyable, especially for teaching art lessons (painting program). The use of materials, in this case, are of importance in facilitating learning (Celik, 2008).

As art classes are one of the favorite courses that always draw students' attention, it's essential for instructors, to learn how to prepare educational materials, advantages, the practical limitations associated with materials, and how to utilize instructional materials within courses (Uşun, 2006).

1.1. Problem Statement

Does teaching with the help of materials in the visual arts have a structural and positive contribution to the academic success of students?

1.2. Objective

The purpose of this study is to investigate the impact of "Color Knowledge" instruction using design materials in the visual arts course on academic success of students. Extending the result of the research, would be effective for furthering other courses.

2. Methodology

In this research, 11th in technical-vocational high school's students were taught color knowledge using two different methods for painting course. A group with classical method (training with lecturing) and another training by means of educational materials method were examined. This study employed "experimental design", "control group design", "pre and post testing", which are of experimental methods, and observation and analyzing documents, which are among qualitative research methods. Experimental method (pilot) is a kind of research done to examine the cause and effect relationships between variables by examining each event, phenomenon, person, factor, and then comparing the results (Büyüköztürk, 2001). In this study, pre-tests were performed in several classes. And close results in the two groups -experimental and control group- were formed randomly (neutrally). In both groups, before and after training, tests were taken and the results compared.

Table 1 Pattern of control group and experimental group, before and after test

Experimental group	X=01 R=03
Control group	X= 02 R= 04

R: is showing Accidental assignment of individuals to groups, 03 and 01: showing pre and post-test of experimental groups, X: showing the independent variable applied in the experimental group (Variable test), 04 and 02: showing pre and post-test of control groups (Doğan, 2008). Here, model of teaching through materials is taken as an independent variable, and the academic achievement as the dependent variable.

For study, two classes of twenty, totally 40 individuals randomly selected and participated voluntarily as the control and experimental group from technical-vocational high school at Tehran, for painting course. For the validity of research study, it kept as secret which group was the control group.

Due to their presence in nature and environment, colors can imply various meanings in humans (Artut, 2004). To better teach students about the relationship between colors, color saturation, chromatic color, first and secondary colors, etc.) Color Circle best explains these principles and inter-color relations (Erbaş, 1996) (Fig 1). Accordingly, this colors which shown on a pinwheel as a moving visual material, features three level. First; Blue and yellow, the latter; Blue and red, third; Red and yellow (Fig 2).

For measuring teaching method efficiency, training was provided for the control group and for the experimental group in three forms of narration/storytelling, lecturing and presentation with material support. At last, post-test applied at the end of the lesson and the results shown as Table 2 and 3.

Fig 1 Color circle

Fig 2 Pinwheel based on color theories

2.1. Data

To collect the required qualitative data about the effect of teaching on students' academic achievement, a simple pinwheel –based on color theories- and an Achievement test containing 20 questions prepared (Appendix). Achievement tests are those that are prepared and applied to determine students' academic achievement in terms of knowledge, concept and understanding at the end of a specific program (Yildirim, 1999). Such tests should use highly discriminatory sampling means covering the subject so that distinguish between those who know and those who don't. In this regard, one of the basis considerations is to prepare equal opportunities in terms of learning environment when establishing a progress test for experimental and control groups (Doğan, 2008).

The test focused on color information questions and its achievements. In order to determine the level of pre-learning from the studied topics, five questions were added to 15 questions of content measuring, totally 20 questions designed and evaluated by experts.

2.2. Hypotheses

During the testing process, students were not affected by external factors and setting in which the test was held. Their answers, as a result, supposed to be error-free and do not affect each other.

3. Finding and Analysis

In the study, pre and post-training achievements tests were taken from both experimental and control groups and the results were compared as the following chart.

Table 2 Results of pre-test progress test of experimental and control students with the subject of "color knowledge".

Groups	Students	Arithmetic mean	Weighted mean	Mode
Control	20	47.50	55	55
Experiment	20	47.75	50	55

As shown in Table 2, there is no significant difference between the pre-test results, and it means students have general information about the topics have been taught. These findings show that pre-teaching student information in both classes is statistically equivalent. Although the scores seem low, in the board, the test of really successful and unsuccessful progress is separated and it can be said that they have achieved success as a group.

In average evaluation, Although the student success rate is slightly lower than average, it can be noted that in art education, there is a level of overall success, a good level of pre-learning and a certain level of preparation. It can be said that with good training and the right method at the right time, maximum efficiency would be obtained.

When all the students' scores (pre-test) reviewed one by one, it was found that they generally knew the definitions of line and point, which is one of the basic topics in art education, and they remembered some basic information about perspective. Observed data indicate that a small number of students recall inanimate nature and pencil techniques with their background information.

As an example of color knowledge, some students had general information about color during their school, but were unaware of its details (color theories). They did not know much about color terms in particular, and faced with difficulty for answering. It can be said that questions 1, 3, 6, 9, 10, 11, 12 and 16 were answered correctly by all students and these topics were dominated by students.

Table 3 Results of post-test taken by the students of the experimental and control groups regarding "Color Knowledge" progress test.

Groups	Students	Arithmetic mean	Weighted mean	Mode
Control	20	58.50	55	55
Experiment	20	67.75	60	55

After taking the pre-test which lasted for a week, the post-test was taken for measuring student achievement, with this difference that the correct answers fields were displaced. In this way, the students read the questions and pointed out the correct answer with thought. That is, they did not memorize the questions and pointed them out after understanding. As can be seen in Table 3, describing the topic using the material support clearly has changed the test results in favor of the experimental group. The answers show the students' high understanding and sufficient mastery on the subject and support their learning.

In control group, the subject was taught by classical methods (lecturing), and in comparison, to the pre-test results, however shows a significant success in the post-test, it's low in contrast to the

success of the experimental group, but it is still observed that modern education supported by materials is more efficient in practice. Due to dynamic structure of art education, it cannot continue to be effective unless it follows contemporary developments and changes. This dynamic structure calls for a rich educational environment equipped with technological materials. The teaching methods used in the educational setting vary according to the interests, abilities and perceptions of each student (Sarıkaya, 2006). The important point here is to opt for something that attracts the students' visual-auditory comprehension characteristics and makes the teaching enjoyable and fruitful while using a valid method. It can be said that this is the main point that contemporary education emphasizes on.

One of the statistical results of this test is that questions were marked correctly by most students successfully. The high level of success should be interpreted to that lesson is well taught and the highest performance is achieved, and it's equal to the simplicity of the questions or the distinctiveness of the test. After reviewing the answers that the students made to the test questions, it can be said that they've reached a good knowledge of color topics and competency for analyzing the color.

4. Conclusion and Suggestion

Undoubtedly, the value and importance of color in art education is undeniable. Accordingly, color knowledge training should be emphasized and considered in educational activities. The main goal for students is not only to look but also to see with the new awareness they have gained during the color training process (Erbaş, 1996). Here, the goal should be to achieve maximum efficiency regardless of the subject being taught, to improve the student's emotional and cognitive development, understanding and interpretation skills.

Based on the above information, this research once again proved that the using educational materials is one of the most important factors that could increase academic success, students' interest in the lesson and motivate and influence them for educational activities.

This study ensures that material usage is an integral part of education so that would be applicable for other courses. In this research, it was shown that similar studies should be considered and developed in form of a model, especially in education field, where art education has an important place.

At least for future generations, there is still time to provide up-to-date teaching equipment and materials (Bölükoğlu, 2002). The technical classes of all schools must be equipped with modern equipment to prevent any problems in the preparation and manufacturing of educational materials.

Teachers should be particularly aware of materials usage skills and stands for the follow-up process. In order to follow the last developments of national and international art education methods, they must be periodically directed to in-service training programs to be nurtured with the participation of competent art educators (Alakuş, 2002). Schools should be equipped in a way that allows performance-based programs implementation (Gelisli, 2007).

Teachers should plan activities that make teaching enjoyable, increase the quality and efficiency of teaching without discriminating, and make the use of the material in the lesson a top priority. In choosing educational materials, it's important to consider student characteristics, appropriate adjusted methods and the best time to get the best result from.

If the scores obtained by students are supported by other measurement tools and evaluation criteria such as process and performance observations, it can be said that the success of the art (painting) course will be achieved with a more modern approach (Alakuş, 2004).

To prevent students from the negative attitude towards the art course with a fear of getting bad grades, they should be replaced with activities such as sample work, setting up exhibitions and evaluating their performance, which are contemporary evaluation criteria.

In terms of determining suitable principles and methods, it is a necessary for the art lessons to be prepared by specialists, separately for the first and second grades of elementary schools, and for the third, fourth and fifth grades separately in two stages. These programs should be flexible and it is important for the teacher to be able to prepare the necessary materials while taking into account the environmental conditions.

Due to the environmental conditions of schools, materials, schools and classrooms should be equipped with modern technology. Establishing smart classes similar to developed countries, would be the way to increase efficiency in educational activities.

In general, educational art activities would increase efficiency in other subjects, because students recognize their feelings-thoughts, become aware of their latent power, develop their creativity power, and become critical of the events around them. It is the reason behind of why in developed countries, art education courses are among the compulsory courses (Kavuran, 2003).

Given this fact, it is necessary for academics and educators to consider the art education course as a compulsory course, especially it's expected from the Ministry of Education to increase the duration time of the course and consider art as a tool and a springboard for the progress of our country.

Undoubtedly, we cannot name a country that has progressed in science and technology, but lags behind in the field of art. In today's developed world of science and technology, art is at the forefront of all progress (Avcı, 2012).

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Appendix

Measurement Tool

1. What is the name of the artistic element resulting from the movement of moving points in a specific direction?
   a. Line
   b. point
   c. Paragraph
   d. Handicraft (skill)

2. What is the border line of shapes in pictures or paintings?
   a. Wallor
   b. point
   c. The meter
   d. Rhythm

3. Which of the following is included in both audio and visual arts?
   a. Literature - music
   b. Poetry - painting
   c. Cinema - Sculpture
   d. Theater-Ballet

4. In which artistic subject in cases such as; Is there a point of intersection, a horizon line, a point of view, a ground line, ...?
   a. In the subject of sculpture
   b. In relation to the subject of criticism
   c. In relation to the subject of perspective

d. In relation to miniatures

5. What does the term naturalism mean in the teaching of the visual arts?

a. means abstract painting design.

b. means inanimate nature.

c. It means figurative painting.

d. means animated painting technique.

6. Which of the following is the original color?

a. orange, b. green, c. yellow, d. purple

7- Why are colors called "original" colors?

a. Because they are obtained without mixing with other colors.

b. Because they are beautiful and impressive.

c. Because they are composed of three colors.

d. Because they are in the center of the color circle.

8 - Why colors, secondary colors, “second-class” called?

a. Because it is found in nature alone.

b. Because they are obtained from soil.

c. Because they are used as home paints and paintings.

d. Because they are composed of a combination of two different colors.

9- From the mixture… with ... green color is obtained.

In which case are the most appropriate words for the spaces above?

a. Orange and red

b. Blue and yellow

c. White and blue

d. Purple and blue

10. Mixed ... with ... purple obtained.

In which case are the most appropriate words for the spaces above?

a. Black and red, b. Red and blue, c. Yellow and blue, d. Green and blue

11- Which of the given options is below the correct color sequence of the main colors?

a. Red, orange and green

b. Red, yellow and green

c. Yellow, blue and red

d. Yellow, green and orange

12 - The mechanism in which the main and intermediate colors displayed in a special systematic, what to say?

a. Color harmony, b. Color riot, c. Color circle, d. Color key

13- Which of the following two items are not considered as color?

a. Black and red, b. Red and yellow, c. White and blue, d. White and black

14. Which of the following is a neutral color?

a. orange, b. red, c. blue, d. gray

15- The color that exists in the color circle in front of the combination of the two main colors ... is called.

a. Complementary, b. Neutral, c. Subtle difference, d. Contrast

16- Grays are formed by combining black and white colors with each other?

a. Contrast colors, b. Complementary colors, c. Neutral colors, d. Thin colors

17- What do we say about mixing any color with neutral colors?

a. Tonality, b. Neutral, c. Contrast, d. Spectrum

18- Which of the following is a warm color?
a. white, b. orange, c. blue, d. black
19. Which of the following is a cold color?
a. red, b. white, c. blue, d. black
20. In which option is the yellow contrast given correctly?
a. red and white, b. white and black, c. blue and red, d. black and red

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Retrieving the Concepts of Persian Garden in the Content of Contemporary Iranian Painting

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Abstract

Contemporary paintings are abundantly brought up with combination of various images of Iranian Gardens in order to describe identity and culture of Iran, because these paintings have important role in retrieving and recognizing Iranian identity, culture and history, and also have a very long-lasting record, because of which there exists a need for studying. Contemporary paintings, all inherited from Iranian Garden design, embed presentation of plans, animals and architecture, as matters of identity and culture of our country, can help to make better recognition and revival of past culture and older Iranian identity. Gardens have had very important place since old days in Iranian culture and civilization and have been counted as one of the fundamental concepts of social, cultural and natural discourse of this land. Still presented in Iranian literature, architecture and painting in different forms, in a way that these days' painters pay special attention to outcome concepts of Iranian Gardens. The main purpose of this work is recognizing and retrieving the concepts of Iranian garden in content of contemporary Iranian painting. At the time being, study conclusions show that it is possible to retrieve the concepts of the Iranian garden by means of analyzing and demonstrating the content of landscape drawing drawn by contemporary painters, especially construction type, rhythm, symmetry, and coloring used in these works.

Keywords: Garden; Iranian Garden Pattern; Contemporary Painting

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1. Introduction

In the contemporary period, begun in the 1941 and continuing to the present day, it has been commonly used in the book illustrations. These paintings contain places that represent Iranian Islamic art and the scenes occurring in nature. During contemporary period, lots of painters work in different genres of whom some choose to use nature as a means of expressing their work. (Mobini and Firuzbakht 2016: 22). Each of these painters looks at a common subject from a specific angle and personal point of view, and this common theme is actually Iranian garden, because all these painters come from Iranian culture and belong to common periods. Although under the influence of different atmosphere, there appears variety of effects. They reveal in their works four main elements: namely water, wind, soil, and fire which are abundant in the nature. Among these all, Iranian garden is an architectural combination of the use of raw materials and plants, so it is a living work that due to these elements represent the culture of each tribe and the climatic condition of its native region.

2. Problem Statement

The combination of raw materials and plants in the Iranian garden shows dominance of rereading, rethinking and recognizing this phenomenon. In Iranian view, garden is in fact the arranged nature based on humanistic abstract thought and is a metaphor for Heaven, constructed by means of quad elements, all of which are devoting oneself to nature and realizing the signs and symbols of God and cause the human psyche to rejoice (Jahandar 2013: 35). The design of the Iranian garden, while being united in general lines, geometry and executive materials, has a unique spatial diversity. The garden flaunts with spatial diversity by defining independent spaces by limiting, adjusting the distance from view, using geometric shapes, planting design, different composition of plant types, spatial function of water, utilization of materials and the like.

Main and Sub-axes, plots, types of ponds and built spaces show an order and unity in the whole garden and the same combination and unity between the elements can be seen in the contemporary paintings (Jangi, 2018: 32). Therefore, in the research project of the present study, the concepts of Iranian garden in contemporary paintings and its role of retrieval and recognition of the identity and culture of the country are studied, so that his contemporary painting is selected and analyzed with the themes of Iranian garden, Also, its weaknesses and strengths are examined in order to exploit the Iranian garden and its related concepts along with understanding the Iranian culture and identity in the audience's view.

3. Concept of the Iranian Garden

Iranian garden as one of the most important achievements of Iranian civilization in the world, is a reflection of the Iranian worldview. For many years, many Iranian and foreign researchers have been looking for a pattern or archetype for the Iranian garden. For a long time, the "Chaharbagh" pattern was introduced as the pattern of the Iranian garden of the world; A geometric pattern that, relying on the four-part worldview of ancient books, is following its adaptation to the pattern and worldview of the Iranians and of course the Promised Paradise, especially in the Islamic era, and justifies the constructive idea of dividing the Paradise into four parts, then introduces it as the archetype for Iranian garden.

Expanding studies and spatial adaptation between these model and various examples of Iranian gardens, the "Chaharbagh" model was doubted as an archetype for all Iranian gardens.

Recent studies by Iranian researchers generally show that beyond the quadruple division, the Iranian garden is a pivotal garden in which an axis as the main axis plays a fundamental role in shaping the geometry of the Iranian garden. Therefore, the use of patterns and concepts of the Iranian garden in modern Iranian paintings can be a reminder of our country's culture and identity.

The architectural concept of the garden is a reflection of the sense of place or "locality" because it is considered to frame the overall image of the universe in its specific space garden. This concept, which is the cultivator of order and harmony, can reach the senses through numbers, geometry, color and matter, while at the same time it conducts the view of reason to the essence, and to the esoteric realm hidden in a positive atmosphere. The garden as a manifestation of the centralist form of the great world or macrocosm, or the appearance and the yard as a manifestation of the centralist form of the small world or the interior, are aspects of place that are mutually complementary (Ardalan and Bakhtiar, 2001: 68). Garden has an important place and status in Iranian culture and civilization and has been considered as one of the basic concepts of social, cultural and natural issues of this land, which is still present in various forms in Iranian literature, architecture and urban planning (Bani Massoud, 2011: 21).

Many Iranians had a special interest in building gardens and orchards in yards and around buildings, from long ago. They called the gardens "pairiya daēsa"meaning around fort or dēs (building) and the person who built the building was called Dēsā (builder) (Pirnia 1994: 4). Schultz also mentions the garden as a cultural landscape: in the "cultural landscape", natural forces are tamed and domesticated and living reality emerges as a regular process in which man participates. The human imagination of campus has in fact always been an enclosed garden. In the garden, known elements of nature come together: fruit trees, flowers and tamed water. In this way, even water can be "made", that is, precisely defined as part of a cultural landscape or seen in a fountain. In the cultural perspective, man builds the earth and reveals its potential structure as a meaningful whole. A cultural landscape is based on "farming" and "cultivating" and includes certain places, ways and territories that determine human understanding of the natural environment (Schultz, 2002: 8).

Fig 1 Carpet with garden design, 12th century BC, Kurdistan

4. Iranian Painting

Iranian painting is commonly used in book illustrations, especially anecdotal poems, which contain stories that take place in space.

Hence, the painting of scenes from those stories also contains images of the place of the artifact, namely the city and architecture. Iranian painting has sometimes been referred to as miniature, according to European tourists and nineteenth-century orientalists, which is not the correct term, because Iranian painting is not limited to making miniature images, but also includes large murals and arrays. In addition, the difference between Iranian painting and miniatures of medieval Europe is so great that they cannot be given the same name (Zamani et al., 2009: 8.) Iranian painting has long been without mere imitation of nature, that is, without using the spaces of three dimensions, real colors, textures, shapes, as well as natural light and shadows, try to create ideal spaces, just what the painter had in mind.

Therefore, except in periods of influence from Western traditions, no sign of naturalism can be found in Iranian painting. Instead, abstract painting, symbolism and decoration were common from the earliest times in the visual arts of this land. The aesthetic foundations of Iranian painting were formed based on this abstract perception of the world (Pakbaz, 2010: 8.) A fixed and unchangeable member of the evolution of painting is an element that cannot be ignored and removed and it is a space that comes from the artist's mind, it is formed, cooked and then materialized in different forms in the canvas (Zamani et al., 2009: 9). A look at contemporary Iranian painting during the decades after World War II, shows that Iranian painting has witnessed a significant change and transformation. The period when the Iranian artist, “Kamal-ol-Molk”, willingly left the traditional position (the ancient tradition of miniature and the tradition of naturalism), and tried to compensate his backwardness from the developments of Western art and open a window to its wide and tempting horizon. The effort, with all its ups and downs, has been going on for more than half a century. The emergence of new and contemporary Iranian painting dates back to the early 20s. When the establishment of the first Iranian School of Art was the beginning of a formal and serious trend of Iranian visual arts towards new findings of Western painting or the beginning of opening a window to the world arena.

Of course, the attention of Iranian art and artists to Western art had an older history. Familiarity of Persian art with European art was several hundred years old. During the Safavid period, the first acquaintances with European classical art began. It was during this period, around 1021-22, that Mohammad Zaman traveled to Rome as the first Iranian painter to learn the art of oil painting. Then, around 1025, he returned to Iran and caused a change in Iranian painting. Although this initial acquaintance with Western art was not very widespread in the first period and for some reason, including the persistence of traditions, novelty and different manifestations of this art could not attract the mystic and ascetic artist, but as we will see, this acquaintance created grounds for fundamental changes in the future of Iranian painting. Familiarity with the basic principles and tools of Western painting in this period, opened new windows on Iranian artists and basically caused his view of nature to be overturned and in other words caused the allegorical space of Iranian art to be turned upside down and forgotten. Until the transformation of the world of the Iranian artist, he never tried to put a mirror in front of nature. In his traditional style of painting (miniature), the Iranian artist was able to reduce the three-dimensional and embodied world of phenomena to a two-dimensional image by using special techniques (Kari Welsh, 1991: 53).

By simplifying elements and objects, using bright and flat colors, avoiding Penumbra and perspective, not emphasizing the differences in textures, and avoiding anything that makes his image look like objective nature, he drew the gardens of Iranian thought and gave them the

horizon of normal life of material existence to conduct to a world beyond this world, with proper time, place, colors and shapes (Shaygan, 1986: 116.) The space that appears in miniature is just a quality that rather wants to be imaginary, that is, a space in which images are free of matter and its properties (Nasr, 1993: 77).

Familiarity with oil painting and attention to tangible nature, made this imaginary but real world of the Iranian artist collapse and basically changed his view of nature and existence. Continuation of the effects of western painting in the Afshari, Zandi and Qajar periods, led to the emergence of a style in Iranian painting that reached its peak during the reign of the Qajar dynasty and especially during the reign of Fath Ali Shah and later became known as the “Qajar school”.

In these stylized and idealized works, although new elements of Western painting had infiltrated the painters’ work, they were "mostly separate and irrelevant elements, such as new types of clothing fabrics or new technical methods such as the use of oil and color (Emami 1975: 32). And yet, the basic image of Iranian painters of their work remained somewhat intact. Thus, the Qajar painters, like the Zand and Safavid painters, almost continued the ancient ways and customs, and the heroes of the ancient legends, with their dignified and calm faces and with the hands, seemingly fighting against their long-lasting foes in a vast plain, full of the mysteries that were repeatedly depicted between the world of myth and the real world. However, the works of this period can be considered by many as one of the most brilliant periods of the manifestation of the art of painting in Iran. Because while the form, materials and materials are fresh, the Iranian spirit is still manifested in the two-dimensional space of these works. In the late nineteenth century, Iranian artists turned their attention to the West to the extent that following the worldview and work style of European artists was a condition of artistic prestige and value. The advent of Kamal-ol-Molk, the semi-legendary figure of Iranian painting, who paid deep attention to the European classical style, caused a complete change in the whole perspective of Iranian painting. Kamal-ol-Molk, who also traveled to Europe around 1893 and studied and copied the works of classical painters there for a few years, became the founder of the classical-naturalist style in the Iranian painting realm, and the one who is still influential after more than half a century after his death. Kamal al-Mulk, with a handful of what he had learned from Western masters and great post-Renaissance artists in European museums, replaced old traditions with new ones. Imaginary, subjective and idealistic painting gave way to objective and precise painting. Perspective with all its tricks, penumbra, for the lighting of colors and photographic construction, etc. appeared in paintings.

When photography was still a new and emerging phenomenon that amazed the viewer, a competition began between painting with a camera, especially in capturing the smallest details, and it was of course a wonder. Thus, Kamal al-Mulk - and later his disciples and followers - evoked the image of the painter in the public mind that "the painter is a photographer holding a pen; The idea that has remained stable to this day. For example, in the painting biennials of Tehran in 1970, 1972 and 1974, we saw the works of his young followers. Iranian painting became close to naturalism and resembled photography at a time when modern European painters had surpassed Impressionism, crushing forms and denying all conventions of the art of painting. In this regard, Kamal al-Mulk traveled to Europe at a time when there was a change in the European societies, especially France, in the field of visual arts, but he did not show interest in them. He was, above all, influenced by naturalism and the art of naturalization in Western classical art. He turned to museum painting, academic and classical painting. Or, in the opinion of some, in fact, he completed his previous knowledge in this field. Kamal al-Mulk had disregarded even realism after the French Revolution. He had returned after he absorbed detail illustration, objective atmosphere, narrative portraiture, and, of course, the basics of Western painting From the Renaissance tradition and his

style set the new perspective of Qajar painting. It was along with this change that the conflict between Iranian identity and traditional visual heritage, on the one hand, and global visual experiences, on the other, was shaped. After returning from Europe, Kamal-ol-Molk established a school, at which he trained students who continued his thought and way, and kept the Iranian visual arts under their influence until the second decade after World War II. So that, for example, the late Ali Mohammad Heydarian (1991), one of Kamal al-Molk's students, was in charge of painting and vice chancellor of the Faculty of Fine Arts, at University of Tehran, until 1966, when he retired. The slogan and practice of the followers of Kamal al-Mulk, and what they have left to this day, was that painting means "imitation" of the beauties of nature (Momayez, 1987: 600) and in a sense, imitation of the appearance of nature.

Thus, Iranian painting came close to naturalism at a time when it became like a photograph and European nouveau artists opened the new frontiers of anti-academic art. Impressionism was evolving and painters were looking to break down forms, so by the time Kamal al-Mulk's students passed on their information to a new generation of students, the Cubist era was more or less over. However, due to the influence of Kamal al-Mulk and his students, a new generation familiar with the basics of Western painting grew up, and in front of them, traditional painting was delayed for a while and the Iranian human view became more and more forgotten. The Second International War brought about many changes in Iran. The Allied occupation of Iran and its aftermath left society "Americanized". The government pursued an apparent economic modernization with a celebration of "ancient Iran" and nationalist ideologies. In terms of political and social issues, a new phase began. Many books from the works of Western contemporaries were translated into Persian and the atmosphere for discussion about them was fascinating among intellectuals. The tendency of so-called Iranian intellectuals to discover the intellectual, cultural and social products of the West was more evident than ever from the second decade of the twentieth century onwards.

The enthusiasm of Iranian intellectuals for the West and its various phenomena had increased. They believed that "old and worn-out Iran should accept a new and young civilization" (Siasi, 1987: 511). They believed that "Iran should become a westernized outwardly, physically and spiritually". After the Second World War, the acceptance of Western civilization was raised again. At this time, Iran's communication routes with the West took on a new shape and expanded. New people were going abroad to study, and new information about the evolution of contemporary art in the West was appearing in Tehran's cultural and press circles. Sokhan magazine gathered a group of writers who paid special attention to the West

The year 1940 was the death of Kamal al-Molk and, in other words, the beginning of the extinction of the "School of Kamal al-Molk" and the beginning of the new developments in contemporary Iranian painting. This year, thanks to the efforts of Andre Godard, the Faculty of Fine Arts of Tehran was established and new grounds arose to get acquainted with the new developments of Western art.

Although the college was still more or less a field of naturalistic painting for Kamal al-Mulk's students, the closure of French professors allowed young painters to become acquainted with other forms of Western painting - and perhaps most importantly, Impressionism. With the establishment of the Faculty of Fine Arts at the University of Tehran and the gradual acquaintance of enthusiastic Iranian youth with new perspectives on Western painting, photograph-like painting begun to decline; A journey that lasted almost thirty years without a break and led contemporary Iranian painting to lack photographic and naturalistic painting, and the curtains of paintings from people's view. Some of the first students of this school who had gone to Europe to continue their art education returned to Iran with the result of their familiarity with the new schools of painting and

sculpture. It was in this condition that the conflict between the old and the new, between the followers of Kamal al-Molk and the modernists, appeared, which was naturally based on the new demands of the Iranian art community, so that gradually the novices conquered the realm of contemporary Iranian art. Young artists, eager and fascinated by the discovery of new artistic phenomena and compensation for their so-called "backwardness" to attain the modern Western art, tried to compensate for this backwardness as quickly as possible (Emami, 1975: 33). Twentieth decade, was assumed as a period of getting ready. It was period of emergence of the first results of the first step of this process, although at first it showed itself very slow and conservative. When in 1325, the "Exhibition of Fine Arts of Iran" - which is the first major exhibition of contemporary Iranian visual artists - was organized in Tehran, in contrast to the works of traditionalist miniature painters (and the works of Kamal al-Molk and his students and followers that were displayed in this exhibition), the works presented by young modern painters such as Hossein Kazemi, Mehdi Vishkaei, Jalil Ziapour and Javad Hamidi were exhibited which seemed new, but mot as new as the modern art that was prevalent in Europe. In Reza Jorjani's words, a critic of Sokhan magazine, who wrote a note on the exhibition: "The exhibition tries to follow the path Europeans have beaten 150 years ago". In this exhibition, in addition to traditional and classical works, quasi-Impressionist works were considered as works of "modern European style", whose painters believed that "an artist's painting should not be blindly imitated just like a photograph taken by a photographer from nature and should be different ". Thus, the modernity of the Iranian painter in the twenties was the avoidance of the photographic recording of nature. What Bozorg Alavi emphasized in his note on the exhibition reveals the extent of the concept of modernity of contemporary Iranian painters in the mid-1930s: "What we call modern painting today is what we saw in Europe 60-70 years ago. It has been common in the name of Impressionism" (Goodarzi, 2008: 59).

5. Presence of Nature and Garden

The presence of simplified or with exaggerated twists and turns and symbolic image of nature and its elements in the background in Iranian painting and miniature mixed with literary, poetry, religious, mythological, and memorial, alike themes has a long history. In fact, the function of the original Iranian painting is to give a glimpse of that pleasant garden in a world without which the reflections will be nothing more than delusions (Burkhart, 1997: 175).

Iranian painting is also realist in the traditional sense of the word, meaning that sensory appearances for it are strongly a reflection of the true nature of objects. It means that everything in it is made of extremely delicate and rich essence, and there, every tree and flower is unique in its kind (Shahcheraghi and Asalami, 2010: 46) so that the animals and plants of the miniature scenes are not just imitations of nature. Rather, it is an attempt to embody that heavenly nature and that primitive creation and nature, the very Ferdows Brin and the world of the kingdom, which at this moment is also active in the world of imagination or the world of allegory. In the same way, the color of each mountain, cloud or sky is unique and different from natural colors, this unity and uniqueness refers to the realm of the kingdom (Burkhart, 1997: 48).

Fig 2 Mehdi Hosseini

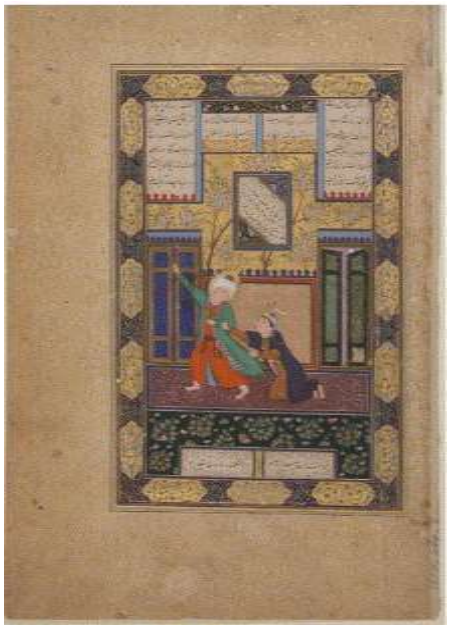

Fig 3 Joseph and Zulaikha, Bukhara, circa 1525 to 1535

6. Conclusion

All divine religions consider man to be a creature expelled from paradise and have promised him (the promised paradise). Belief in heaven after death has been present in other religious beliefs as well, including the beliefs of the ancient Egyptians and Hindus, and from the Chinese and Japanese point of view, the human soul after death and during the difficult stages, he returns to earth in a new form or reaches eternal peace and happiness in a paradise that is completely similar to the earth.In ancient Iran, the beliefs of the religion (Mazdisani) about heaven is quite clear that it has three srāy (house) that from the third house it reaches the glorious court of Ahura and the throne of the Almighty. Since the highest level of paradise is the Garden of Eden that God has planted himself, to be his abode, it seems that the Islamic worldview, borrows this image, as an allegorical image.

According to Henry Carbone, this celestial body was chosen in order to establish man's relationship with the supreme world, which has become ideal and has become an eternal paradise.

Also, the garden is the model of the first place at the end of the physical world (property) and the world of the soul (world of the kingdom). In other words, the garden is an intermediate world that can be called the world of imagination. It is a the Lote Tree of the Boundary shows the boundary, and is kind of fence and separates this world from the chaos of the world. Now it can be said that the idea of the promised paradise that has been created in the minds of Iranians from previous periods is a picture of the most beautiful and pleasant gardens. The Iranians also refer to the roof of paradise by referring to different gardens. The word paradise is Ferdows, which has the meaning of garden and paradise together. Poets enjoy comparing the earthly gardens and the heavenly paradise, which are promised in the Qur'an, and consider the highest type of garden to be the Eram, which is mentioned decorated with columns. Therefore, Iranians give their mental image of paradise, which will be given to them as a reward for good deeds in this way. A symbol like the paradise of Kowsar, which consists of trees, flowers and streams, in the form of a garden with flowing water and beautiful flowers and trees that they can rested in their shade, and all enclosed in a wall that prevents the entrance of hellish people to it has manifested as mentioned. Gardens are the greatest joy and happiness for the inhabitants of dry and barren lands where a particle of greenery is a gift. That is why the Qur'an, in order to convey the concept of pleasure and happiness, constantly refers to the Garden of Eden many times and promises that: (on that day, the pious will be in the gardens and by the springs).

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Designing the Beekeepers' Clothes with the ability to Repel Insects

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Abstract

In this research, insect repellent fabric (bee) was produced and with this fabric the beekeepers' clothes were designed. Therefore, a fabric has been designed and produced so that the bee does not come in connect with the beekeeper from a distance so that it cannot bite. In the theoretical section of this article, initially, types of fabrics were examined. After selecting the type of fabric that should have the cooling property, the different types of beekeepers' clothes were studied. In this regard, research and study has been done on the repellents that can be used in this article. Then, the process of practical work and production of repellent fabrics was done and the repellent fabrics were produced by using diethyltoluamide in combination with the fabric. Finally, with the findings obtained regarding the efficiency and use of the relevant clothing, the initial plans related to them were performed, and after the approval of the final designs, the Marulus program was used to implement them. Also, the design execution was analyzed.

Keywords: Beekeepers' Clothes; Fabric Design; Insect Repellent

1. Introduction

Honey bee is one of the beneficial insects for humans, which belongs to the double wing category. The honey bee came into existence on earth long before man. Bees were there since 150 million years ago and were busy breeding. However, the difference is that it did not have a social life and like todays many non-honey bees, it had a solitary life and each bee had its own beehive and lived in it. A hive is a place where bees are born, work, raise their siblings, and store their

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necessary food. Bees have different breeds and with complex body structure (Michener, 2000; Danforth, 2006; www.daneshnameh.roshd.com).

1.1. Appearance of Honey Bees

The honey bees are approximately 15 mm in size and usually light brown in color. Bees are usually oval shaped creatures in golden yellow color with brown stripes. Although, the body color of bees varies from species to species, some bees have black bodies, but all bees have dark to light spectrum. These dark and light bands target the bee existence: unlike other species that hide when detected by hunters, those with light-colored bodies and the ability to bite act as a warning to the hunters (www.ahoota .com).

1.2. Honey Bee Body Structure

Head: located in the front part of the body and includes the following organs: two compound eyes, three simple eyes, two antennas, and a mouth with proboscis. The size of the eyes is a means by which the beekeeper can easily distinguish the male bee from the worker bee. Because the male honey bee eyes are larger and meet each other from the back of the head, but it does not meet for the worker and the queen bee. The antenna's does the job of touch and smell. Bee with the help of proboscis collects the nectar from the flowers and sends it into the honey making bee hive through the mouth (www.ahoota.com).

Chest: It is made of three chitin rings and the underneath members are attached to it: four wings or feathers, two of which are the forewings and the other two are the hind wings. Among the six legs, the hind pair has porous called baskets, that the bee fills it with flower pollen and carries it to the hive. These baskets are larger in workers than in males (www.ahoota.com).

Abdomen: Located at the end of the body, it consists of six hind chitin rings and six abdominal pieces. At the end of the abdomen, the anus is seen for fecal excretion. Through this anus can remove its sting to bite. The male honey bees cannot bite, because they do not have sting at all (www.ahoota.com; Cardinal, 2011; Engel, 2001).

2. Types of Beekeeper's Clothes

1. Finished space beekeeping clothes: The finished space beekeeping clothes and in terms of quality are sewn in three categories. In the first grade, it is made of multi-layered net at the waist for proper air ventilation and prevents perspiration. The finished beekeeping clothes include beekeeping clothes connected to the head hat and trousers which is one piece suit and sewn in the model finished space beekeeping clothes (www.roodinshop.com).

2. Two-piece beekeeping dress was the shirt attached to the hat: This dress is suitable for those who use a separate beekeeping hat (www.makikala.com).

3. Two-piece beekeeping clothes without hat: This model of clothes is in two pieces (shirt and pant). Some people feel more comfortable with this model of clothes (www: roodinco.com/).

4. Super complete beekeeping clothes: These clothes are made by extra-ordinary technology. They are made of a high-tech three-dimensional polyester mesh fabric that keeps the person cool and comfortable during the day. The thickness of the fabric is five millimeters, which is deeper than the length of a bee sting.

5. Beekeeping jacket: This jacket has also used high technology for production and the honey bee and its sting cannot pass through it in anyways.

6. Luxury beekeeping clothes: The complete luxury clothes are the most popular and favorite clothes among commercial enthusiasts and beekeepers. With too many pockets, other accessories can be included and can protect from head to toe when used with accessories.

7. Light weight luxury beekeeping clothes: This innovative fabric is covered with rain-resistant Teflon and has a very soft covering. It has lost about half its weight and is cooler and is worn by beekeepers who work in hot climates.

8. Beekeeping vest: This vest has a half-zipper near the neck, which does not mean that it separates completely. The trunk is a stretchable net that is light and breathable.

9. Beekeeping shirt and pant suit: The pant is luxury with waterproof patches on the knees and ankle zippers.

10. Children's beekeeping clothes: Children's bee clothes have everything that is necessary for the children to move around the apiary.

3. Insect Repellents

Insect repellents are substances which only irritate the skin while protecting the body. Some may be used against insect bites and can have systemic effects. Some reports have stated that this substance causes serious illness and possibility of death, because insects act as carriers of disease. Mosquito bites are a common problem around the world, and in some area, mosquitoes are carriers of serious diseases such as malaria, West Nile virus, dengue fever, and Congenial fever (www.dermnetnz.org).

Lyme disease is spread through the bites of infected mites on the skin. Currently, the insect repellents come under two categories: chemical repellents and natural plant repellents substances. The most well-known chemical repellents are DEET. Other chemical repellents include MGK-326/IR3535 and MGK264. The last chemical substance that is effective on DEET is the pepcaridin. The natural plant repellents are popularly processed for their low toxicity but have not been as effective as DEET to date. This substance includes Bistonella, soybean oil, and eucalyptus products (www.dermnetnz.com; Johansson, 1982; Alcock, 1999).

4. Material and Goods Used

In this article, has used the cotton fabric with the specifications listed in Table 1. Also, the substance “Diethyl toluamide” with the chemical formula CH3C6H4CON (C2H5)2 was used.

Table 1 Specifications of the fabric used

Weave type	Cloth quality	Weight (g/m2)	Density warp(1/cm)	Density weft (1/cm)
Tafte	100% cotton	115	24	13

5. Practical Work Process

To prepare, the cloth was kept in a laboratory beaker and pour on it distilled water until the volume reaches 100 ml. Then 3 gm of diethyltoluamide was added to it and place beaker for 20 minutes on a heater (at 50^0C) and subjected to ultrasonic radiation. Then the cloth was washed with distilled water and dried in an oven.

6. Cloth Design

In the following designs, two-piece cloths are considered which is easy for the person to use. With respect to the special design, repellent fabrics have been used in the areas marked in yellow color to prevent the honey bee from approaching the person. The sections with repellent properties on the fabric provide us possibility to use it in an easier way. In the sections of the wrist and the wrist of the pants, has been incorporated with elastic so that the honey bee cannot approach the person. In these designs the loose parts of the clothes have been reduced so that the person is at ease to performance the activity.

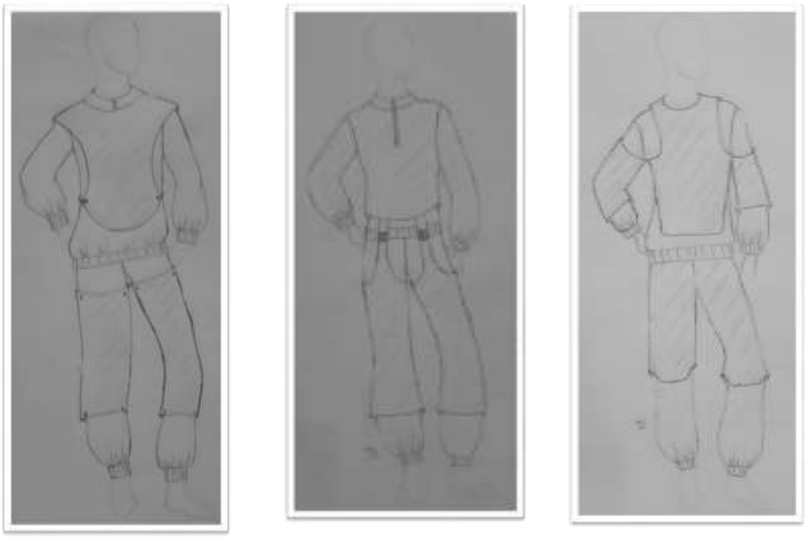

Fig 1 Linear sketch of clothing design

Fig 2 Final design of a beekeeper suit

7. Conclusion

In this article, due to the movement and security problems that exist for beekeepers, steps were taken to design clothes for this group. The designed cloths in this article were examined from two

aspects. Therefore, the fabrics used were completed with diethyl toluamide, which is an insect repellent, and secondly, due to the repellent properties of the fabric, clothes were designed for this profession. Clothes are presented that were not loose as earlier ones, so the beekeepers were comfortable of work with more security. Finally, the clothes design was presented which is proportional to beekeeping environment, based on color and form principles.

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Comparative Study of the Form and Shapes of Sassanid and Parthian Rhytons

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Abstract

There are two major Hellenic and Oriental tendencies in party art. In addition, the gradual transformation of Greek thought under the influence of the East can be discerned. Sassanid art is a sign of ethnic effort and taste, whose culture and art follow the Achaemenid and Parthian art. This art embodies the principles of Iranian aesthetics, which inherits the arts of early Asia. Making Rhyton is one of the most interesting and valuable examples of Iranian art and expresses the creative spirit and inherent genius of Iranians. Rhytons are animal drinking vessels, some with one mouth and some with two or more openings for liquids to enter and leave, used for drinking liquids at banquets, court ceremonies, and ceremonies. Drinking from such cups has symbolically meant the transfer of living vital force to man. By examining the achievements of the ancient Iranians, the possibility of recognizing and understanding their mental concepts as well as the type of social and cultural life of the societies of that time becomes clear to us. Based on this, it was decided to study the unique form, role and composition of a small number of Rhytons of the Parthian and Sassanid periods. The early Parthian rites were influenced by Greek and Hellenic culture, but gradually the national tendencies of the Iranian tribes emerged in them, while the early Sassanid rites were influenced by the Achaemenids, but the influence of Parthian and Roman art can't be denied.

Keywords: Rhyton; Sassanid; Parthian; Form; Shape

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1. Introduction

Rython is usually a container in which the lower and lower part is engraved with the role of a human or animal (real or imaginary) and the standing and upper part is a horn-shaped container. These dishes were used in religious ceremonies, court ceremonies, gatherings and parties. (Mohammadpanah, 2010). In Greek culture, a Rython is a container whose upper part is attached to the cup (vertically or horizontally) and the lower part to the animal's head or torso or torso. In the dictionary of Fors Asadi, we read of Rython, "a vessel made of gold or silver or mud, in the form of animals, especially in the form of milk, to drink wine" (Sarfaraz, 2008). According to the above opinions, it can be said that Rhytons are containers in the form of various animals and of different objects, some of which have an opening and in others two or more openings that were used for drinking. The shapes of some Rhytons are natural and some are abstract.

2. Application of Rhyton

The prevailing theory as to why animals in the form of containers are used to drink liquids and wine is that drinking in animal horns has been common since prehistoric times, and since then it has been believed by people in different eras that fluid passes through. An animal-shaped container, the force of that animal is transmitted to humans. This belief is actually associated with many sacrificial rites. In many of these rituals, the sacrificial blood flows to the earth and gives its reproductive power to the earth and through it to other living beings, including humans. In many ceremonies, wine passes through a container, the cup of which is sometimes in the shape of an animal horn and the outlet of which is in the shape of the head of animals such as bulls, lions, tigers, horses, deer, rams, antelopes, and humpback cows. Symbolic has meant the transfer of living vital force to man.

Another idea of the Achaemenid kings was that, for example, matters of a religious nature, such as the transfer of royal power from God or the lord of kindness to the king, are done by the holy drink that a lord of kindness gives to the king in a blessed rite. For example, the power transfer assembly is shown on a Rhyton that Ahuramazda gives power to the king (Gershman, 2011).

3. History of Rhyton

Pottery Rhyton in Iran date back to the fourth millennium BC, i.e. six thousand years ago. In the Old Testament, it was customary for a feast to be held after the hunt, where wine was drunk inside the horns. Prehistoric pottery cups are made like horns (Sami, 1964).

The art of Rhytoning with pottery, following natural examples, developed in the first millennium BC. Examples of this type of Rhyton have been discovered from Kelardasht, Mazandaran, Azerbaijan, Marlik, Silk, Qeytariyeh, Hasanlu and Amlash in the form of animals such as deer, rams, cows and sheep. Also found in silk teapots that imitated the beak of a bird, which belongs to the first millennium BC. Rhyton related to the Median and Manichaean periods have been discovered from Ziviyeh grave and from Hasanlu region, New Elam and Azerbaijan in the form of gazelle, cow and horse head (Kambakhshfard, 2010). The art of Rhytoning, both in prehistoric and historical times, was not an imported art, but an Iranian initiative that has continued since the fourth millennium BC. During the Median period, due to the fact that they had a special interest in this type of dish, they enjoyed a lot of development and progress, and during the Achaemenid period, they reached their highest level in every way (Sarfaraz, 2008). Achaemenid Rhytons are taken from

material, Urartian and Scythian examples, but Achaemenid artists are more inspired by material examples (Sarfaraz, 2008).

In the old city of Nisa, the first Parthian capital, a few kilometers from the new city of Ashgabat, works of art from the 2nd-3rd century BC have been found on the south side of the palace. Among them are pottery and glass objects, small Hellenistic sculptures made of marble or gold and about forty horns that have survived looting (Gershman, 2011). Enamel Rhytons with sculptural ornaments and pottery jugs from the Parthian period. One of these cups found in Damavand belongs to the second century BC and is similar to the ivory cups found in Nessa (Gershman, 2011).

During the Sassanid dynasty, horn-shaped cups ending in animals were common, and most Rhytons were made entirely in the shape of animals.

Rhytons found in Asia Minor and in Greece, Mesopotamia and the land of the Scythians were most likely inspired by Iranian Rhytons (Sarfaraz, 2008).

Tubular pottery, some of which ends in an animal's head, has been obtained from different areas, all of which are comparable in appearance, known in archeology as Raytheon, which has been continuously evolving. And changes have been made. The simplest type of these Rhytons is the shape of a container that starts with a long tip and sometimes ends with a bird's head instead of a tip, which means that the long beak of such Rhytons represents the neck and the container itself, like a chicken with an elongated body. And sometimes this body becomes rounder and its drain becomes a mountain goat or deer head with turned horns. In fact, in this type of container, the neck and mouth of the container are made in the shape of the neck and head of the animal. Gradually, such vessels change in shape and their body takes the shape of a horn or funnel, and the lower part ends at the head of an animal or a sleeping animal. After the Medes, the best type of these Rhytons, especially of gold and silver, can be seen in the Achaemenid period (Sarfaraz, 2008).

According to Kambakhsh Fard, the author of the book Pottery and Pottery in Iran, among all the pottery made in the shape of animal or human limbs, it is called “Rhyton", meaning the cup and cup cut from the animal's horn, if these ritual vessels should be referred to as jugs. The Iranians never drank directly from jugs, pitcher and jugs, but poured the liquid inside the pitcher into a measure or cup (Rhyton) and drank. It may be common among Westerners to grab the handle of the jug directly and pour the liquid into it, and it is only in this case that the name Rhyton refers to a jug with a handle and a tube decorated with the body of an animal or a human being. From the beginning of the first millennium BC, the Iranians made cups, cup, cups and cups from pottery in the form of severed heads and horns of animals, which can be called Rhytons, such as Rhytons of Zivieh, Damavand, Nessa, etc. But pottery made in animal or human limbs and obtained in abundance in Marlik and Amlash (first millennium BC) and Garmi of Azerbaijan (Parthian period), have a use as a jar, pitcher and jug and in the category of allegorical dishes and they are considered ritual. Their ritual use cannot be precisely determined because they mysteriously express inner meanings. These containers are generally hollow and made in the shape of an animal. These potteries are formed with two to three negative molds. The potters of this region, with their complete knowledge of the domestic animals of their environment, have shown special skills and mastery in shaping the limbs of these animals. Most of these pottery animals have three appendages instead of legs, and so the potters have considered the symbolic shape by shaping the head, horns, neck, snout and body of the animals and have ignored some organs and joints, however, the sign A few can also determine the group, genus and type of animal well (Kambakhshfard, 2010).

4. Material of Rhyton

Rhytons tons are generally made of pottery, ceramics, metals (gold, silver, bronze, iron), glass and ivory. Occasionally, the exterior of cups and wine glasses was decorated to create a two-tone state, instead of using the gold-plating technique by attaching gold leaf to silver. Most of the remaining Rhytons are made of silver, although bronze, gold and pottery types have also been discovered (Mohammadpanah, 2010). In terms of Rhyton-making style and works of art, these courses have a very important place among ritual, luxury and industrial works (Sarfaraz, 2008).

4.1. Parthian Rhytons

The art of Rhyton making, which has a long history in Iran, continued during the Parthian period. Rhytons are made of various materials and are made of different metals and non-metals (Sarfaraz, 2008).

In some Rhytons of this period, a narrow tubular fluid came out of the animal's chest and extended to its legs (Gunter, 2004).

The horned cups found in the royal palace of Nessa, the first Parthian capital, are similar to those of the Achaemenid period. These Rhytons date back to the first two centuries of Parthian rule. The Parthians were popular, but they restrained themselves in eating. In addition, many broken potteries have been found, dating back to the first century BC, around the mounds. Perhaps it was common at that time to have earthenware pieces on wine jars with not only the amount and date of the wine (inscriptions in the Aramaic alphabet) but also their mustaches. This was also mentioned on the jars of vinegar and raisins. Wherever you grow dates, they make date wine (College, 2001).

Rhytons discovered in Nessa are generally made by connecting three or more different pieces. Their length is between 30 to 60 cm. They reach a diameter of 17 cm and their capacity is about one and a half liters. The Rhytons are horn-shaped and curved near their base. The other end of them ends in a statue. It is as if the sculptures came out of the leaves that grow on the trunks of the Rhytons. There are one or two holes at the bottom of the Rhytons to drain the liquid. These holes and the heavy weight of the dishes indicate that Rhytons were not used every day but were used for vows or special occasions. At the upper end of the Rhytons is a wide decorative border with embossed patterns. These motifs and images represent complex subjects, and the throats of the Rhytons are adorned with images of prominent heads, with intermittent bells or small glass eyes. In the designs of Rhytons, sometimes silver, sometimes gold brass, or gold itself was used (Mohammadifar, 2008).

In terms of beauty and art, Nessa Rhytons are unique in their kind in the world of fine arts. These Rhytons were made in the second century BC. Judging by the style and set of designs, they show that a basic pattern has been followed in their construction, but they all belong to a single art school whose artists have perfect and excellent skills in ivory engraving. The subjects created in the decorative fringe designs of the Rhytons are very diverse; but they can all be categorized into certain groups. In the first category, the images of the gods, and most of all, the image of the 12 Lords of Olympus; in two places, Apollo, the goddess of art (banana), is depicted on one of the Rhytons, the goddess of art with Hephaestus, and on the other, the role of Artemis among the nymphs. This shows that the Parthian kings were familiar with Euripides dramas. Topics related to Dionysus such as: taking animals to places of sacrifice, offering wine to the gods, performing religious ceremonies and dancing in the sanctuary of temples have an important place in these images. Although the subject of the images is taken from the Greeks, their creation has Asian and artistic features. In the neck of the dishes, the prominent heads are very beautifully made in the

style of a drum. The pictures at the bottom of the dishes reflect the Asian style. Most of these mythical images are: human-animal-like creatures, images of strange creatures with wings and horns, and "Iranian" winged lions that bear no resemblance to earlier examples. There are also motifs on a cow with a human head that also has wings. In classical art, the image of a wing on a horse with a human head is not seen. Images and motifs of Nessa Rhytons have unique features; therefore, it can be said that as a result of Nessa excavation, the Parthian-Hellenistic school of sculpture was discovered (Mason, 2005).

4.2. Sassanid Rhytons

The tradition of using Rhyton, which is a dish in all Iranian meanings, is preserved in the Sassanid period with the same stability that it had in the currents of the previous period and the beginning of the arrival of Iranians (Gershman, 2011).

During this period, Rhytons are mostly vessels that were made entirely of metal or ceramic in the form of animals (Gunter, 2004). The design of cups consisting of horn-shaped cups and animal heads has been common in Iran for a long time during the Sassanid dynasty, and the heads of animals such as horses with mouths, etc. have been added to these shapes. The method of drinking from the dishes, which became common at this time as in the Parthian period, was to make a hole or holes in the middle or bottom of the cup from which the liquor would come out and open the mouth under or in front of it. In Sassanid times, they drank alcohol in the body of vessels, usually from the mouth or body of an animal in which it was embedded, such as some wine glasses or small muskets that are common in Spain today (Kalikan, 2008).

Animals made by Sassanid artists are closer to Scythian art than animals made by Achaemenid or Parthian (Gershman, 2011).

5. Form and Shape of Parthian Rhytons

Fig 1, is a cup that is attached to the anterior part of the milky trunk and is elongated and horn-shaped. The leaves of the grapevine, in the form of emerald ivy, surround the mouth of the horn. One of these yellow leaves has continued in the direction of the lower part of the horn. The front part, which looks like a lion, is made separately. The back of the lion, the legs, and the tail extend upward on the trunk of the horn.

The edges, claws, facial hair, tongue, eyebrows, and pupils are all gilded. Small twisting designs can be seen at the end of the eyebrows and on the ears. The mane continues to twist to the center of the forehead, and a tube protrudes from the animal's chest. The decoration and appearance of this Rhyton due to the extension of the animal's body inwards into the trumpet, is reminiscent of a connection between this object and the Achaemenid and Greek specimens, during the 5th-5th centuries BC. Artichoke leaves are found on the underside of the horn. Similar plant designs can be seen on Rhytons discovered in the city of Nessa.

The dish consists of two main parts; Trumpet and anterior part. The junction of these two parts does not have any cover tape. The container is made of a thin sheet of silver and in order to balance and stabilize the container, milk legs have been added separately to the Rhyton. The thickness of the metal appears to be the same everywhere, except for the edge of the dish, which is slightly thicker at the top and protruding outwards. The effect of any seam is not seen in the horn or anterior part. It is clear from the embossed details of the dish that a combination of three embossing techniques, embossing from the inside, and carving has been used. However, its surface probably needed more work to form this Rhyton. Gilding with its great radiance on small parts of the carved

areas, on the grape leaves, which is the main design, near the edge of the dish and adorns the underside of the horn, as well as on the edges, beard, the tongue, eyebrows, pupils and claws are visible. The angular edges of the gold leaf can be clearly seen in most places.

This gold-plated Raytheon dates from the 1st century BC to the 1st century AD and is housed in the Sackler Museum. Its height is 25.6 cm, length is 27.3 cm, width is 17.3 cm and its approximate weight is 502 grams (Fig 1 a, b) (Gunter, 2004).

Fig 1 (a, b) Trumpet Shape, Silver and Gold Plated, Arthur Sackler Exhibition (Gunter, 2004, 45)

Fig 2: A narrow, elongated vessel with a sloping horn that has an outward-facing edge and a horn-shaped section attached to a separate interior section, which includes the head, chest, and legs of an animal resembling a lynx (fur). A circular cover is located at the junction of the anterior part and the horn part. The front legs of the animal are made separately and then added to the animal's body. A gutter-like tube protrudes from the animal's chest and extends between its legs. The edge of the horn, which is turned outwards, is gold-plated. An inscription can be seen on the outside of the edge of the container. The animal's mouth is open and its tongue is sticking out. A tuft of hair protrudes from both ears of this animal. A torsional pattern can be seen on the shoulders and chest above the gutter. A collar-like band surrounds the neck. A Parthian inscription can be seen on the edge of the trumpet, only part of which remains intact, apparently indicating the name of the owner of the vessel and its weight.

Rhyton's anterior part, with its cat-like shape, is similar to Hellenistic and Roman art; and this dish has been introduced as a ritual dish, which is definitely related to Dionysian religious rites. The animal's pointed ears are a symbol of the Near East to the West; and this is one of the special features of this dish.

This Rhyton consists of three main parts connected together; the horn, the anterior part, and the annular covering at the junction of the two parts. However, the anterior part is made up of several components. The horn building is integrated and seamless. In the trumpet section, there are veins that indicate the construction of this section by hammering. The edge of the pan is raised and, in addition, the structure of the pan is slowly cooled and worked on after heating; No trace of casting can be seen in this section. Your anterior part is empty and has a very thin wall compared to the trumpet. Of course, your legs are full and seemingly cast. They are elaborately attached to the

anterior part with the help of a port (or connecting agent). The legs are narrower at the junction, and are embedded inside the ligament, and the base of the legs rest on the anterior part.

The details of the dish are created with the help of carving technique. A series of small oval holes, reminiscent of fur, have been created on the surface of the anterior part. The inscription on the edge of the dish is formed using a series of small circular holes. There is gilding on the surface of the back edge of the dish and on the whole anterior part. This Rhyton has a special leaf gilding structure.

This gold-plated Rhyton dates from the 1st century BC to the 1st century AD and is housed in the Sackler Museum. Its height is 23.5 cm, length is 28.5 cm, width is 12.3 cm and its approximate weight is 698 grams (Fig 2 a, b, c) (Gunter, 2004).

Fig 2 (a, b, c) Trumpet Shape Rhyton, Silver and Gold, Arthur Sackler Exhibition (Gunter, 2004, 46 & 133 & 135)

6. Form and Shape of Sassanid Rhytons

The container in Figure.3 is made by connecting a short, small horn to the anterior part of the Ghazal. A short, ruined tubular drain drained from the gazelle's mouth. The eyeballs that are now empty may have been gems in the past. The lower part of the horn is grooved or Dalber, and in the upper part of the trumpet, there are two rows of animals approaching a central tree. These animals include a sitting goat, a lion, cattle, a goat; In addition, there is a tree with a wavy trunk, whose leaves are seen in the shape of three trunks. The skins of the animals are depicted with a series of hatched lines all over, and the images are decorated with the gold-plated dot gilding method.

At the top of this arranged area, a twisted band surrounds the trumpet; between this strip and the edge of the dish, a row of circular plates can be seen. The edge of the horn, which is added separately, is tubed and thickened outwards. The twisted bands around the horns and behind the head, the nose, the two grooves on the underside of the horn, and the embossed parts of the animals' bodies on the horn are gold-plated. The unusual shape and decoration of this dish is the main stimulus of its historical charm and cultural birthplace.

Ms. Harper has provided a more detailed report on this Raytheon. He dates this Rhyton to the beginning of the Sassanid period, and probably to the beginning of the fourth century, and believes that the construction of this object was influenced by non-Iranian patterns, and that Balkhi artists probably played an important role in this. The species and style of the tree depicted on the Raytheon cosmetic border with a wavy trunk and ornate branches represent a form of foliage found on silverware made in Balkh or India. He writes: In addition, the decomposition of the composition

of the silver metal of this vessel also indicates the beginning of the Sassanid period. The technical and stylistic features used in this Rhyton, such as the use of spot gilding and the all-embroidered design, which represents the skin of animals, are among the features of silverware of the early Sassanid period.

This Rhyton is made with a combination of two different types of embossing technique, these two types are: embossing from the inside, and embossing from the outside.

The horn and the front part are made of a piece of metal. Gazelle ears are formed separately and inserted into the cavities of the anterior part. The edge of the dish is also considered as an added piece. At the same time, there are signs of using the tool on the inner surface and indicate some actions on the inner part. The existing design on the trumpet is created by creating holes on the outer surface. The skins of the animals are finely depicted, using only two types of holes, which mean crescent and oval holes, and a gilded amalgam with great radiance on various details such as the nose and the short horns of the gazelle in the anterior part, the trumpet divider strip and the anterior part, and the details of the embossed design on the trumpet (lion head, cow hump, central leaf of the tree, twisted strip below the edge, and two grooves on the underside of the trumpet) are seen. Becomes.

This gold-plated Raytheon dates back to the 4th century AD and is housed in the Sackler Museum. Its height is 15.5 cm, length is 25.4 cm, width is 1/14 cm and the diameter of the mouth is 14 cm and its approximate weight is 599 grams (Fig 3 a, b, c, d) (Gunter, 2004).

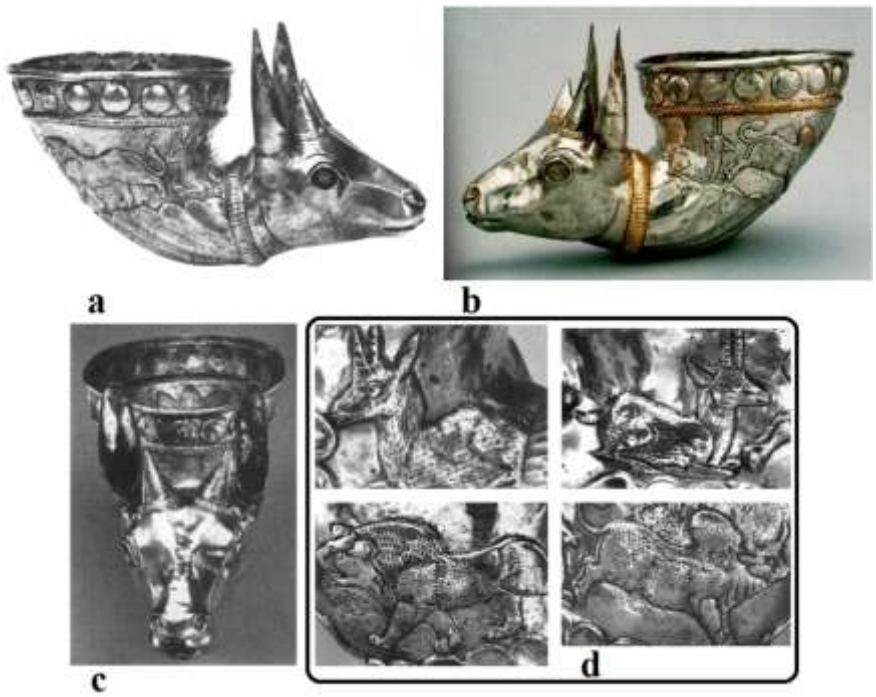

Fig 3 (a, b, c, d (part of the image)). Rhyton Trumpet Shape, Silver and Goldsmith, 4th Century AD, Arthur Sackler Exhibition (Gunter, 2004, 293-296)

7. Conclusion

The history of Rhyton art dates back to the fourth millennium BC and continued until before Islam, the Sassanids. Rhytons are vessels that are either entirely in the shape of an animal or in the

lower part of which the carving of an animal or a human is engraved and the upper part of which is in the shape of a horn or trumpet. These cups were used in religious ceremonies, court ceremonies and parties, and it was believed that by drinking the liquid, the cup transmits animal power to humans. Rhytons are in the form of various animals such as horned and legendary animals, lions, goats, deer, horses, cows, etc. These utensils are made of pottery, metal, ivory, glass, etc. with complete skill and mastery. It was common for courtiers and aristocrats to use gold and silver Rhytons, and for ordinary people to use pottery Rhytons. According to the classification of the type of Rhytons and according to the pictures and descriptions given, the features and characteristics of this ancient masterpiece have been revealed to some extent.

An examination of works from Parthian civilization and art reveals that the Parthians gradually abolished the influence of Greek culture and art during their reign, and revived the features of Achaemenid art. In the first century AD, Parthian art with its specific and national nature was revealed. Parthian art is rooted in Oriental art, not borrowed from Greece. Spiritual designs and interest in many details and details in the decoration originate from this eastern source. The Parthians took only what they liked from Greek art.

Parthian Rhytons are excellently written and polished. By examining these works, we can understand the different and influential artistic styles that were due to the vastness of the Parthian realm. According to the research, it has been found that the Rhytons of the first Parthian period are Eastern, but the decoration on them is from the Achaemenid period and the mythological scenes around them are Greek.

Sassanid art, which may seem separate from its predecessor, is essentially composed of ancient Persian and Oriental elements. Sassanid art explored the Achaemenid traditions that resulted from these elements, followed and perpetuated non-Hellenistic Parthian artwork, and paved the way for art that flourished in the Roman states. Construction. This art embodies the principles of Iranian aesthetics, which is the inheritor of the arts of Asia Minor, and has a force that can leave its mark on the arts of neighboring nations.

Some Sassanid Rhytons have been influenced by non-Iranian patterns. Spotted gilding and an all-embroidered design representing animal skins are among the characteristics of early Sassanid silver.

In general, the shape and decoration of the Rhytons of the Parthian and Sassanid periods are very close to each other, so it is very difficult to accurately distinguish the ancient metal and pottery works of these two periods. One common feature of the Rhytons of these two periods is the orifice or orifices that are embedded in the front of the animal's body from which the liquor jumps out. They stopped their mouths to drink alcohol. The difference between Sassanid Rhytons and Parthians is that the use of amalgam for gilding, as a prominent method, was common in the Sassanid period, but by studying the works of the Parthian period, no case of using mercury for gilding has been observed.

Based on the collection of Persian literary-historical sources, it is clear that the continuation of the ancient Iranian Rhyton, which is in the form of a complete animal, as well as the Rhytons that end in the anterior part of the animal, has entered the Islamic period.

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