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Acknowledgement

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 Feb – Mar 2018. The deadline for submissions for this issue is Jan 31, 2018.

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
International Journal of Applied Arts Studies (IJAPAS)
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Performance Assessment of Double Skin Façade in Optimizing Building Energy Consumption (Case Study in Shiraz)

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Abstract

Reducing the energy consumption of the buildings in Iran is essential, since the building energy consumptions in the country are about 40% of the total energy consumption. Approaches and strategies to reduce the level of energy consumption in buildings can be investigated in two main parts: designing energy-efficient buildings and energy efficiency in existing buildings. With the advent of various technologies, complexity and administration costs are also increased. Therefore, the decision-making about the selection of optimal strategies and finding the solutions to reduce the energy consumption in buildings has become more important. On the other hand, the interaction between the design elements, climate, users, cooling, heating, ventilation, and lighting is very complex and can only be studied by simulating all of the influencing factors in the energy efficiency of the building. Since the building shell as the separator of the interior and exterior environment plays an important role in the thermal behavior of the buildings, in this article, the use of double skin facades was investigated, as a new technology that is designed as an obstruction which creates a balance between the interior and exterior environments. Based on the results of this study, it was concluded that if this technology is properly used and implemented in the designing process of the buildings, it could have an important role in reducing the energy consumption of buildings, as well as several side benefits.

Keywords: Double Skin Facade; Energy; Saving; Optimization

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1. Introduction

Saving energy in buildings and environmental pollution are two important concerns in architecture, which have attracted a considerable attention. The façade, as a part of the construction associated with external factors, plays an important role in the energy performance and comfort in the building. In fact, the facade is the common element that forms the interior and exterior of the building, and hence it is responsible for several concerns such as heat loss, solar heat absorption, daylight, and daze control (Heidari et al., 2013).

In general, thermal dissipation structure arises from two fundamental sources: first, the heat dissipation is due to the entrance of cold outside air into the building, through air infiltration and renewal. Secondly, the heat dissipation from the walls of the building where the outer shell exists and is related to all surfaces around buildings, including walls, ceilings, floors, openings, and light transmitting surfaces, which on the one hand are linked with uncontrolled space or outer space, and on the other hand, are linked to the controlled space within the building. Therefore, the outer shell will prevent the waste of the generated heat and cold, which will subsequently save a considerable amount of energy consumption (Shah Mohammadi, 2010).

In the contemporary world, with the use of new materials and intelligent technology, this idea is gradually taking shape that the facade of the building to be designed or implemented should be like a skin or intelligent shell which withstands some of the external factors, shows different actions, and takes advantage of some natural environment phenomena. It is possible to use glass that responds to light in accordance with the specified conditions. Similarly, it is gradually becoming possible to use openings which respond to outside air temperature and create a balance in the process of air exchange between the inside and outside of the building. Hence, one can use the textures and materials in façades, through which the energy of the sun and the radiant energy can be converted and used for another type of energy.

2. Literature Review

2.1. Intelligent Façade

Smart exterior architecture is a trend for energy waste reduction, air pollution reduction, usage of renewable energies, and the interaction between buildings, environments, and the users (Servatjoo & Armaghan, 2011). Intelligent facades can be divided into the following categories, based on the structure, the materials, and the performance: 1. Double skin façade 2. Smart material façade 3. Integrated intelligent system with façade (ventilation, solar, etc) and 4. Integrated intelligent façade (Servatjoo & Armaghan, 2011).

2.2. Double Skin Façade

The essential concept of the Double skin façade was first explored and tested by the Swiss-French architect Le Corbusier in the early 20th century; he called his idea "neutralizing wall". American engineers studying the system in 1930 informed Le Corbusier that it would use much more energy than a conventional air system, but Harvey Bryan later concluded Le Corbusier's idea had merit if it included solar heating (Bryan, 1991).

Another early experiment was the Alfred Loomis' house built in 1937 by architect William Lescaze in Tuxedo Park, NY. This house included "an elaborate double envelope" with a 2-foot-deep airspace conditioned by a separate system from the house itself. The objective was to maintain high humidity levels inside (Braham, 2005).

But the most reliable definitions, which relate to the Belgian Building Research Institute, are as follows:

"A double skin façade can be defined as a traditional single façade doubled inside or outside by a second, essentially glazed façade. Each of these two façades is commonly called a skin. A ventilated cavity is located between these two skins having a width ranging from several centimeters to several meters.

Automated equipment, such as shading devices, motorized openings or fans, are most often integrated into the façade. The main difference between a ventilated double façade and an airtight multiple glazing, whether or not integrating a shading device in the cavity separating the glazing, lies in the intentional and possibly controlled ventilation of the cavity of the double façade".

Another definition provided by this Institute focuses on ventilated facades and does not have the comprehensiveness of the previous definition. The definition is: "A two-shell view with at least two shells between the interior space and the external environment is distinguished from other views. Between these two shells, there is a gap for air flow. The width of this cavity can vary from a few centimeters (in the narrowest state) to several meters (in the broadest state). The outer shell is glass, which is usually made of hard glass. The inner shell is almost entirely of glass and the glass is used in the type of insulation (BBRI, 2002).

In recent years, in European countries, especially Germany, The Netherlands, and the United Kingdom, double skin facade solution is widely considered. This system has provided many fans with a significant reduction in energy consumption, natural ventilation in the building and a significant reduction of noise. The architecture is very transparent, providing comfort and convenience for the residents (Motiee & Nasiri, 2006).

One of the first modern examples to be constructed was the Occidental Chemical Building (Harrison & Boake, 2003). The Occidental Chemical building, especially the glass cube, included a 4-feet deep cavity between glass layers to preheat air in winter. This design has been used in buildings recently because it is useful in reducing energy consumption in buildings (Grondzik et al., 2009). The active facade (usually when mechanical ventilation is available), passive facade (usually when there is natural ventilation), dynamic facade, double sheet façade and the multi-chamber facade and smart glass facades were mentioned (Poirazis, 2004).

According to Claessens and DeHerde, a second skin façade is an additional building envelope installed over the existing façade. This additional façade is mainly transparent. The new space between the second skin and the original façade is a buffer zone that serves to insulate the building. This buffer space may also be heated by solar radiation, depending on the orientation of the façade. For south oriented systems, this solar heated air is used for heating purposes in the winter time. It must be vented in order to prevent overheating in other periods (Poirazis, 2006).

Double skin façade system was known by other names such as ventilated facades, façade wall ventilation, double façade, double cover, and facades glass two layers (Madahei et al., 2012). Accordingly, the simplest definition of Double-skin façade is based on the features it may offer. The Double-skin façade is sometimes a pair of glass skins separated by an air corridor. The main layer of glass is usually insulating. The air space between the layers of glass acts as insulation against temperature extremes, winds, and sound (Lang & Herzog, 2000).

About fifty percent of the global energy consumption is used in building areas. The savings of energy in this area could lead to significant decrease in global energy consumption. One way to reduce energy consumption in the building is using Double skin façade (Yazdizad et al., 2014). Recent studies showed that the energy performance of a building connected to a double-skin facade can be improved either in cold and warm season or in cold and warm climates by optimizing the

ventilation strategy of the façade (Mingotti et al., 2011). Building facades in designing spaces could have an effective role in reducing energy consumption. According to the literature in the field of sustainability, the design of an efficient shell can significantly decrease the heat repulse in the winter and heat absorption in the summer (Hadianpour et al., 2014).

a. First Shell of the Double Skin Façade: The first shell can be any type of wall. However, in Iran, the glass facades are generally considered as the first shell. That is the single paneled window or the curtain wall (Yazdizad et al., 2014).

b. Second Shell of the Double Skin Façade: In the construction of the second shell, we should use a light material, such as metals with minimum thicknesses that do not reduce their strength and resilience due to applied pressures. Finally, the weight of the second shell is also imposed on the structure of the building. Such facades differ from other facades by placing at least two shells or walls between the interior and exterior space. Usually, the outer shell is the hardest kind of glass (Yazdizad et al., 2014).

Fig 1 From left to right: the outer shell, the airspace, the inner shell, a double skin façade (Zolfaghari et al., 2013)

c. Air Space between Two Glasses: Air conditioning between two glasses can be natural or artificial. The width of the air gap between the glasses could vary from 2 to 60 cm (Zolfaghari et al., 2013).
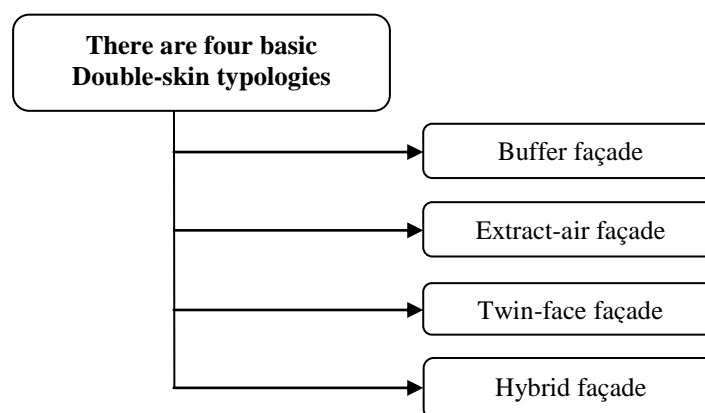
Fig 2 General classification of Double-skin façade (Emami Tabrizi, 2013)

2.3. Typologies

a. Buffer Façade: The buffer façade consists of two layers of glazing mounted, approximately 250 to 750mm (10" to 30") apart, with the air space between the two sealed layers. This is the oldest typology which has been used for nearly 100 years (Lang & Herzog, 2001). The buffer façade was developed before the invention of insulating glazing to increase sound and heat insulation without reducing the amount of daylight entering the building. A contemporary example is the Occidental Chemical Centre (or Hooker Building) in Niagra Falls, New York (Emami Tabrizi, 2013).

b. Extract-Air Façade: The Extract-Air Façade consists of a main double-glazed skin of insulating glass with a second single-glazed skin placed inside. The air space between the two layers of glazing becomes part of the HVAC (Heating, ventilation, and air conditioning) system. The heated "used" air between the glazing layers is extracted through the cavity with the use of fans and thereby tempers the inner layer of glazing while the outer layer of insulating glass minimizes heat-transmission loss. This system is used where natural ventilation is not possible (for example in locations with a high level of noise, wind or fumes). Shading devices are mounted within the cavity. An example of an Extract-Air Façade is the Helicon Building, London (Ebrahimi et al., 2011).
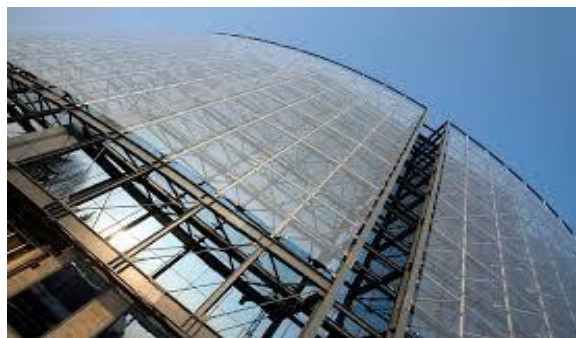
Fig 3 Close view of two shells of the Helicon building extractor in London (Emami Tabrizi, 2013)

c. Twin-Face Façade: The twin-face façade is comprised of a conventional curtain or massive wall system with an outer skin of single glazing (Lang & Herzog, 2001). The single-glazed outer skin is used primarily for the protection of the air cavity contents (shading devices) from the weather. With this system, the internal skin offers the insulating properties to minimize heat loss. This typology differs from the Extract-Air façade in that it permits openings in the skin, allowing for natural ventilation. Windows on the interior façade can be opened, while ventilation openings in the outer skin moderate temperature extremes within the façade. The use of windows allows night-time cooling of the interior, and thereby the cooling loads of the building's HVAC system will be reduced. For noise control, the openings in the outer skin can be staggered or placed remotely from the windows on the interior façade. Some examples of twin-face façades are Telus William Farrell building, Vancouver, Debi's building, Berlin, and Das Dusseldorfer Stadttor, Dusseldorf (Lang & Herzog, 2001).

d. Hybrid Façade: The Hybrid façade is a system that combines one or more of the basic characteristics of the aforementioned typologies to create a new hybrid system. Examples of buildings with a Hybrid façade are the RWE building, Germany, ING Headquarters, Amsterdam and the Tjibaou Cultural Centre, New Caledonia (Boake et al., 2001).

2.4. Goals of Double-Skin Façade Design

The goals are categorized as;
• Providing acoustic targets for a glass view that increases transparency.
• Acoustics development in buildings located in a busy and polluted area.
• The use of natural ventilation instead of mechanical ventilation.
• Reduce the need for heat during the winter and reduce the need for cooling during the summer
• The maximum reduction in heating and cooling systems.
• Use natural light instead of artificial light as much as possible.
• Adjusting the optimum interior temperature of the building during summer and winter (Zolfaghari et al., 2013).

2.5. Advantages

One of the reasons for the use of double-skin facade, which has led to the rapid growth in its use, is the following: The building with this facade has lower energy consumption, for example, studies show that "Komertz Bank" in Frankfurt consumes about 30% less energy than similar buildings. This would be the best incentive for designers and users to use this type of façade. Cost savings as a result of reducing the number of mechanical facilities and reducing the dependence on artificial light are other benefits of the application of this system.

One of the most important reasons for the public interest in this face is the ability to open windows in the internal shell. This is easily possible, even in high-rise buildings where bodies are exposed to high wind pressure. This feature is also used to reduce noise, and the possibilities set by the user, to a large extent, provide comfort to the residents. Another benefit of this façade is avoiding contamination and providing night security for moving windows. Also, there is the possibility to use shade on the façade, even in bad climate conditions, where there is wind, rain, and polluted air. From the point of aesthetics, using this technology increases the architectural qualities. In some buildings, including the max Planck building and Stadttor building in Germany, using this facade displays advanced technology. Another aspect of the aesthetics of using this view is the achievement of transparent architecture. In this method, compared to the conventional method, the buildings mentioned have dramatically achieved this goal (Taghi & Montazer Motamedi, 2006).

In Iran, a significant portion of energy is spent on cooling or heating the buildings. A new solution with a sustainable architecture approach is required for reducing energy consumption. The proper use of light and solar energy in buildings is one of the most basic principles of optimal use of energy in architecture. The application of canopies and double-skin facade are an appropriate response to the use of energy resources (Mohammad Khani, 2012).

The advantages of double skin facades over conventional single skin facades are not clear-cut; similar isolative values may be obtained with conventional high performance with fewer windows. The cavity causes a decrease in usable floor space and depending on the strategy for ventilating the cavity, it may lead to problems with condensation, and subsequently exposure to outside noise. The construction of a second skin may also present a significant increase in materials and design costs. Building energy modeling of double skin facades is inherently more difficult because of varying heat transfer properties within the cavity, making the modeling of energy performance and the prediction of savings debatable (Penić et al., 2014).

There are other advantages of the double-skin facade:
• Low construction costs compared to other similar methods.
• Sound insulation.

- Thermal insulation.
- Natural ventilation.
- Reducing the effect of wind pressure.
- Transparent designing.
- Escape from fire.
- Solar performance.

On the other hand, the important question is the impact of using these shells to reduce energy consumption in buildings. The Design Builder software was used for thermal simulation; the result verified that the total amount of energy consumption of the models with an optimized double-skin facade for warm and dry climates was 14.4 kW-hr/m^2, which is less than the energy consumption of the models without the double-skin facade. Although energy consumption for lighting throughout the room with optimized double-skin facade was higher, the impact of the double-skin facade to reduce energy consumption for heating and cooling is more tangible. This shows the high-potential of using these optimized shells for hot and dry climates to reduce energy consumption in buildings (Hadiyanpour et al., 2014).

Indeed, nowadays the use of natural ventilation in buildings, in order to ensure the welfare and convenience of the users, needs to be considered in building design. Taking advantage of natural ventilation will decrease the indiscriminate use of HVAC in buildings. Double-skin facade will provide noise, wind, and rain control. Double-skin facades have the possibility to protect and adjust the heat, cold, light, wind, and the outside noise condition, as well as providing comfort and well-being to residents without wasting energy (Ghadimi et al., 2013). Challenges carried out in buildings with double-skin façade cause the creation of balance between performance aesthetics, acoustics solutions, and visual efficiency in construction of the building from the point of view of energy supply (Afshin Mehr et al., 2015).

2.6. Disadvantages of Double Skin Façade

Despite the huge benefits of this technology, double skin façade system has some disadvantages, some of which are mentioned below:
- High manufacturing costs compared with conventional façades.
- Reducing the usable valuable space.
- Excessive cost of maintenance.
- Accumulation of warm air in the upper classes.
- Welding problems.
- Increasing the heat of structures (Servatjoo & Armaghan, 2011).

2.7. Double Skin Façade and its Role in Energy Efficiency in Buildings

According to studies and real examples, double skin facade system, in addition to having a positive impact in the field of aesthetics, saves 30% of energy consumption. Furthermore, it also provides natural ventilation, reduces the dependency of the building on natural light, and significantly reduces noise pollution. Moreover, the upper floors of the building also show good resistance against wind-power (Shahriari & Karimzadeh, 2012).

In a study of thermal behavior of single skin and double skin glass façade conducted by Ghanbarian and Hosseinpour, using simulation-based samples with double skin facades, it was observed that the "double skin glass separated by air gap", in other words, the so-called double skin façade, can reduce energy consumption by 16 to 20 percent HVAC system in the building.

However, it was recommended that even in the case of using double skin facade, the façade itself should not be fully covered by glass, and some opaque parts should also be considered. In total, the first option of double skin facade with glass surface 70% could be a good choice as an alternative to single-skin glass facades which causes 20% reduction in energy consumption of HVAC systems in office buildings. Indeed, it was found that these facades show better performance on energy savings during the cold season (Ghanbaran & Hosseinpour, 2013).

Another study has reviewed the cooling energy consumption and the percentage of energy efficiency for warm months in Tabriz. It was determined that the use of the double skin façade, with internal ventilation in the space between the skin, had a significant dominance for the city of Tabriz. It could reduce energy consumption from 100 percent to zero percent in October, whereas energy consumption was reduced by about 98 percent in May. This means that there is no need to spend money and energy on buildings for cooling in these two months. The consecutive results in reduced energy consumption belong to September with 83 percent, June with 63 percent, July, and August with about 44 percent, respectively. The reason is that the average temperature in the city of Tabriz in the summer is slightly higher than the comfort temperature, and double skin facade with natural ventilation could easily control the indoor temperature. Indeed, using internal sheds in the space between double skin facades does not let direct sunlight enter the building while the natural outdoor light is used. As a result, the indoor temperature is kept low and the need for cooling is reduced (Zolfaghari et al., 2013).

The simulation results conducted in the Design Builder software by Hadipour et al. (2014) in a room with an improved double skin facade (equipped with the best results of the previous calculations) showed that total energy consumption of the room with double skin facade is 4.14 kWh / m2 less than that of the room without double skin facade. This result shows the potential of using this type of facade in the reduction of energy consumption of the buildings in hot and dry climate (Hadiyanpour et al., 2014).

Research conducted by Zolfaghari et al. (2015) indicates that the use of double skin facades generally could reduce the building energy consumption in the cold season with a greenhouse-like performance which is stronger in cooler months. The double skin phase-change facades, in addition to utilizing a greenhouse-like performance, could save the energy during the warm periods and release it to the building during the night with the aid of their phase change to prevent the cold to enter the building (Zolfaghari et al., 2015).

In recent years, the interest in double skin facades has increased because of esthetic reasons and for its use as a passive system to save energy. Some authors have investigated their behavior related to thermal performance and energy efficiency in comparison with single skin facades. The aim of this work is to identify more efficient double glazed facade configuration that improves energy efficiency and indoor comfort conditions in buildings, and to study natural ventilation due to buoyancy-driven flow and heat transfer, including solar radiation, as compared to a single skin facade. A simplified model was simulated using a computational fluid dynamics software to investigate the effects due to different cavity widths in winter and summer conditions, with opened and closed vents, and whether there is solar radiation or not. The main results obtained were that in winter closed vents are always efficient and ventilating is never beneficial. In summer, closed vents are efficient in the absence of solar radiation, and in its presence opened vents are favorable. Results showed the optimum air cavity width, and it was concluded that these double skin facades reduce the heating and cooling demands of a building, being more efficient compared to single skin facades (Sanchez et al., 2016).

3. Methodology

In this study, descriptive, analytical, and simulation with software were used. It was also tried to use a comparative approach to identify and assess some indicators to provide some solutions for more energy efficiency.

3.1. Site Location

Shiraz is situated in Fars, Iran, its geographical coordinates are Latitude: (29°32′37″ N) Longitude: (52°36′52″E) Elevation above sea level: 1545 m = 5068 ft.

Evaluation of the performance of double-skin facade in Shiraz climate: To accurately evaluate the performance of double skin facades in the city of Shiraz, the Design Builder software was used for the simulation process. In the first step, the energy plus weather data related to Shiraz, according to table 1, were imported into the software.

Table 1 Energy Plus Weather Data of Shiraz.

In the next step, two buildings were designed in the software environment.

A building without double skin façade, as building A, and a similar type building with an exterior double skin façade (building B).
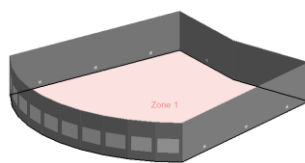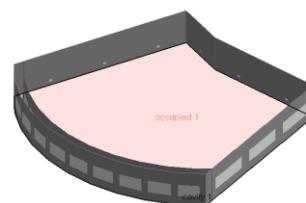
Building A   Building B

Fig 4 The schematic construction of building A and building B.

The characteristics of the four profile layers of building A are shown in Fig (5).
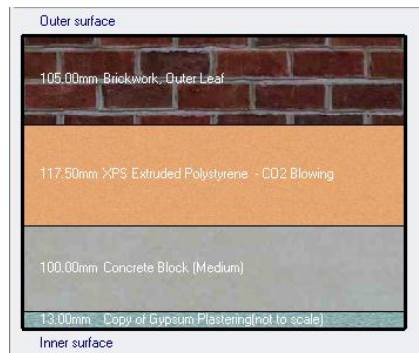
Fig 5 Layout of Building A, defined in the project.
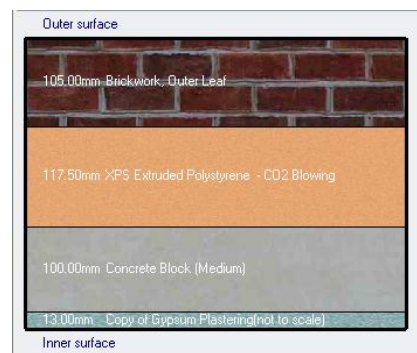
Fig 6 The outer skin defined for the building with double skin façade.

The design of the double skin facade building was carried out in two stages. The first stage, the outer skin designed with the specifications listed in fig (5), as shown in fig 6, and then the inner skin was designed with the specifications listed in fig (7).
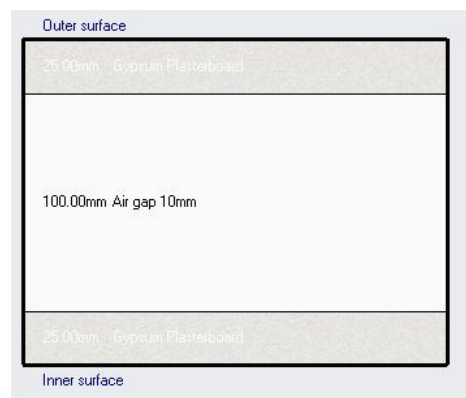
Fig 7 The inner skin defined for the building with double skin facade.

4. Results and Discussion

Annual energy loss was studied in the main parts of the building. The results were obtained on the basis of figures (7) and (8).
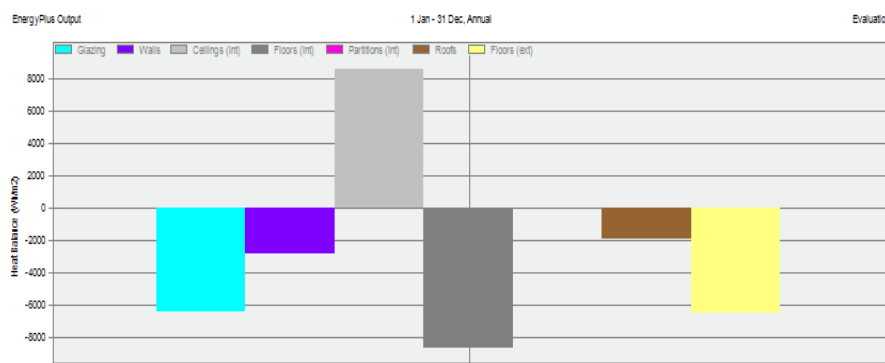
Fig 8 Amount of energy loss in terms of Watt-hours per square meter in building A.
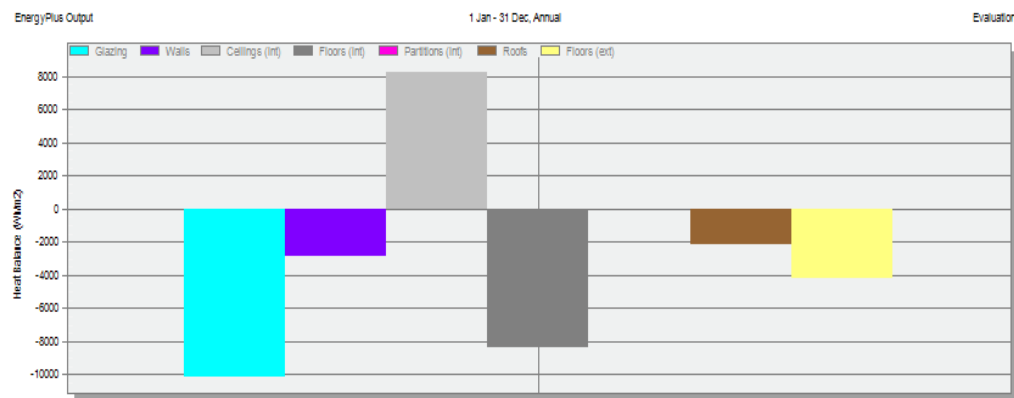
Fig 9 Amount of energy loss in terms of watt-hours per square meter in building B.

As it was expected, in the building designed with double skin facade a reduction in thermal dissipation was observed in all parts. For example, in the external floors, heat balance was significantly decreased compared to a standard building with only one shell. The reduction was about 1000 [Wh/m^2], which is a considerable decrease in annual energy consumption of the building as it can be seen in Fig (9).

Table 2 Annual building energy performance in building A

Site and source Energy

	Total Energy [kWh]	Energy per total building area [kWh/m^2]	Energy per conditioned building area [kWh/m^2]
Total site energy	6214822.01	349.39	349.39
Net site energy	6214822.01	349.39	349.39
Total source energy	13071643.41	734.86	734.86
Net source energy	10231241.66	575.18	575.18

Table 3 Annual building energy performance in building B

Site and source energy

	Total Energy [kWh]	Energy per total building area [kWh/m^2]	Energy per conditioned building area [kWh/m^2]
Total site energy	5876135.67	329.99	345.21
Net site energy	5876135.67	329.99	345.21
Total source energy	12363448.31	694.31	726.33
Net source energy	9687479.71	544.03	569.12

The further results indicate that the total energy in the building designed with double skin facade was significantly decreased compared to a standard building, which the only reduction of one shell was from 6214822.01 - 5876135.67 [kWh]. Also, Energy per total building area reduction and Energy per conditioned building area reduction were from 349.39 - 329.99 [kWh/m^2] and 349.39 - 345.21 [kWh/m^2], respectively. Finally, by comparing Tables 2 and 3, it can be concluded that the double skin facade design decreased the energy consumption significantly.

5. Conclusion

Due to the limited resources of fossil energy, energy crisis, environmental pollution, as well as consumption of 40% of energy by the construction sector, attention to different active and passive methods is of utmost importance in order to optimize energy consumption in the building sector. Low cost of energy and fuel is the reason for insufficient attention to national capital preservation and its wastage, which is especially observed in the construction industry and building engineering.

Suitable design in architecture, along with the use of new equipment and materials, create a competition between the manufacturers, as well as engineers. Implementation of energy management and the use of new methods and technologies in buildings like double skin facade are the ways which reduce the costs and increase the welfare of the users.

It is important that the outer shell in the single shell have high heat dissipation. To fix this problem, the design and implementation of intelligent facade and the inclusion of double skin facade are quite useful in optimizing energy consumption in buildings. The fact is that the air between the shells is an appropriate thermal insulation. Double skin facade has many advantages, such as light weight, high strength, and the possibility to simultaneously run with brickwork. In addition, if the cavity space is properly controlled in this type of Façade, it will play a very effective role in building energy efficiency.

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Revising the Principles of Designing Based on Promoting Social Interactions (Case Study: Designing a Religious-Complex)

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Abstract

One of the most significant issues in architectural design is to take into account the users' needs, particularly social interactions, which in turn lead to individual growth. Weakness in expressing social interactions in designing a space is among the principle issues in today's architecture. In fact, what was not infrequent long ago, in old religious and cultural constructions of Iran, such as mosques and other religious building, was the manifestation of people interactions and relations in the body of the constructions. Based on the observations, nowadays the individuals seem to be estranged from these spaces. This leads to a lack of fascination on the users and thus a gradual decrease in the quality of the spaces. The primary purpose of the current research is to explain the criteria of designing a religious and cultural complex, the aim of which is to increase social interaction among users. This research uses library studies, and descriptive-analytic research method. The social and physical solutions that are deduced from this research are to create the affiliation, security, public participation, accessibility, cordiality, as well as creating public and collective spaces, using climate-appropriate natural elements, and variety in form and robustness.

1. Introduction

In all societies, architecture is influenced by culture, religion, and also the social context of that society. In societies where the intention is to ameliorate the social condition and people's interactions, spaces can be designed by taking into account the religious and cultural beliefs of that

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society, so as to meet the cultural and religious needs of the people besides increasing social interactions. Nonetheless, nowadays the spatial and qualitative structures of architectural spaces are in such a way that individuals have the least amount of encounters and communication with one another. The aforementioned issues lead to a decrease in the sense of excitement, psychological calmness, and ease of mind, and hence a lack of quality in urban spaces. Consequently, designing a religious and cultural complex seems to be a matter of great importance in Iran. This is due to the fact that culture and religion are intertwined in Iran, and it is easy to use this principle as the starting point for designing a complex that not only meets the religious needs but also satisfies the cultural needs of the people. The structure of the current research is as follows:
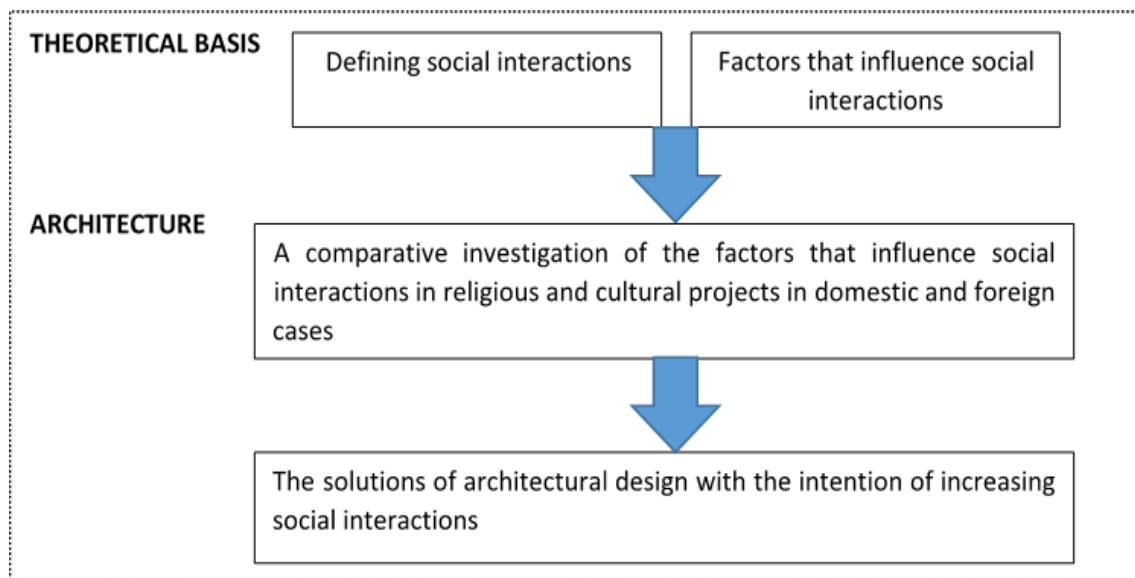
Fig 1 Introducing the article's structure

2. Theoretical Basis

2.1. Social Interaction

When an action is done by an individual and a mutual response is received, it can be said that a social interaction or a social mutual action has taken place. In such a case, a social relationship has emerged between the two individuals (William & Meyer, 2001). In other words, social interaction can be defined as the establishment of a relationship between two or more individuals that leads to reactions among them that are recognized by the two sides (Behzadfar & Tahmasebi, 2013: 18). When the system of actions among individuals is intentional, it could be said that "social relations" are established. Social relations should be "meaningful" and "conscious". Social relations could be "temporary" or "permanent". If a mutual relationship is constant and regular, it is probably describable, recognizable, and relatively stable (Coser, 1975). Obviously, the human need to establish a direct relationship with the environment is reflected in a direct experience of space, people, and social activities such as interaction with acquaintances, meetings, walking, playing, having fun, exercising, body activities, the possibility of competition, etc. That in turn plays a significant role in helping individuals to create a good mental image of space, dynamism and excitement, leading to acquisition of new experience, and environmental education (Whyte, 1980).

2.2. Necessity of Social Interaction

Humans recognize their abilities, make meaning, and create their identities through interaction with other individuals (Wood, 2000). Humans possess a natural need to establish social relations, and thus they create situations that lead to experiencing social relations. What is seen today is a decrease in the level of relationship among individuals in a society. As a consequence of the increase in the size and spread of the cities, speed, density, etc., the primary rules of urbanity such as civility, citizenship, and social relations are weakened (Behzadfar & Tahmasebi, 2013: 18). The emergence of modern architecture in some of the developing cities has caused changes in the social structures of that society; as it could be seen in large cities in Iran, an increase in the height of the buildings, density of construction, population density, and other factors have caused a decrease in people's communication with each other and in social interactions. An increase in social interactions leads to the promotion of the sense of liveliness, an increase in social trust, cultural cooperation, and a decrease in delinquency. These issues are among the goals of urban and architectural design (Tabrizi et al., 2014: 264).

Social interaction may include a physical relationship, a conversation, a glance, or communication among people, and thus needs the definition of events and appropriate activities and consequently, people's acceptance of their roles in space and their membership in social groups (Carr et al., 1992). Social interaction and observing people's activities advance individual growth through creating the basis for sociability and accepting the society. Nowadays, these interactions are significantly fading in metropolises due to various reasons such as the emergence of automobile technology and other private transportation vehicles, long distance between the living and the workplace, the instability and transience of people's relationship with one another, and finally the immigration and non-durability of residence in the neighborhood (Tabrizi et al., 2014: 258).

2.3. Factors Influencing Social Interaction

Some of the most significant factors that influence social interactions are as follows; it should be noted that a summary of the following issues is brought in tables 1 and 2.

a. Sense of Belonging: The sense of belonging to an environment or a place (such as city or neighborhood) is a certain type of the sense of belonging as a general category. The existence of this sense in an individual not only develops honor and prestige in him/her, but also makes the residents of a certain place feel responsible for the affairs related to that place, and persuades them to cooperate in those affairs. In other words, the sense of belonging to a place increases the level of cooperativeness in the related affairs in the residents of that neighborhood or city (Naeemi et al., 2015: 136).

b. Cooperativeness of the Space: Cooperation is a process in which the individual willingly attempts to do social activities through the sense of belonging to a group, and participates actively and voluntarily in it. Some theorists have defined and analyzed the concept of cooperation on a large scale, and have considered cooperation to mean active cooperation of the individuals in political, and cultural lives, and generally all other aspects of life (Naeemi et al., 2015: 138).

c. Security: Sense of security is one of the necessities of people's freedom in public spaces, and any kind of threat to this sense would cause them to give up active attendance in urban spaces (Mahmoudi, 2009: 149). Providing security in urban and architectural spaces is an integral part of a good design. Providing security for the presence of children and women in these spaces should be prioritized, since in case of insecurity these spaces are less welcomed, fewer people would attend them, and consequently the level of social interactions would decrease significantly.

d. Green Spaces: The existence of green space is one of the methods to increase communication and social exhilaration in public spaces (Sullivan et al., 2004). The way of using natural elements directly influences the emotional atmosphere of the space and the five senses of humans, and consequently affects the physical and mental aspects of humans. In fact, the sum of all the things that are perceived by various senses leads to the perception of the environment (Mousavi & Zahedian, 2013: 152). Through adequate furniture, which can help to increase the interactions, green spaces can provide an appropriate foundation for gathering different people and groups, and this in turn would increase the liveliness of the space and consequently makes it welcoming.

e. Activity: The activities that take place in an architectural or urban space have great influence on the amount and the type of social relations in that space. In what follows, three categories of the current activities in a space are defined according to Gehl's point of view.

- Necessary activities: these activities are done under any conditions and are not relative to the specific social condition of that environment. Activities such as going to school or workplace, shopping, waiting at the bus stop, and other daily activities can be categorized in this group of activities.

- Selective activities: these activities are done under the appropriate conditions for the users of certain space. Walking in the open air, stopping at amusing places, and also sitting or resting in attractive places are categorized in this group.

- Social activities: depending on the features of an urban space, these activities include a wide range of people's interactions. Due to the fact that these activities are influenced by other activities and social spaces, they are also called eventual activities. Particular conditions of the spaces - for standing, sitting, eating, playing, etc. affect the activities of this category. In urban spaces that lack the necessary aspects for reinforcing social relations, only a few of these activities are realized, and they in turn differ depending on people's certain conditions. Contrary to this, in the spaces that are rich in these aspects, a great amount of these activities happen.

f. Collective Spaces: A collective space is a space in which one is in a relationship with a stranger. This type of space is appropriate for politics, religion, trade, sport, peaceful coexistence, and impersonal encounters (Walzer, 1986). In the cities, collective spaces act as the spaces in which maximum interactions and communication happen among citizens. These spaces provide the basic ground for practical and ritual activities of the citizens and are significant elements in creating social bonds among the citizens and making collective memories (Andalib, 2010).

g. Public Spaces: Public spaces are the most significant foundations for social interactions. In fact, most of the social interactions take place in these spaces. An appropriate design in these spaces can increase social interaction; furthermore, an inconsiderate designing of the public spaces, and also a lack of appropriate basis for social interactions in these spaces may lead to ill effects. This part of the research will express some ideas regarding public spaces. Satisfying the human need to be loved and to be accepted as part of a group needs a structural setting. Public urban spaces have the maximum capacity concerning this issue. Due to the fact that the calmness of atmosphere, the existence of natural elements, the frontage of the space, and controlling the transportation vehicles satisfy the human need to rest, they are effective in this regard (Whyte, 1980). Public spaces are shared by various individuals and social groups; these spaces are spaces for exchanging thoughts and information, and therein social networks are created. In fact, such a space could be recognized as an experience rather than only a physical place (Hajer et al., 2001).

h. Collective Life: Collective living is an opportunity to get rid of daily tensions, spare the leisure time, have social interactions, gather together with different people and social groups, and it is also a basis for presence, freedom of speech, and expressing it in a space. Collective life in open public

spaces depends on the promotion of social interactions, attracting different individuals and groups, social security and consequently, encouraging the people to tolerate different groups in the space, more sociability, and creating an active, dynamic and lively space (Behzadfar & Tahmasebi, 2013: 19).

Table 1 Comparing different viewpoints towards social interactions

<table>
<tr><td rowspan="6">Comparing different viewpoints towards the promotion of social interactions</td><td>**Theorists**</td><td>Naeemei</td><td>Gehl</td><td>Mahmoudi</td><td>Behzadfar & Tahmasebi</td></tr>
<tr><td>**Spiritual-social solution**</td><td>Creating a sense of belonging

Providing the cooperativeness of the space</td><td>Creating the basis for necessary, selective, and collective activities</td><td>Providing security</td><td>Creating collective life</td></tr>
<tr><td>**Architectural theorists**</td><td>Sullivan</td><td>Walzer</td><td>Whyte</td><td></td></tr>
<tr><td>**Architectural solution**</td><td>Creating green spaces</td><td>Creating collective space</td><td>Creating public spaces</td><td></td></tr>
</table>

3. Comparative Investigation of Factors that promote Social Interaction in Religious and Cultural Spaces

One of the most important issues in today's architecture is the weakness in taking social interactions into account while designing a space. Although in the past religious spaces were labeled with the name of the religion, in practice, cultural activities also took place within them. However, today's religious spaces such as mosques are only used as a place for doing daily religious activities and rituals. Therefore, people's relationship with religious spaces is fading compared with the past. This research intends to investigate the principles of culture, religion, and social interactions, and to study similar cases and their solutions in designing. Studying cases of cultural and religious spaces can be effective in identifying structural solutions for the promotion of social interactions. In what follows, some of these cases are studied briefly (table 2). The Islamic-cultural complex in Tirana, Albania, and also Imam Reza cultural complex at Imam Hossein square, in Tehran are among the similar cultural and religious spaces.

3.1. Imam Reza Cultural Complex (Designing architects: Clout Architectural Studio in Collaboration with Saeed Reza Bariri and Samane Qasem Pour)

This complex was built in 2011 and covers an area of 6500 square meters. The complex site is located near Imam Hossein square in Tehran. This district is considered as a cultural one in Tehran. Therefore, the project of designing Imam Reza multipurpose complex is based on creating an urban space for social activities of different social groups and ages (www.setavin.com). Regarding his design, the designer of the project has stated that "I defined and arranged a project called 'the house of knowledge.' It was based on the philosophy that our generation was in close contact with the mosque, and the next generation was more in touch with cultural houses, therefore the aim of designing this complex was to create a space in which the two detached generations could get

nearer to each other, whether regarding its use or its design. In this space, the 'Shabestan' (or the nave) of the mosque is defined alongside its library, IT center, coffee shop, the amphitheater and the other various uses that were not considered as having the potential to be alongside each other in the past. This kind of designing intends to make the two generations familiar with this space, and to make interaction and conversation happen (fig 2)."

Fig 2 Imam Reza cultural complex (Source: www.setavin.com)

3.2. Albania Islamic-Cultural Complex (Architect: Big Architects)

Tirana, the capital of Albania in southeastern Europe, has undergone an enormous change in urban planning. This change includes reconstruction of the available buildings, construction of several private and public urban buildings, and also a reconceptualization of Skanderbeg square. This important square is the site of the new cultural complex of the city, which consists of a mosque, a center of Islamic culture, and a museum of religious correspondence (www.e-architect.co.uk). This mosque can accommodate thousands of people daily to say their prayers. Through its exclusive connection to the yard and to the public area, it can also increase its capacity up to five thousand people on Fridays and up to ten thousand on celebration, or special days (fig 3 & 4).

In what follows, some of the solutions for increasing social interactions in the above mentioned cases are considered, based on the items mentioned in table 1 (table 2).

Fig 3 Exterior view of Albania Islamic-cultural complex (Source: www.e-architect.co.uk)
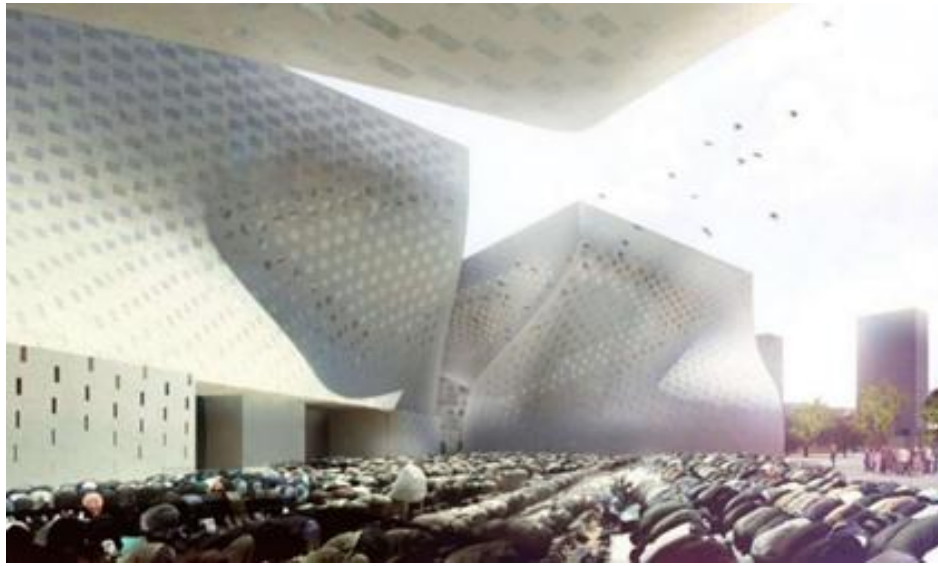
Fig 4 Interior view of Albania Islamic-cultural complex (Source: www.e-architect.co.uk)

Table 2 Studying the reflection of the solutions for increasing social interactions in sample cases

Sample case	Structural feature of the construction	Comparing structural features of the construction with theories of modern theorists and architects							
		Creating the sense of belonging	Providing the cooperativeness of the space	Creating public spaces	Creating green spaces	Creating collective spaces	Creating the basis for necessary, selective, and collective spaces	Providing security	Creating collective life
Albania Islamic cultural complex	Existence of square-like spaces			*	*	*			*
	Existence of narrow windows with adequate height for easy entrance of light and securing the frontage							*	
	Creating a public space with high invitingness and appropriate flexibility			*		*	*	*	*
	Providing the uses related to the previous and the next generation	*	*				*	*	
	Using symbols such as numbers; pointing to the 8th Imam of Shiites (for example repetition of 8 God's names on the skin of the dome, or the existence of 8 intertwined wings or fingers as a symbol of unity)	*			*				

		Comparing structural features of the construction with theories of modern theorists and architects							
Imam Reza cultural complex	Using Iranian architectural elements such as sunken courtyard in the main yard.	*			*				
	Using some of the most significant Iranian architectural elements such as *Gereh Chini* (making geometrical knots in Persian) in the 'Shabestan (the nave)', the walls of the sunken courtyard and the corridor	*			*				
	Putting a fountain in the sunken courtyard and across the 'Shabestan'	*			*				

4. Conclusion

According to the above mentioned issues and the research done, the solutions for increasing social interactions can be summarized follows: creating the sense of belonging, providing the cooperativeness of the space, creating public spaces, creating green spaces, creating collective spaces, creating the basis for necessary, selective, and collective activities, providing security, as well as creating collective life. Some of the above mentioned items are social solutions and consequently need a structural solution. We have attained several principles and strategies through studying them. The results are brought in table 3 and are categorized as three groups: social solution, structural solution, and strategy (the manifestation of the solution in the structure of the building).

Table 3 Comparative study of architectural solutions in religious-cultural projects

Social Interaction	Structural solution	Manifestation of the solution in the structure of the building
Sense of belongings	Accessibility	Creating various entrances to different fronts Adequate stopping spaces The possibility of providing public transportation for the complex (for ease of access for the users)
	Invitingness	Appropriate space-making (open and semi-open spaces) for the entrances
Security	-	Creating short walls to separate the spaces while preserving the visual extension of the spaces Adequate lighting at nights Preventing the creation of dark and lonely places
Cooperative-ness of the space	-	Putting religious space alongside an amphitheater, a coffee shop, and a library, in order to respond to the needs of not only the previous generation and the next generation, but also people with various tendencies. Employing native people in order to do the activities with the aim of increasing their sense of responsibility Employing native people with related professions in different

		sections (a kind of entrepreneurship)
Creating collective life	Creating public and collective spaces	Creating convergent and communal spaces in open, semi-open, and closed spaces.
-	Using natural elements appropriate for the climate	Using water in order for humans to communicate with it through their audio-visual and tactile senses. Using vegetation in the complex in order to reduce noise pollution
Creating basis for necessary, selective and collective activities	Variety in form and flexibility	Creating multifunctional and public spaces Combining open, semi-open, and closed spaces in the complex Variety of dimension in spaces, furniture and vegetation Creating spaces for desirable privacy

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Evaluation of the Quality of Life in Urban Texture with Rural Core Case Study: Naimeabad Neighborhood, Yazd, Iran

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Abstract

In recent decades the unprecedented growth of urbanization, which has been the result of economic and industrial growth, has led to the expansion of cities. Some of the villages located away from the city, within the urban texture, the surrounding land which is considered more evolving as the urban development axes in the metropolitan plans. One of the most noticeable and disturbing issues in these areas is the mismatch problem between the new built environment around the countryside and the immediate urban fabric, which has a significant impact on the quality of urban living. This research aims at evaluating and ranking the quality of life indicators, based on the TOPSIS technique, by exploring the Naimeabad neighborhood of Yazd city, which has a rustic nucleus located in the heart of the city. The study implemented descriptive-analytical method for data collection and analysis. The library data were collected using questionnaires and field surveys. Sample population was selected using simple random sampling method. Cronbach's alpha was used for 288 sample selections and confirmed the reliability of the questionnaire. In addition, the information obtained from the questionnaire was analyzed and ranked using the TOPSIS technique. The research results shows that the social dimension gained the best points and the economic dimension gained the lowest.

Keywords: Quality of Life; Rural Texture; Naimeabad Yazd; TOPSIS Technique

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1. Introduction

From the distant past, residential neighborhoods of cities, as in urban life, have had an essential role in living cells. In the past, urban neighborhoods were a place for gathering people of similar ethnic, religious, economic, social characteristics, and so on. Following the accumulation of more people with common features in one area, that part of the city would acquire a particular and well-known identity that differentiated it from other surrounding areas. Over the past few decades, major changes have also been made to the lifestyles in the neighborhoods. Meanwhile, the quality of life of the city which would solve the current problems, is not a process of one-dimensional economic development at the national level, and a purely physical-urban development on the scale of the city, but is also dependent on achieving more comprehensive and multidimensional criteria in the realm of planning.

Accordingly, the purpose of the urban quality of life is to consider social and environmental indicators, while also paying attention to physical and cultural indicators. Based on different approaches, the main goal of urban planning and design is to achieve the optimal quality of social and civil spaces, and housing and environment for the citizens. The issue of achieving the most desirable quality of life has been one of the long-term desires of mankind throughout history, but with regard to economic and industrial growth since the 1960s, special attention has been paid to a wide range of topics in various fields. Quality of life is a complex and multidimensional concept, which is directly related to the time and the place in which an individual lives, as well as social values which are influenced by researchers (Mahdavi et al., 2012: 286).

2. Background of Related Studies in Iran

Even after the economic growth in 1960s, the desired quality of life for humans has continued to attract the thoughts of philosophers, scholars, scientists, and government officials. In this regard, recently, large number of researchers in different areas have examined the concept of quality of life, in works such as social studies (Wang et al., 2010; J. Mason et al., 2010), economic studies (Wang et al., 2010; Whitehead et al., 2006), health and medical (Habib et al., 2009; Ryashchenko & Gukalova, 2010), environmental studies (Godefroid, 2001; M. J. Geelen et al., 2009; Moser, 2009 & S. Westaway, 2006), transportation and quality of life (EL Spinney et al., 2009; de Groot & Steg, 2006), land use and quality of life (Preuss & W. Vemuri, 2004; O. Marquez & C. Smith, 1999), and other types of studies (Manoochehri et al., 2011). In addition, international organizations such as: UNDP, UN, WHO, have given their desired opinions in relation to the quality of life (Faraji Mollaei et al., 2010). This concept was introduced for the first time in December 1991, in the symposium on Healthy Cities in Tehran, with the slogan, "healthy city for a better life". The World Health Organization in 1996 organized the 56 cities' work in the project in Iran, until the end of 1996 (Manoochehri et al., 2010). Also, in 2000, internal studies, from the Management and Planning Organization of Iran introduced three indicators: life expectancy, percentage of literacy, and per capita income as the most important factors in the quality of life (Management and Planning Organization, 2001). Table 1, provides an overview summary of studies regarding this subject investigated in Iran.

Table 1 Literature review of studies related to the quality of life in Iran

Authors	Year	Results and research approaches
Shahkouhi et al	2014	Results of this study suggest that different socioeconomic, physical, and environmental dimensions of quality of life have different areas. It also showed that there is a direct relationship between the sense of belonging to a place and satisfaction with the quality of life.
Bandar Abad & Ahmadi Nejad	2012	Having a mismatch between objective and subjective satisfaction is a result of the relationship between subjective and objective aspects of the quality of life and reflects the lack of proper definition of 'per capita' and 'standard accessibility', which shows the importance of participatory planning based on public opinion.
Hatami Nejad et al	2012	Existence of clustering (positive spatial auto-correlation), and spatial heterogeneity distribution of quality of life index and its four components at the level areas of Tehran show that some areas need more public intervention, provision of social programs, and public infrastructure.
Jamshidi et al	2012	Apart from the quality of residential environment, other quality aspect of life in the region is below the national average. Also, there is a positive significant relationship between the population and the quality of life in the village.
Dadashpour & Roshani	2012	In most sub-indices, the interaction between the individual, the environment, and the level of satisfaction depends on the facilities and the physical environment. Also, there is a significant difference between the perceived quality of the neighborhood and the objective quality.
Abbas Zade & Tamri	2012	Components of vitality, legibility, safety, security, and the permeability of the main elements are considered as the factors influencing the quality of urban spaces and are significantly associated with level of social interactions and the presence of citizens in pedestrian-oriented urban spaces of Tabriz.
Ghalibaf et al	2011	Quality of life in the region in terms of environmental, social, and economic conditions was between undesirable and moderate in terms of transport and communication.
Pourtaheri et al	2011	Quality of life in the area in terms of education, residential, physical environment, income, and employment was between lower than average and moderate in terms of quality indicators, such as health, safety and physical conditions.
Heidari	2011	There is a significant difference in favor of urban areas between the quality of life in urban and rural areas.
Lotfi & Saberi	2012	Quality of the life of citizens and the inequality in the urban areas are divided into three levels: high, medium, low or semi deprived.
Faraji Molaei	2010	According to the wide gap in economic prosperity, income is the most important indicator of quality of life in the region.
Rezvani et al	2009	In general, the correlation between objective and subjective dimensions of the quality of life is not high.
Ghiasvand	2009	There is a positive significant relationship between social capital and the assessment of the quality of the physical environment (mental) by people, sense of belonging, and neighborhood satisfaction.
Rezvani & Mansourian	2007	Assess the quality of rural life based on human needs with indicators and descriptors measurement.
Rabbani & Kianpour	2007	This study provides a method for the quality of life, and found that there is no significant relationship between age and gender with the quality of life, but there is a direct relationship with marital status.

2.1. Quality of Life

The phrase 'quality of life' in Latin means "Quality" that is how to extract and literally means the circumstances of life. Some people know quality of life as viability in an area, others as a

measure for the charm, welfare, social welfare, happiness, satisfaction, etc. (Epley & Menon, 2008). Quality of life for a person depends on subjective and objective facts of life and his perceptions of these factors (Lotfi, 2009). Quality of life is not a new concept, and mankind has always worked to achieve it. Philosophers, poets, religious leaders, and revolutionaries have provided their insights on how to achieve a good life over thousands of years (Andrews, 1976). But, for the first time, in 1920 Pigou in an economy and welfare book used the term "quality of life" as a specialized term (Mokhtari & Nazari, 2010). Also, in 1955, with the foundation of the International Association for studying the quality of life, this concept was institutionalized (Vennhoven, 1994). Later, in 1960, the concept of quality of life was promoted in European countries (Ghalibaf et al., 2011). Before the 1970s, quality of life indicators in the studies were objective, but in the 1970s, subjective indicators were added to measure the quality of life. In 1976, Campbell and his colleagues, for the first time, noted the subjective and psychological indices of quality of life (Noghani et al., 2008). According to McLaren (1996), it is generally agreed that there are two distinct types of indices to measure the quality of life; the first are objective indicators that measures tangible aspects of the built environment, the natural environment, and the social and economic areas, and the second type are the subjective indicators that measures the sense of well-being and satisfaction of certain aspects of life (Lotfi, 2009). These two are often individually, and rarely in combination, used to measure the quality of life, because the difference in the quality of life studies is the distinction between objective and subjective dimensions of the quality of life. Thus, researchers study quality of life in two categories of indicators:

1. Factors that study the objective indicators, such as: housing, social, cultural, and economic characteristics and so on.
2. Factors that study subjective indicators, such as: satisfaction and motivation.

Table 2 Quality of life analysis

Dimensions	Definitions	Method of Measuring
Subjective	Subjective aspects of quality of life reflect people's perception and evaluation of their lives.	By using subjective indicators measured.
		In one of the most important methods, subjective quality of life can be the cumulative amount of satisfaction in various areas of life.
		Alternatively, subjective quality of life in terms of overall satisfaction of life is measured as a whole. In this way, overall life satisfaction is usually measured by witnesses or logical responses.
Objective	Represents external conditions of life	The objective quality of life is measured by using objective indicators related to the visible and tangible realities of life. This index is obtained from secondary data.

However, these two categories in the index of quality of life studies are complementary to each other, and they should be used in conjunction with each other (Pour Ahmed & Zarei, 2015). Noll (2000) stated that based on objective and subjective dimensions of quality of life, we can conceptualize well-being as a 2*2 matrix that includes the states of exclusion, adaptation, and inconsistency (Rapley, 2003). According to Table 3, if an individual has good objective and subjective conditions, the state of "welfare" exists. If both conditions are bad, the state of "exclusion" exists. If the objective conditions are good and subjective conditions are bad, "disharmony" exists, and if the objective conditions are bad and subjective conditions are good, "adaptation" exists (Rezvani et al., 2009).

Table 3 Different states of quality of life, combining with objective and subjective dimensions. (Rezvani et al., 2009, quoted by Rapley)

Objective conditions of life	Subjective evaluation	
	good	bad
good	welfare	disharmony
bad	adaptation	exclusion

2.2. Urban Quality of Life (UQoL)

The QoL study in cities is of particular interest. According to Li and Weng (2007), ''the study of the QoL in the cities of both developing and developed countries is gaining interest from a variety of disciplines, such as planning, geography, sociology, economics, psychology, political science, behavioral medicine, marketing and management, and is becoming an important tool for policy evaluation, rating of places, urban planning and management''.

In recent years, the effects of demographic growth, urban expansion, environmental degradation and the increase in undesirable social patterns have attracted new attention to planning and urban management (Pichardo-Muñiz, 2011).

The main challenge of the UQoL evaluation is to include as many of its dimensions as possible. To achieve that goal, several indices are generally used; all of them combine several indicators (Babbie, 1999). The UQoL is a hierarchical, multi-attribute concept characterized by several underlying attributes that, in turn, are defined by more specific underlying attributes. These attributes (D'Acci & Lombardi, 2010; Ulengin et al., 2001; van Poll, 1997) are: environmental quality, air quality, green spaces, jobs, social condition, urban quality, architecture quality, pedestrian areas, etc.

Estimating the urban quality of life is a complex quality assessment of many different features that must be considered simultaneously. The behavioral decision theory provides a number of methods for the analysis of multi-attribute objects/concepts (D'Acci, 2014). A right selection of variables and dimensions is essential for UQoL assessment. Table 4 shows the dimensions included in several studies (Cabello Eras, 2014).

Table 4 Dimensions included in UQoL studies (Reference: Cabello Eras, 2014)

References	Dimensions
Carranza Torres (2010)	- Urban environment - Public service infrastructure - Private service infrastructure - Local economic development
Orellana (2011)	- Employment - Business frame - Socio-cultural frame - Network connectivity - Health - Environmental quality - Housing conditions
Ramı´rez Casas (2006)	- Urban services and equipment - Urban environment
Herna´ndez Aja (2008)	- Social dimension - Economic performance

	- Environmental quality
	- Cultural development
Rodrı´guez and Go´mez (2008)	- Urban environment
	- Urban equipment
	- Urban services
	- Urban planning
	- Socio-economic performance
Lotfi and Solaimani (2009)	- Environmental quality
	- Economical quality
	- Social quality
Leva (2005)	- Habitat
	- Social
	- Economic
	- Subjective
Azizi et al. (2011)	- Basic needs: housing, nutrition, resources (energy, capital, facilities, and equipment), communications, and education
	- Well-being needs of disabled and elderly: individual development and social development
Li and Weng (2007)	- Population density
	- Housing density
	- Median family income
	- Median household income,
	- Per capita income
	- Unemployment rate
	- Percentage of families under poverty level

3. Case Study

The study area is Naeemabad district of Yazd city; this neighborhood is located in the division of urban areas of neighborhood 1 from zone 3 of district 2 of Yazd municipality. In less than a century, the neighborhood has turned from a small village into a residential neighborhood in the metropolitan capital. This neighborhood is limited to the Akbarabad neighborhood from north to Khorramshah district, west to the railway and Qasemabad area, and to the south and southwest to the Silo and Kui Fayzia neighborhoods and to the east Mahdi Abad and Hojjat neighborhoods. The neighborhood is generally located in the boundary of the Ayatollah Kashani Street, Daneshamooz Boulevard, Shahid Beheshti Boulevard, and Imam Jafar Sadegh Boulevard, with an approximate area of 399 hectares (fig 1).
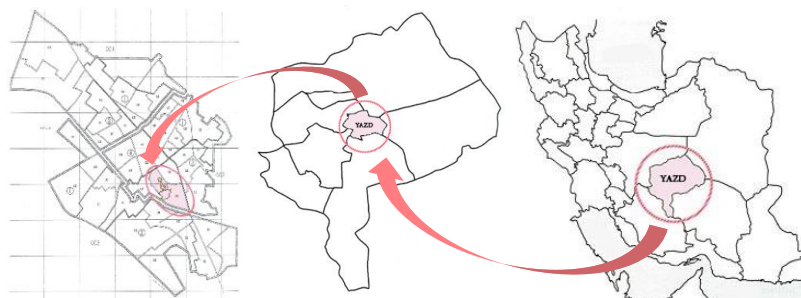
Fig 1 Location site

Naimeabad is located within the city of Yazd and close to the city center, at a short distance from the old and the new urban centers. Also, the immediate vicinity of the arterial roads of the city (Kashani Street and Imam Jafar Sadegh Boulevard) makes it easy to get to the other parts of the city. It is worth noting that Ayatollah Kashani Street provides direct access to Naimeabad's historic district and the old city center, and Daneshamooz Boulevard provides a direct access to Naimeabad's new urban center. In general, it can be said that the structure of the Naimeabad neighborhood is in the form of two parts, which are the old (rural), and the new (urban). The first part, which is the old and the rural area, includes gardens, agricultural land, and rural houses, while the second part is a series of new constructions (mostly around the urban passages and core), which have significant differences with the first part. There are many factors involved in the division of the neighborhood in this way. The first and most basic factor can be considered the sudden merger of the village in the city, or rather, the change in the old structure of Naimeabad village from the consequences of joining the village. However, this heterogeneity and coordination between the two adjacent urban areas has led to many issues (fig 2).
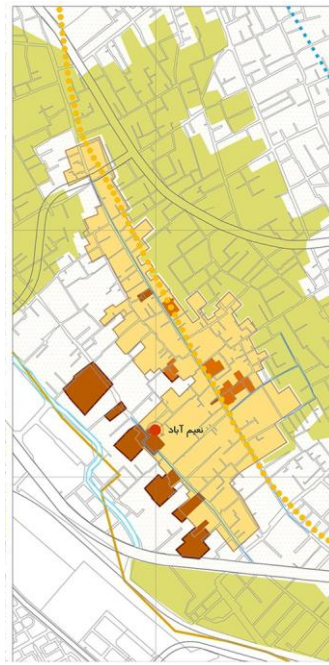
Fig 2 Location site

4. Methodology

In the present research, descriptive-analytical method was used, and through literature review and focusing on theoretical foundations of the subject, and then using the analytical-comparative method, the criteria and indicators were identified among the views of different thinkers. Using fundamental ideas of quality of life, the research sought to identify the criteria for the quality of life in both cognitive and objective dimensions and prioritize these criteria based on the analysis of the impact of location. Finally, the criteria have been revised and modified in order to localize and adapt it to the existing context of Iran. Afterwards, by using the questionnaires, the indicators were extracted from the residents, and then they were prioritized and analyzed by preparing the database and using the TOPSIS technique.

4.1. TOPSIS Technique

There are several methods and techniques to analyze the data, but due to the high number of criteria (38 cases) and the existence of multiple relationships between them, it is necessary to use multi-criteria decision-making methods, among which Analysis Hierarchy and TOPSIS method are more popular. Hierarchy analysis is one of the most widely used methods for ranking and determining the factors. Using paired comparisons of options, priority is given to each criterion, therefore, the number of criteria and options should be such that the number of proxy comparisons in the questionnaire is reasonable. Therefore, considering the number of criteria in this study, the use of this technique did not seem appropriate. Hence, the TOPSIS technique was used to rank and compare the options, to choose the best option, to determine the intervals between the options, and to group them. There is no limit to the use of quantitative or qualitative data, as well as the number of criteria and options. Therefore, this research implemented TOPSIS technique to analyze the data. This model is based on several indicators that can solve many decision-making issues for managers and planners. The model was first introduced in 1981, by Hwang and Yoon, and has been acknowledged as one of the best and most accurate decision-making methods among planners.

This technique is based on theoretical foundations, in contrast with multi-factor decision-making techniques, so that in this technique many problems of numerical-numerical methods have been solved. The theoretical foundations of this technique are based on the process in which, it first calculates the most efficient mode and the most difficult mode for each indicators, and then, the distance between each option of positive and negative ideal is calculated.

The option chosen is the one that has the shortest distance from the positive ideal and the longest distance from the negative ideal solution. This technique is designed to be able to interact with the types of indicators in terms of positive or negative influence on the purpose of decision making in the model, as well as the weight and the degree of importance of each indicator in the model. In order to use TOPSIS technique to rank and select the best option among available options, the following steps should be taken (Asgharpur, 2006: 87):
   Decision making matrix
• Weighting indicators
• Quantifying the decision matrix
• Formation of an unbalanced matrix
• Find the unbalanced matrix
• Find the positive and negative ones
• Find the distance of each indicator from the cost of an individual for each option
• Find the relative proximity of each option and the best condition
• Ranking
   The last step is to rank the options and determine the best option. For this purpose, it is enough to arrange the relative distance of each option, calculated using the above relationship and arranged in order of largest to smallest. In this case, the option with the largest relative distance to the other options will have the highest rating.

4.2. Descriptive Data

The quality of life satisfaction questionnaire was prepared to document the status of the area in relation to each of the extracted criteria. Since the indices and variables of this research are qualitative, in the current questionnaire, after the validation of scientific assemblies approved the

use of the Likert scale anchored at very low = 0 to very high = 1, criteria, ease of accountability and design evaluation were considered for operational purposes.

The statistical population of all residents was from Naimeabad, with sample size of 288 people. Validity and reliability of the questionnaire were evaluated using the Cronbach's alpha coefficient evaluation method. The high score of 0.91 for the questionnaires in this test indicates the reliability of the questionnaire. The questionnaires were completed by different age groups, in relation to the range, of which 57.6% were men and 42.4% were women.

4.3. Analytical Data

Using the answers provided by people about the satisfaction of quality of life, the prioritization of criteria in the TOPSIS technique and the final score of the criteria are given in Table 5.

Table 5 Indicator Analysis Results

Rating	Criteria	Subject	di+	di-	Cl	Ci
1	A18	The sense of belonging to the city and neighborhood	0.000037	0.000104	0.736845	0.833867337
2	A24	Safety	0.000053	0.000074	0.583012	0.808009272
3	A5	Access to safe drinking water	0.000039	0.000101	0.723853	0.766036881
4	A21	Solidarity between residents	0.000044	0.000099	0.690655	0.762619763
5	A19	Feeling of identity in the neighborhood	0.000037	0.000121	0.766037	0.754127896
6	A43	The quality of residential environment	0.000044	0.000094	0.682605	0.744253374
7	A1	Existence of skylight and adequate lighting	0.000050	0.000084	0.624218	0.736845234
8	A3	Existence of good facilities and public baths in residential	0.000097	0.000051	0.345031	0.723852853
9	A4	Ease of access to facilities and urban services	0.000069	0.000060	0.464621	0.69065464
10	A23	Child safety	0.000076	0.000053	0.412304	0.689459219
11	A6	Benefit from health services	0.000105	0.000042	0.283835	0.682605363
12	A29	Weekly consumption of fruits and vegetables	0.000081	0.000062	0.431865	0.647613928
13	A35	The satisfaction of air quality and noise	0.000074	0.000056	0.428830	0.624620824
14	A7	Environmental quality	0.000094	0.000047	0.332601	0.624217816
15	A20	Social participation	0.000087	0.000049	0.359678	0.587430036
16	A2	Physica	0.000106	0.000038	0.264675	0.583011672
17	A28	Weekly consumption of protein	0.000085	0.000050	0.370709	0.58212672
18	A33	Use of sanitary methods for garbage collection and disposal of domestic sewage	0.000028	0.000142	0.833867	0.551501473
19	A30	Social	0.000037	0.000114	0.754128	0.549573455
20	A25	Ease of access to the police	0.000060	0.000085	0.587430	0.525203866
21	A42	Average family expenses	0.000034	0.000111	0.762620	0.516379682
22	A9	Satisfaction with public lighting	0.000099	0.000046	0.315959	0.464620845
23	A26	performance of firefighters	0.000046	0.000103	0.689459	0.45717933
24	A31	Familiarity with Computers and Internet	0.000029	0.000121	0.808009	0.434164156
25	A12	Satisfaction of traffic	0.000066	0.000073	0.525204	0.431865354
26	A13	Transportation	0.000072	0.000061	0.457179	0.428830388
27	A10	Time of travel	0.000099	0.000039	0.280504	0.412303683
28	A34	Passages status	0.000054	0.000075	0.582127	0.389464435
29	A38	Job satisfaction	0.000048	0.000088	0.647614	0.381842579
30	A32	Use of computer and internet in daily affairs	0.000061	0.000075	0.549573	0.374154899
31	A17	Social quality of education	0.000088	0.000067	0.434164	0.370709285

32	A15	Weekly consumption of fruits and vegetables	0.000099	0.000059	0.374155	0.359678414
33	A37	Access to financial references	0.000060	0.000074	0.551501	0.357529948
34	A39	Job security and hope for the future career	0.000080	0.000051	0.389464	0.356978589
35	A8	Access to public transport	0.000052	0.000086	0.624621	0.345030517
36	A14	Access to new and good quality schools	0.000094	0.000046	0.328987	0.332600666
37	A36	Aesthetic factors	0.000089	0.000049	0.357530	0.328987307
38	A22	Sexual equality	0.000083	0.000051	0.381843	0.31595852
39	A11	Satisfaction with access to public parking (facilities)	0.000087	0.000048	0.356979	0.283835117
40	A27	Administrative services and the accountability	0.000104	0.000038	0.268003	0.280503818
41	A40	Opportunity to find decent jobs	0.000106	0.000039	0.267223	0.26800346
42	A41	Satisfaction with income and existence of savings	0.000066	0.000070	0.516380	0.267223471
43	A16	Students' access to appropriate laboratory equipment	0.000036	0.000106	0.744253	0.264675387

5. Discussion

According to the extent of the issue, the study variables will be identified based on literature research, studies, history of the subject, repeated indicators in both objective and subjective aspects in various areas. Also, measuring the quality of life is based on the extracted indicators. Therefore, a total 8 objective and 38 subjective indicators were selected in physical, social, environmental, and economic dimensions, shown in table 6 (Amini, 2006).

Table 6 Subjective criteria of quality of life survey, conceptual model (derived from previous studies)

Dimension	Indicator	Researcher / Items	Jamshidi et al	Faraji Mollaei Daman bagh et al	Ghiasvand	Bandarabad & Ahmadinejad	Baskha and others	Baskha and others	Pourtaheri et al	Rezvani and Mansourian	Lotfi & Saberi	Mahdavi & others	Dadashpour & Roshani	Rezvani & others
Physical	The quality of residential environment	Existence of good facilities and public baths in residential areas	❋	❋				❋	❋			❋		
		Existence skylight and adequate lighting	❋	❋		❋		❋	❋			❋		
		Ease access to facilities and urban services	❋			❋				❋		❋		
		Access to safe drinking water	❋					❋	❋	❋			❋	
	Transportation	Access to public transport		❋		❋			❋	❋	❋	❋	❋	
		Satisfaction with access to public parking		❋		❋			❋			❋		

		(facilities)												
		Satisfaction with public lighting		❋		❋			❋	❋	❋		❋	
		Satisfaction of traffic		❋		❋			❋	❋	❋		❋	
		Time of travel		❋				❋						
Social	Social quality of education	Access to new and good quality schools	❋	❋		❋		❋	❋	❋		❋	❋	
		Students access to good and experienced teachers	❋	❋		❋		❋						
		Students access to appropriate laboratory equipment	❋	❋		❋		❋	❋					
	Quality of health and safety	Weekly consumption of protein	❋	❋				❋	❋					
		Weekly consumption of fruits and vegetables	❋	❋				❋	❋					
		Benefit from health services	❋	❋		❋	❋	❋	❋	❋	❋		❋	
		Benefit from healthy bath	❋				❋	❋	❋					
		Ease access to the police	❋	❋			❋	❋	❋	❋			❋	
		Safety	❋	❋			❋	❋	❋	❋			❋	
		Administrative services and the accountability and performance of firefighters		❋										
		Solidarity between residents	❋	❋		❋							❋	
		Lack of struggle among residents	❋	❋		❋							❋	
		Child safety		❋		❋						❋		
		Freedom of expression (The satisfaction of trust in people)					❋					❋	❋	
		Sexual equality					❋							
	Belonging to local	Social participation		❋	❋	❋	❋		❋			❋	❋	❋
		The sense of belonging to		❋		❋						❋	❋	

Category	Subcategory	Indicator													
		the city and neighborhood													
		Feeling of identity in the neighborhood		※		※							※		
	ICT	Familiarity with Computers and Internet		※				※							
		Use of computer and internet in daily affairs		※				※							
Environmental	Environmental quality	Use of sanitary methods for garbage collection and disposal of domestic sewage	※	※	※	※	※	※	※				※	※	
		Passages status	※			※									
		The satisfaction of air quality and noise				※							※		
		Aesthetic factors				※							※		
Economic	Occupation	Job satisfaction	※	※					※	※		※			
		Job security and hope for the future career	※	※			※	※	※		※		※		
		Opportunity to find decent jobs		※					※	※			※		
	Income	Satisfaction with income and existence of savings	※	※		※	※	※	※		※		※		
		Average family expenses		※		※					※	※			
		Access to financial references						※							

6. Conclusion

The importance of qualified human resources and their perception of quality of life cannot be ignored in the assessment of urban development. The quality of urban neighborhoods has been evaluated on the bases of subjective and objective strategies, by using qualitative and quantitative data. Subjective evaluation of quality usually includes field studies, such as questionnaires and interviews, to understand the citizens' mental imagination. Objective evaluation usually uses quantitative indicators and is more social, as well as economic.

This study has addressed and contributed to the indicators of urban quality of life in the neighborhood and has important implications for both urban planners and policy makers. In this way, collecting, examining, classifying, evaluating, and putting criteria in specific categories are the basic steps to achieve a complete checklist to assess the quality of life. This method can measure satisfaction for quality of life in urban areas by ranking activities, plans and performance for weak indicators in order to directly improve the quality of life.

Naimeabad neighborhood in Yazd city is composed of a rural core and retains its rural features. However, based on the conducted survey, according to the residents of the neighborhood, the physical problems were ranked lower, and the most important problems in this neighborhood were related to economic indicators. As shown in Table 5, specifically the factors of students' access to appropriate laboratory equipment, satisfaction with income, savings, and opportunity to find decent jobs are the most important problems of the neighborhood. The social and cultural issues in this neighborhood are in a favorable condition, because of the cultural preservation and customs.

Collecting, reviewing, classifying, and evaluating the criteria's in specific categories are the main steps in assessing the quality of life. The method in this research can be used as a model for measuring the quality of life in various urban contexts. This increase in the number of examined samples can lead to the elaboration of the research and the ability to generalize the results in the area or the city. This research can also be done by increasing the sample size, localization, and development of quality assessment criteria according to the environment and conditions of each region, or by using other advanced statistical methods and multi-criteria analysis techniques.

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Crisis Management in the Persepolis World Heritage Complex (A Case Study about Drought)

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Abstract

This study tries to present a crisis management plan for the Persepolis World Heritage Site (a case study about drought). The study and data collection procedure is conducted mainly by descriptive and analytical methods. The study population includes the experts of historical places in Department of Agriculture, Natural Resources Department, Geology Department, and Regional Water Department of Fars, among whom 62 people were chosen by using Cochran sampling formula. Their liability for the case study variable of drought was confirmed to be 83 percent, using Cronbach alpha. In this study, the internal and external factors of weaknesses, strengths, threats, and opportunities in this important World Heritage Site were investigated using SPSS software and SWOT method. In this way, drawing a matrix (SWOT) and implementing related strategic analysis, a strategy table including WO, ST, SO, WT has been provided regarding proactive protection. As the next step, putting collective wisdom and consensus of experts and managers of the department were proposed to optimize the designed strategies, to prioritize these strategies, and finally to choose the most suitable one for the aforementioned site.

1. Introduction

Persepolis was built near the city of Shiraz, in the northeast of Marvdasht, over the hillside of Rahmat Mountain which is located 1770 meters above the sea level. Construction of Persepolis is traced back to 518 B.C, and in 1979 it was recorded as a world Heritage by UNESCO. Among the important issues that have led to researches in this field is that with all risks that threaten this area,

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so far no master plan has been provided as the management plan of Persepolis possible crisis. In this study, we have tried to provide a crisis management plan (before, during, and after the crisis) to identify crisis-generating natural and un-natural factors such as flood, drought, earthquake, visitors, etc. Afterwards, a great emphasis is put on the drought that has caused the greatest threats to this historical site. First, we refer to the literature review in this field of study, and then discuss the factors that may lead to such crisis. Given that the Persepolis complex is located on the hillside of Rahmat Mountain and has the disposal system for surface water, its section can be used as a reservoir for rain. Unexpected events have been very important issues in the last twenty years, causing the death of nearly 10 million people and more than 1,000 billion dollars' worth of damage. Iran also has not been exempted. Iran is the fourth most disaster-prone country in Asia. In different areas of this country, natural disasters such as floods, earthquakes and other un-natural disasters such as traffic accidents, plane crashes, etc. are always taking place. These days, the development of cities have caused factories to move out of the city, water shortages have led to legal and illegal drilling of wells and this has caused excessive growth of agriculture, that, in its turn, led to problems in historical areas such as Persepolis complex, which is located outside the city and faces threats and eventually gradual destruction. In this article, it is tried to identify and introduce the natural critical factors of drought. They include mismanagement of underground waters, mismanagement and carelessness about destruction of plants, lack of appropriate cultivation principles, and lack of attention to gradual destruction of non-mineral compounds of the soil. This study has led to presentation of a crisis management plan of Persepolis (before, during and after the crisis), and all attempts have been directed towards applying some changes in the excessive withdrawal of underground water agriculture principles according to existing map of the wells in agricultural field. The approach of the farmers and ranchers will bring about other consequences like draught, sinking, and flood which may include life and irreparable casualties. The results of the research have shown that when standardized precipitation index has negative sequence, drought occurs, and when standardized precipitation index has one or fewer sequences, droughts are intensified. These time scales state the reaction of drought-in relation to availability of water resources when the reaction of moisture of soil is more short-termed than raining condition. While the response of groundwater levels and river flows and reservoir of water resources is a long-term process in response to the lack of precipitation (Fattahi, 2008).

Since excessive withdrawal of water in deep wells has resulted in intensive decrease in water level, eventually, Khorasan Province has faced with severe water crisis. In this province, based on reports, draught has been introduced as the cause of the water crisis. Whereas in this study, the main cause of the water crisis has been determined to be continuous over drafts by deep wells from aquifers of plains. The decline of groundwater levels in recent years occurs according to the above rule, which has led to the continuation of its decline. The irreparable consequences of the water crisis include: rising cost of pumping water, salinization of ground water, land subsidence, and creation of slots in the surface of the plains and environmental problems (Velayati, 2006). In the study of the design of hydro-geological studies regarding Persepolis World Heritage area, through investigating and studying of groundwater, and performing numerous tests, the possible causes of the water crisis, land subsidence, and flooding in Persepolis were stated, and it is claimed that a sharp drop in underground water level during 2007 to 2009, coincides with the drought which has been unprecedented in 50 years (Naderi et al., 2009). The main objectives include the analysis and modeling crisis management in the Persepolis World Heritage area, and to determine the factors and areas of strengths, weaknesses, opportunities, and threats of crisis management in Persepolis World Series.

1.1. Objective of the Study

Developing a strategic plan to manage the crisis at the Persepolis World Series and its sub-goals are as below:

1. To investigate the relationship between drought and the subsiding of Marvdasht plain and Persepolis World Series
2. To investigate the connection between the landslides and subsidence of Shiraz plains and Persepolis
3. To investigate the relationship between the flood and the subsidence of Marvdasht plain and Persepolis World Series

According to the researches, in addition to solving the problems of the area, helping the endangered historic sites, advertising the culture of familiarizing people with the risks and crises caused by indiscriminate withdrawal of subsurface water, as well as controlling floods and proper cropping patterns are effective steps to improve the situation.

2. Research Methodology

Considering that the subject is both theoretically and practically applicable, after collecting data about the area, we used sample population to accomplish the project. One of the methods is experimental applied research. In fact, after collecting data, the geo-historical information questionnaire was distributed in related departments. The statistical results showed that in fact this method is suitable for this study. This is happening, as its signs are clearly evident in the site. According to the experts, it is regarded as a descriptive-analytic way of data collecting. The population of this research is comprised of experts and managers of Cultural Heritage, Department of Agriculture, Natural Geological Resources, or Archeologists, Agriculture and Natural resources and Regional Water Organization of Fars province, as well as Archeologists, among which 62 people were chosen, using Cochran sampling formula. The reliability of the drought component equals (93%) and is confirmed by Cronbach alpha. This research is carried out using SPSS software and SWOT technique to analyze the statistical data.

3. Research Findings

3.1. SWOT Technique

One of the most suitable technologies for planning and strategy analyses is SWOT matrix, which is now used as a new tool for Gap functions analysis and the analysis of the performances. The design and evaluation of strategies are used. SWOT technique or matrix is used to identify threats and opportunities in the external environment of a system and for the recognition of its internal strengths and weaknesses, in order to assess the situation and to formulate an appropriate strategy to guide and control it. In fact, this approach provides the best strategy for management of the organizations. In brief, what can be said is that the technique for analyzing the situation and formulating strategy are chosen through:

- Recognition and classification of strengths and weaknesses in the system
- Recognition and classification of the opportunities and threats in the environment outside the system
- Competing the SWOT matrix and formulating various strategies to guide the future system

In other words, SWOT model is one of the strategic tools to comply with the opportunities and the strengths and weaknesses of the system, as well as the external threats to the system. The

SWOT model provides a systematic analysis to identify these factors and to choose a strategy that establishes the correspondence between them. In terms of this model, an appropriate strategy maximizes the strengths and opportunities and minimizes the threats and weaknesses. To this purpose, strengths, weaknesses, opportunities, and threats are linked within the general framework of (SO, WO, ST, WT) and strategy options are selected among them.

3.2. Procedures of SWOT Technique

To build a matrix of strengths, weaknesses and opportunities and threats, the following steps should be taken:
1. Identifying the main strengths and weaknesses, and creating evaluation matrix of internal factors (IFE)
2. Identifying the main opportunities and threats, and creating evaluation matrix of external factors (EFE)
3. Designing strategies and creating Matrix of threats, opportunities, weaknesses, and strengths (TOWS)
4. Drawing internal-external matrix (IE)

4. Internal Factors Evaluation Matrix (IFE)

In this step, the main and most important strengths and weaknesses of crisis management are listed, which were collected through questionnaires and interviewing experts and other people involved in the field of historical context and crisis management. In order to identify the impact of each of these factors, according to their opinion, each of the criteria was scored from zero to one, so that the sum of the coefficients equals one. Afterwards, to determine the effectiveness of a standing strategy and reflecting the responses to factors, scores are given as follows: The score of 1 indicates fundamental weakness, the score of 2 indicates the ordinary weakness, the score of 3 indicates normal strength, and the score of 4 indicates a very high strength.

Then, in order to determine the final score, each factor is multiplied by its score. Finally, the final total score is calculated to obtain the final score of internal factors (the final score should not be more than 4 and less than 1). This matrix is a tool to examine the internal factors. Thus, we identify strengths and weaknesses and then put them in the relevant columns. In order to design an internal factors evaluation matrix, typically, intuitive judgment and the views of involved individuals are considered. After identifying the internal factors and the strengths and weaknesses, each factor is allocated a given weight factor of zero (trivial) to one (very important). Normalization can be used for weighting, so that the summation allocated to weighting coefficients should equal one. To determine the importance of each factor, the weight of each factor, and to decide the high or low importance of factors, scholars and experts comments can be used, and then we can normalize the weight factor between zero and one. As it was mentioned above, the status of each factor is stated with a score "rating status quo" and determined to be 1 to 4. Due to the fact that it is very important to determine the score based on status quo, the dominant activities and environment weights must be determined and assessed based on the status quo. Subsequently, the weighted score for each factor is calculated. To do this, the score of each row of internal factors is multiplied by its normalized weight and inserted in a new column, and finally, the sum of weighted points is calculated, so that the minimum is 1 and the maximum is 4 and the average is 2.5. If the final score of IFE matrix in regulatory strategies is less than 2.5, it means that the overall strategy in terms of internal factors is weak, and if the final IFE score is greater than 2.5, it indicates that the

strategy has strengths regarding total internal factors. It is also possible to insert a column in which the reason of selecting the factor is explained and its status quo is analyzed, and the weight and score can therefore be explained. Weight of each factor is determined by a score ranging from 1 to 4. According to the key or the normal internal factors, the strengths and weaknesses are scored based on their scores from 4 to 1 or 2 to 3 to the strengths and weaknesses. Allocating points are calculated in such a way that if the strength was a great one, points 4 and if it was a normal strength, points 3 are given to the agent, and if weakness was a typical one, point 2 and if the weakness was a critical one, point 1 is given to the agent. And also, according to the key or external factors, opportunities and threats, the scores of 4 or 3 are assigned to opportunities and the score of 2 or 1 are assigned to the threats, respectively. Tables 1 and 2 show the results of analysis of the internal factors (strength) and external factors (weakness).

Table 1 Analysis of Internal Factors (Strengths)

	Strong points	Weight	Ranking	Weight score
S1	Location of Persepolis world complex by the side of historical towns in the province such as Pasargadae or historical buildings like Nagsh-e-Rajab Naghsh-e-Rostam , and Estakhr city	0.03	4	0.12
S2	Place and special role of historical context in attracting tourists that is an encouraging factor to increase the motivation of officials and practitioners in the field of attention to crisis management of the context of historical sights.	0.03	4	0.12
S4	Existence of the world complex of Pasargadae and Parse with integrated rocky ground in Fars province.	0.02	4	0.08
S5	Introversion structure aesthetics	0.02	4	0.08
S6	Extroversion and architecture	0.02	4	0.02
S7	Existence of valuable natural elements in neighborhood of the complex and its surrounding like plants and animals	0.02	3	0.06
S8	Business and recreational centers	0.02	4	0.08
S9	Ceremonial center for political and commercial guests	0.02	3	0.06
S10	The tourism development according to the tourism industry and domestic and foreign tourists	0.04	3	0.12
S11	Sufficient space to hold events and seminars	0.03	4	0.12
S12	Passages for the transport and providing services in the event and in time of a crisis	0.03	4	0.12
S13	The possibility of constructing transportation with less degradation	0.03	4	0.12
S14	Empty and usable lands outside boundaries of the complex	0.03	4	0.12
S15	International connections	0.03	4	0.12
Total				1.58

Table 2 Analysis of Internal Factors (weaknesses)

Row	Weak points	Weight	Ranking	Weight scores
W1	Failure to utilize the functionality of NGOs and the lack of community participation	0.02	1	0.02
W2	Dysfunctionality of the visitor management system	0.03	2	0.06
W3	The lack of formulation of hydrological and aqueous space in Persepolis	0.02	1	0.02
W4	Weakness in the legal system	0.03	2	0.06

W5	Weakness in physical protection of the works	0.03	2	0.06
W6	Not using the results of the projects and research projects	0.03	2	0.06
W7	Weakness in the preservation of ancient buried artifacts	0.02	1	0.02
W8	Vulnerability of the relics as a result of industrial activities in the region	0.02	1	0.02
W9	Lack of access to financial resources and income	0.03	2	0.06
W10	Dominance of political relations to the situations in the site	0.03	2	0.06
W11	Weakness of in-service training system for staff and experts	0.03	2	0.06
W12	Weakness in communication beyond the organization	0.02	2	0.04
W13	Low productivity of existing forces	0.02	2	0.04
W14	No crisis management plan	0.02	2	0.04
W15	The ineffectiveness of the legal system of the base	0.02	2	0.04
W16	The lack of stable fixed rules for landscaping around and neighborhood for supervising and administrating	0.02	2	0.04
W17	The absence of efficient regulatory system in surrounding areas	0.03	2	0.06
W18	Lack of understanding about the importance of regional political and executive system regulations and boundaries	0.02	2	0.04
W19	Unavailability of equipment for theft prevention and criminal cases during, before, and after the crisis	0.02	1	0.02
W20	Increase in the number of visitors and non-distribution with good dispersion, lack of any measures for the capacity threshold of historical relics	0.03	2	0.06
W21	Interference of decision-making system	0.03	2	0.06
W22	Increase of the visitors and lack of proper dispersion distribution	0.02	2	0.04
Total				1.04

4.1. External Factors Evaluation Matrix (EFE)

After strategists investigated working and social environment and identified a number of likely external factors, EFE matrix is used to analyze their action. EFE matrix is one of the methods used to organize external factors in terms of opportunities and threats, and a method for analyzing how to respond to the opportunities and threats out of these strategies (in Tables 3 and 4 the external factors of opportunity and threats are stated). The stages of EFE matrix, are like IFE matrix, with the difference that in Table 5, instead of internal factors the term external, and instead of strong and weak points, we propose opportunities and threats, respectively. The process itself is the same as before, like the previous matrix. Note that it is necessary to understand that in threats, if we can manage that effectively, it will receive a higher score, and if we cannot use opportunities effectively, a low score with be assigned.

Table 3 Results of the Analysis of External Factors (Opportunity)

Row	Opportunities	Weight	Racking	Weight score
O1	Management by Board of trustees with appropriate combination	0.04	4	0.16
O2	National efforts to prevent the indiscriminate harvesting of subsurface waters	0.03	4	0.12
O3	Recent laws to control indiscriminate harvesting of subsurface water	0.02	4	0.08

O4	The possibility of non-agricultural employment	0.01	3	0.03
O5	Existence of NGOs and associations of cultural heritage enthusiasts	0.03	4	0.12
O6	The possibility of attracting domestic and foreign investors through international exchange programs	0.04	4	0.16
O7	International and national laws that support Persepolis	0.04	4	0.16
O8	Creation of supplementary charm through timed ownership	0.01	3	0.03
O9	Existence of air transport infrastructure on site (small airport and ...)	0.02	4	0.08
O10	Ability to create and organize promotional incentives such as international conferences, concerts and cultural events to raise public and scientific awareness on different levels	0.03	4	0.12
O11	possibility to create new attractions with the help of advanced technologies	0.03	4	0.12
O12	Possibility of generating more income due to existing potential	0.02	3	0.06
O13	Enthusiasm of worldwide national research institutes to participate in the projects of the site	0.04	4	0.08
O14	National and global positive attitudes to collection	0.04	4	0.16
Total		0.4	48	1.56

Table 4 Results of the Analysis of External Factors (Threats)
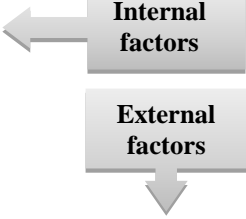
Row	Threats	Weight	Ranking	Weight score
T1	Unprecedented decline in groundwater levels(several thousand deep and semi- deep wells and uncontrolled exploitation of subsurface waters)	0.04	2	0.08
T2	Rail and road network development in around the site	0.03	1	0.03
T3	Political crises	0.01	2	0.02
T4	Lack of a department called crisis management in administrative system	0.03	2	0.06
T5	Interference of state ownership on the current activities	0.03	2	0.06
T6	Credit allocation system of the province	0.03	1	0.03
T7	The lack of a centralized system of organization	0.01	2	0.02
T8	Current policies and not introducing new duties	0.03	2	0.06
T9	Inappropriate personal and staff habits at the site	0.02	2	0.04
T10	Weakness in current protection policies	0.03	2	0.06
T11	The threat posed by neighboring villages within reach of many sites	0.02	2	0.04
T12	Inappropriate land use change of agricultural lands (like the city garden) in the neighborhood	0.03	2	0.06
T13	Legal and administrative issues	0.01	2	0.02
T14	Traditional management and administrative cumbersome bureaucracy.	0.02	2	0.04
T15	Industrial development policies.	0.02	2	0.04
T16	Distribution policy and the allocation of funds.	0.02	2	0.04
T17	Cultural conflict	0.03	2	0.06
T18	Active mines and destructive factories (such as stone crusher, Marvdasht Municipality, petrochemical, poultry, etc.)	0.04	2	0.08
T19	The damaging effects of agriculture on the monuments, burning straw, High efficiency, low water use crops, increasing the number of multi-farming in Agricultural products and ...	0.04	2	0.08
T20	Expansion of the development and transmission facilities in	0.04	1	0.04

	surrounding areas of the site			
Total		0.6		1

4.2. Analytical Models and offering Macro and Micro Strategies

SWOT analysis model is a useful and brief analysis of each of the strengths, weaknesses, opportunities and threats that have been identified in the previous step, and it reflects appropriate strategies. Therefore, the matrix always results in four categories of ST, WT, WO and SO. In Table 5, SWOT analysis matrix is shown.

Table 5 SWOT Analysis Matrix

Weakness (W) W25 to W1	Strength (S) S1 to S16	Internal factors / External factors
Competitive strategies (improvement of integral system using external opportunities)	Aggressive strategies (use of capabilities to exploit the opportunities)	**Opportunities (O) O1 to O14**
Defensive strategy (reduction of weakness and preventing threats)	Conservative strategies	**Threats (T) T1 toT22**

A. Strengths strategies of opportunities (SO): This case is the most favorable and the most appropriate for the organization and it means that the organization which makes use of the capabilities and strengths is worthy and reliable. In the context of their interaction it faces appropriate and precious opportunity.

B. Strategies of strength threat (ST): In this case, although the organizations have reliable strengths and abilities, but they also face numerous serious challenges and threats in an interactive environment and their fields.

C. Strategies weakness opportunities (WO): In this case, although a precious opportunity and environment is provided for the organizations, but, on the other hand, serious weaknesses, vulnerabilities, and disabilities surround it. Hence, using the WO strategies they should try their best to compensate for their weaknesses and disabilities using environmental opportunities.

D. Weakness threat Strategies (WT): This case draws the worst, the most difficult and threatening conditions for the activities. Because of the numerous and significant weaknesses and disabilities that the organization faces, it should cope with the pressures, challenges and various threats in its interactive environments or backgrounds.

4.3. Strengths, Weakness, Threats and Opportunities of SWOT

In order to show SWOT matrix and its strategic analysis, the list of WO, ST, SO, WT strategies is provided. In the next step, by using QSPM matrix that has numerical calculations like SPACE matrix, or by using the collective wisdom and consensus of leaders and senior managers to optimize

the designed strategies, we prioritize strategies, and ultimately select the most attractive and best strategy for an organization. In this way, using the SWOT matrix lists of the different strategies that can be obtained in four different groups and in SWOT improved hybrid strategies is also considered and suggested. The strategy matrix SWOT is divided into macro, original, functional, and specific strategies.
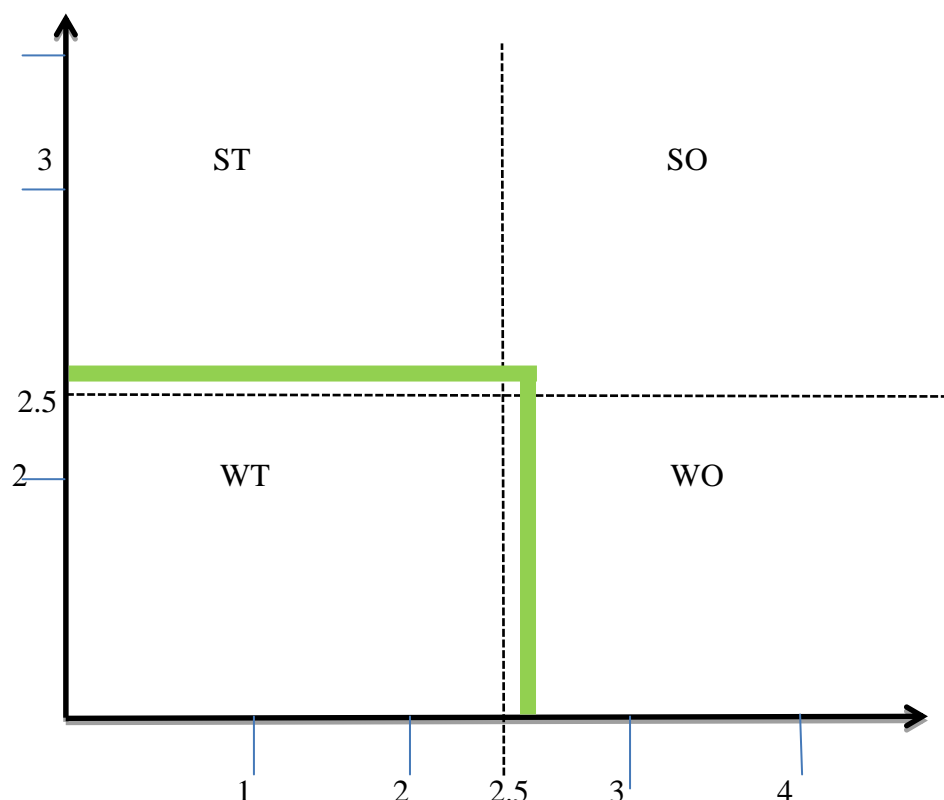

Fig 1 World Collection of Persepolis in Internal - External Matrix

4.4. Strategies

According to the above figure, WT seem prevailing and through using WT strategies it must be tried to strengthen the weak points and minimize our vulnerabilities from the dimension of environmental threats and to minimize our area or if possible, protect ourselves from harm and threats, and to keep away from damages. In this regard, the first step is to complete the master crisis management plan. The plan along with the research projects in the development and use of research results can be very useful. Identification of buried historical relics and launching archeological excavations are some of the requirements of this strategy. It should not be forgotten that formulation of hydrological and water privacy policy of the site should be done in parallel with the aforementioned matters. Obviously, maintaining existing and buried relics, because of their vulnerability, is regarded as the first priority. There is also a bigger possibility of floods, earthquakes and other natural disasters in the area. The existing unprotected relics because of the aging of the buildings are in the risk of loss because of the aging of the buildings. Serious measures must be taken in these cases. This means that the required equipment and prevention of theft and other related crimes during the crisis should be provided. In this way, all cases will be protected. As it was mentioned, deterioration of the protected relics requires it. There exist inefficiencies such as

lack of personnel training system, low efficiency of existing forces, lack of regular monitoring environmental threats, interference, weakness in decision making and administration, which are difficult to solve, but must be dealt with nonetheless. There is also the lack employing the potential of public organizations and a weakness in attracting public association. Numerous management on site resulted in previous weak legal system and still continues its deficiency. And on the other side, there are recruiting and appropriate distribution of monitory resources, inefficiency of the observers' management system and distribution with appropriate scattering. Overcoming political relations over the privacy policy available on the site, lack of efficient monitoring system on environment and lack of understanding of the political and administrative system in the area with crucial importance of internal factors are some of the important internal factors that must be resolved. Of course, the importance of considering the current situation is undeniable, this means that the threats should be prevented, or their likelihood of occurrence reduced. The above mentioned weaknesses must be overcome to provide the possibility of preventing threats, including unprecedented decline in groundwater levels of several thousand deep and semi-deep wells, excessive harvesting of subsurface waters, development of rail and road network in surrounding areas of the relics, political crises, vandalism, interference of state ownership on current activities, credit allocation system of the province, lack of centralized system of organization, the lack of introduction of new tasks by current policies, unfit habits and personal strength of staff, poor security policies, the threat posed by neighboring villages within reach of many of the relics, change of land use of agricultural fields and inappropriate land use system such as urban garden in the area, developmental projects such as the master plan, detailed policy evaluation and rural plan development, legal and administrative issues, traditional management and cumbersome administrative bureaucracy, industrial development policies, distribution policy and the allocation of funds, cultural conflict, active mines and destructive factories such as municipal stone breaker of Marvdasht, petrochemical, poultry, etc. The damaging effects of agriculture on monuments, cultivating high water use product with low efficiency, increasing multi-use of agricultural products, etc., have violated the perspective privacy, enhancing the development and transmission facilities in the surrounding. Next is avoiding the threats and exploiting the opportunities. Using WO strategies, we should do our best to compensate for the weaknesses and disabilities by the use of environmental opportunities. These opportunities are as follows:

- Management of board of trustees with the right combination
- National efforts to prevent the indiscriminate harvesting of subsurface waters
- Recent laws to control indiscriminate harvesting of subsurface water
- The possibility of non-agricultural employment
- Existence of NGOs and associations of cultural heritage enthusiasts
- The possibility of attracting domestic and foreign investors through international exchange programs
- International and national laws that support Persepolis
- Creation of supplementary charm through timed ownership
- Existence of air transport infrastructure on site (small airport and so on)
- Ability to create and organize promotional incentives such as international conferences, concerts, and cultural events to raise public and scientific awareness on different levels
- Possibility to create new attractions with the help of advanced technologies
- Possibility of generating more income due to existing potential
- Enthusiasm of worldwide national research institutes to participate in the projects of the site
- National and global positive attitudes to collection

The next step is to get the most of valuable opportunities to employ the existing environment with devoted efforts. This means using the power of organization to exploit the opportunities.

- The presence of a suitable space for the sake of holding events and seminars
- Having a total impact of important monuments and being recorded as world heritage
- Existence of buried Monuments
- Existence of discoveries of the museum
- Presence of experts and skillful specialists in the domains of security, repair, archeology, and architecture
- Presence of money resources such as selling tickets, service possibilities, environmental advertisements
- Existence of researches, studies, documents in the domain of the site
- The existence of financial and scientific infrastructures
- Existence of international relationship
- Existence of bare and useable lands
- The possibility of creating transportation system with less destructive effects
- Existence of passages to provide help in the case of emergency and crisis

5. Conclusion

In the subjects of drought crisis, the results of the studies reveal the lack of proper planting and irrigation methods, resulting from the fact that the residents still follow the traditional method. While digging wells per day dramatically increased, first semi-deep wells turned into deep wells. Water withdrawals from aquifers has increased as compared with the past, due to population growth and agriculture industry, and use of high water consuming products has led to a faster waste rate of groundwater, and about this, no action was taken until years 2014 to 2015. In fact, 78 percent of the water was wasted, which led to the banning of digging wells in the range. Currently, approximately 7000 illegal wells exist in the regions that are still being used. If a water crisis occurs, it won't be long before we're faced with a period of drought. It must be said that due to uncontrolled exploitation of groundwater, as an earlier problem, waters eject out of the layers by pumping pressure, creating a gap between the layers; hence, the layers of dust fills this distance, and the base of the plain declines from the top and finally the plain sinks down. This issue happened to a large extent. Therefore, the results indicated that the drought crisis with 58.04 percent has the most destructive effects on the Persepolis.

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A Comparative Analysis of Decorative Motifs of Seyed Shams-o-ddin Tomb in Yazd and the Soltanieh Dome in Zanjan, Iran

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Abstract

The city of Yazd had one of its most historically prosperous periods in the time of "āl-e-Muzaffar" dynasty, in the 8th century. In this period, various monuments and buildings were built, one of which was the tomb of "Seyyed Shams-o-ddin" in Yazd. This monument was previously a complex of "khanqah" (Sufis' worship place), "madrasah", (traditional school), "bazaar" (traditional enclosed marketplace), "āb-anbār" (traditional reservoir), and historical bathroom.
By the support of Seyyed Shams-o-ddin, the plan of this building was designed in the city of Tabriz and was sent to Yazd to be built. After Seyed Shams-o-ddin's death, this building turned into his tomb. In addition to its architecture, the decorations of this tomb are samples of the most accurate and various-pattern ornaments of the Ilkhanid period, created in the forms of tilings, paintings, and plasterworks. Through field and library studies, this article presents a case study about motifs and arrays of Seyed Sham-o-ddin tomb and compares them with the ornaments of Soltaniyeh dome in the city of Zanjan. Then through historical and descriptive method, different characteristics of these ornaments are analyzed. In general, this research shows that the decorations of Ilkhanid period have an independent and unique style. They were expanded in a vast geographic area and then were taken to other areas as well. In terms of technique and design, the decorations of Seyed Sham-o-ddin tomb, is in continuation of the Ilkanid style, especially those related to the Soltaniyeh dome.

Keywords: Decorative Motifs; Yazd Architecture; Seyed Shams-o-ddin Tomb; Soltanieh Dome

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1. Introduction

In the Ilkhanid period, buildings had varieties of decorations, especially in respect with plasterworks. The methods of creating these decorations remained as a secret and were only transmitted orally between the generations from master to apprentice. Despite the unique style, architectural decorations in Ilkhanid period are yet a compilation of the precedent Iranian arts, the same as Ilkhanid architecture. In Islamic architecture, the quality of space causes introversion and individual contemplation, even the abundance of decorations does not contradict this quality in any way. "It is believed by the Islamic artists that this spatial quality could not be accomplished if portrait motives were used among the ornaments, in contrast, decoration with abstract motifs increases the sense of peace and contemplation in space. It is because of the infinite complexity and continuity of rhythm and harmony of the motifs (Corbin, 1993: 43). The repetition of geometrical motifs, missing any worldly themes, displays a harmonic rhythm of the unification among multiplicities. It acts like "recitation" that removes any other mental engagements from the mind (Khakpour, 2009: 21). Also, colors in Islamic architecture have symbolic significance. "Turquoise and lapis lazuli colors are the symbols of sky and create spiritual tranquility and internal peace" (Makinejad, 2007: 105).

Yazd, in the 8th century, in the time of āl-e-Muzaffar, was one of the thriving cities with many remarkable buildings and constructions. In the unsafe conditions of that time in Iran and because of the security and peace of the city of Yazd in that era, scientists and scholars migrated to this city and settled. This matter caused and persuaded the empowered people of the city, such as the judge Seyed Rokn-o-ddin and his son Seyed Shamas-o-ddin, to construct many schools (Madreseh) and cultural places in Yazd. One of these important complex buildings that was built with the order of Seyed Shams-o-ddin in Yazd, was a school in the "Chār-Menār" neighborhood. This is the place that he was buried in after his death and was called "Shamsieh". In the past, this tomb included a complex of Khanqah, Madrasah, Bazaar, historical bath, and Ab-anbar. Realizing the technique of creating plasterworks in the buildings of "Shamsieh" is very important, because it gives us basic information in respect with the history of architectural decoration in the āl-e-Muzaffar's period, and even in the history of Islamic architecture. In this period, the tendency to create mirroring and symmetry in architectural decorations becomes more strengthened. Also, most of the plasterworks are colorful in this period or have been created on a colorful background.

Other decorations of the Shamsieh building includes tiling and painting of geometrical and herbal patterns such as lotus, "Shamseh", and their combination with calligraphy of the Quran verses that have been written on inscriptions. These motifs strengthen and emphasize the basic architectural divisions of the building and accompany the movement of wall surfaces and their hollow and solid volumes. The rhythmic various motifs have been organized in such a way that seems like a unified collection. From the view of design and decorative compositions, every corner of this tomb involves very subtle and accurate artistic innovation. It can be said that the most important part of these decorations is the great designed motifs under the "Ivan's" (porch) ceiling with a Shamseh in the middle. This decorated collection of motifs is like a spread surface of book illuminations in Islamic art that indicates a rhythmic composition of "arabesques", "Khatayees", and calligraphies. They have been organized to create an infinite space of forms and colors.

1.1. Soltanieh Dome

The "Soltanieh" dome is a reminder of the Glory and prosperity of the city of Zanjan about 700 years ago. In the year 702 AH, emperor "Muhammad Oljayto" decided to construct a building

according to the design of the "Qazan khan's" tomb in Soltanieh. Although the Soltanieh dome is very similar to the tomb of emperor "Sanjar" in "Marv", the creativity and innovation in this building has turned it into one of the masterpieces of Iranian art and architecture. Altogether, the decorations of the Soltanieh dome have been divided in two periods: the first period includes the original decorations of the dome, and the second period consists of the plasterworks and paintings that have been created over the first layer. What can be concluded from the study of the applied arts of the Soltaniyeh dome is that we find that both courses of ornamentation belong to the Ilkhanid period and coincide with the reign of "Oljayto" and "Abu Saeed" (Hamzehlu, 2002: 82).

This great dome turned into a model for the construction of many buildings in the upcoming periods. The dome structure, which is one of the most prominent buildings of the Islamic architecture, is also very important and unique in terms of construction and decorative elements. Most of the researchers have attributed a part of the art works of the dome, including the brick works, tilings, and inscriptions such as the "Moaghali" inscriptions in and out of the building, to the first period. A great part of the plasterworks, such as the works related to the outside facade and the second floor ivans have been credited to the first period as well. They have also attributed some of the other parts to the second period of the dome decoration, including a few of the plaster works, paintings, calligraphy and inscriptions, especially those related to the inside of the dome and "Torbat khaneh" (sacred space for worship), which have been executed in beautiful colors (Hamzehlu, 2002: 83).

There are many similarities between these decorations and the art works created at the same period in Iran, such as metal works, wood carvings, and manuscript illuminations. This matter proves that the Ilkhanid designers were among the first artists who used paper sketches in order to enlarge their plan into the scale of architecture (Vilber, 1970: 90). Also, existing documents show that in "the Ilkhanid period, the architecture plans and decorative sketches were created on paper and sometimes on plaster, and they were exchanged between the states of Iran and "Turan" (Najib Oghlu, 2000: 69). These exchanges can be clearly observed in the elements of wall paintings related to this period. The colors mostly used in these plans are red, orange, blue, green, and black, executed on white plaster surfaces. Among these colors, blue is the dominant one and has covered most of the surfaces. The forms of Shamseh, created in different sizes and forms are the special pattern in this period, and examples of which can be observed in the second period of decorations in the Soltanieh dome, and Seyed Shams-o-ddin, and Seyed Rokn-o-ddin tombs (Shekofteh & Salehi Kakhaki, 2014: 93). The outside and inside motifs of the ivans in the Sultanieh building and the indoor and outdoor decorations of the dome are some of the works that we are going to compare, in this article, with the decorations of the Seyed Shams-o-ddin tomb in Yazd.

1.2. Seyed Shams-o-ddin Tomb in Yazd (Shamsieh School)

According to the historical documents, the Shamsieh School was built in 767 AH, Ilkhanid period, in the city of Yazd. This building is one of the buildings that were constructed by the order of Seyed Shams-o-ddin, the son of Seyed Rokn-o-ddin, in order to teach religious sciences. At the time being, this monument is the only part that has remained from that grand school. It was turned into the tomb of this famous Sufi after his death. Some of the artworks existing in this building are plasterwork, "Moaraq" tiling, painting, as well as different inscriptions. The significance of this monument comes from the plaster works, eye-catching paintings, and also relief inscriptions that have remained to this day. Seyed Rokn-o-ddin who was "the judge of the judges" in the city of Yazd, built the "Roknieh" school in Yazd. But due to sectarian and ideological conflicts with "Atabak Yousef", the governor of the Yazd; he was imprisoned in the village of Qaleh Khormiz.

His son, Seyed Shams-o-ddin, who was familiar with Rashid-o-ddin Fazl-o-llah, the minister of Abu Saeed Bahador Khan (the king of Iran at that time) traveled to Tabriz in order to get the king's permission for his father's freedom. Seyed Rokn-o-ddin managed to free his father and marry Rashid-o-ddin Fazl-o-llah's daughter and stay in Tabriz (Kazemeini, 2003).

One of the sons of "Khajeh Rashid-o-ddin", named "Ghias-o-ddin Muhammad", who had position in the court, took him to Abu Saeed and entrusted him with the posts of general liaison of estates and judge. In Tabriz, Seyed Shams-o-ddin provided the plans and sketches of the complex building, including madrasa, dār al sayādeh (the place of sādāt gathering), khānqāh, and bāzār and sent it to Yazd. Then, the building was built in Yazd with his support. Afterwards, he died in the year 733 AH, in Tabriz. They transported his corpse to Yazd and buried him under the dome of Shamsieh School. His wife, Rashid-o-ddin's daughter, gave the order to build a coffin from Abnoos and Sandal wood and to prepare a "Mehrab" (Altar) from green marble stone and had it installed in the west side of his grave (Afshar, 1995).
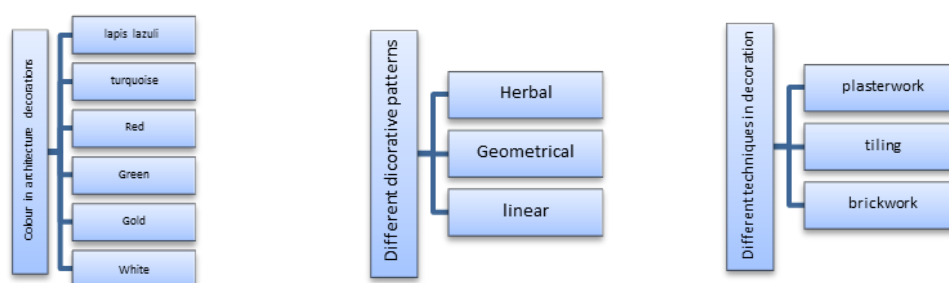
Fig 1 Introduction and analysis of the Seyed Shams-o-ddin building in Yazd
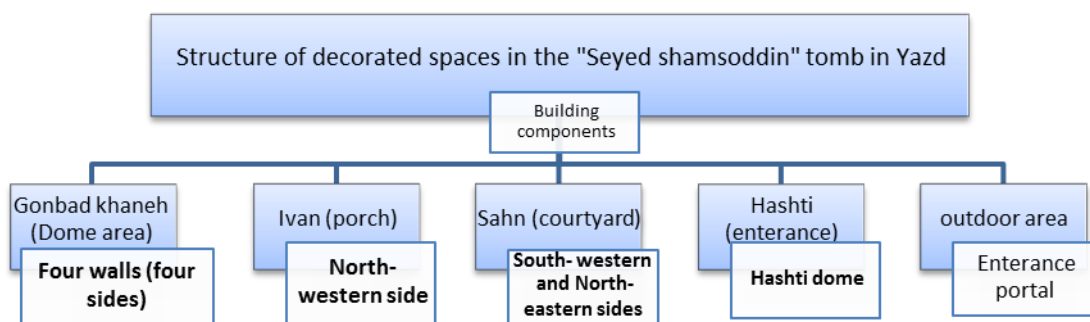
Fig 2 Structure of the decorated spaces in the Seyed Shams-o-ddin

The different parts of this tomb include:

"Pishkhan" (entrance counter) without any decorations, "Hashti" (entrance hall) decorated by simple brick and plasterworks, "Sahn" (courtyard), whose walls are covered with Moaraq tiling, "Ivan" decorated with painting, plasterworks and inscriptions, "Gonbad khaneh" (under the dome's ceiling) decorated in different styles of plasterwork and painting, "Shabestan" (indoor halls), and the open space at the back of the tomb, without any decorations (Sharifi, 2013).

2. Decorations of the Ivan Ceiling

Before the entrance to Seyed Shams-o-ddin tomb, there is an Ivan with a tall cradle arch, consistent of different paintings and plasterwork decorations. The ceiling of the Ivan is in the form

of two symmetrical templates with the "sura" (chapter) of "Fath" written on it, along with the calligraphy of "Solse Jali". All around its narrow and rectangular bands have been painted. The verses of 1 to 10 have been written on the right side band, and the 11 to 20 verses are written on the left side band. The "Sols" calligraphy, with its fluid and non-geometric nature, has been surrounded with various kinds of herbal decorations. These decorations create a kind of complexity with the calligraphy in such a way that the inscriptions written between the patterns turn into a complete decorative surface and cannot be read easily (Nadim, 2008).

In the ceiling of Ivan, two rectangular frames have been painted horizontally beside each other, and the form of Shamseh has been executed in the middle. The spaces around the Shamseh have been filled with herbal patterns, and there are four "Lachakis" (Gussets) on each side. This type of composition is very similar to Quran manuscript decorations and Persian carpet patterns. The Shamseh has been decorated with numerous interconnected stripes, but their forms cannot be recognized due to their destruction. The main colors on the Ivan's ceiling are white, lapis lazuli, and brown. The form of Shamseh is a symbol of light and spirituality. The verses 21 to 25 of the sureh of Fatha have been written in Kufic script, located at the middle of the Ivan.

The picture below shows similarities between the ceiling paintings of the Seyyed Shams-o-ddin's tomb, the decorations of the opening page of a manuscript, and the cover of a Quran belonging to the Ilkhanid period. What one can see in these pictures are the forms of rotational Shamsehs in the center, which are surrounded by decorated margins (Fig 3).

Fig 3 The picture of the north - western ceiling of the Ivan of Seyed Shams-o-ddin in Yazd in comparison to a Quran cover page and book layout version of Ilkhanid period.

In precious manuscripts, Shamseh is a complete and single form that sometimes is joined with two head-shamsehs (Sar Shamseh) or head-toranjes (Sar Toranj). And sometimes four "Toranj

Lachaks" (Bergamot gussets) surround it. In this case, it is called Shamseh and "Lachak Toranj" (Mojarrad Takestani, 1996).

3. Decorations and Wall Paintings

The interior decorations of the tomb of Seyed Shams-o-ddin consist of:
- Decorations of the under-dome ceiling (Gonbad Khaneh)
- Decorations of the north-western wall (the entrance side) and the south-eastern wall (the opposite side)
- The south-western wall (right side) and the north-eastern wall (left side)

Each of the north-western (the entrance side) and south-eastern (the opposite side) walls can be divided to three parts. The middle part is a shallow arch that includes the entrance door. The divisions of the walls with a prominent decorative band, along with the geometrical motifs have caused integrity and continuity of the space.

The decorations of the entrance and the front arches have been created like two symmetrical frames in a rectangular form. In each of them, two 12-petal lotuses, and in each corner a half or a quarter form of an 8-petal lotus has been created. These plasterworks have been painted with watercolor technique, through the juxtaposition of the colors of gold and lapis lazuli. The decorations under the entrance and in the front-arches are structurally very similar to the ceiling decoration of the under-arch of south-eastern Ivan in the Soltanieh dome in Zanjan (Fig 4).
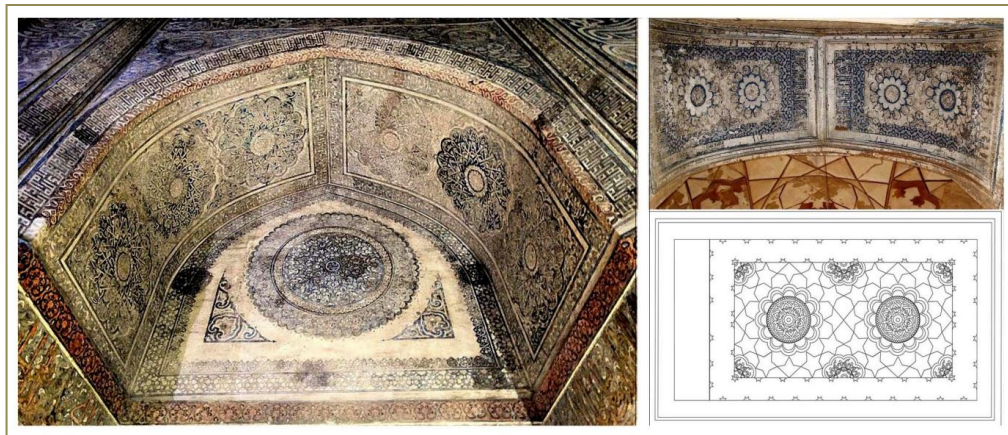
Fig 4 The north-western and south-eastern walls in the Seyed Shams-o-ddin tomb and the decoration under the arch of the south-eastern Ivan of the Soltanieh dome.

The difference is that in the Soltanieh dome, inside each rectangle on the arch of the south-eastern Ivan, three 16-petal flowers can be seen. Inside each flower, there is a 16 petal star, inside which the name of the prophet Muhammad has been repeated 16 times in Kufic calligraphy, and the name of Ali has been repeated 16 times in the Sols calligraphy. Surrounding the flowers, the names of the four Caliphs and "Hassan" and "Hossain" have been written (Hamzehlu, 2002). In the center of each 16-petal lotus the holly name of "Allah" can be observed. These motifs have been surrounded with different margin decorations and written inscriptions. The applied colors are lapis lazuli, gold, white, indigo, green, and orange-red.

One of the important characteristics in this monument is the way that the decorations have been executed. They are so intensive that even the edges of the walls have not been forgotten and have

been covered with the different spiral and rope-form motifs (Khademzadeh, 2008: 105). The decorations on the left and right sides are similar to the decorations of the entrance. These decorations have been created symmetrically. In the south-western wall (the right side) and the north-eastern wall (left side), the decorations under the arches and in the middle of them are the regular repetition of a 12-petal and an 8-petal lotus with the name of the prophet Muhammad (Fig 5). The combination of the lotuses, arabesque, and "Khataei" patterns create a kind of relation and continuity at the background.

Fig 5 The decorations under the arches in the south-western (up-side picture) and the north-eastern (down-side picture) sides

The margin decorations that have been applied in this tomb are narrow eminent bonds with herbal motifs, arabesques, geometrical forms, and the calligraphy of the verses of the Quran which have created coherence and consistency. This harmony and integrity between the motifs is very important. The designers of these decorations have been well aware of the principles of design and could create compositions in accordance with the subject. They could represent rhythm and harmony in each part and unity in the entire work, integrating all parts of the composition. The Fig 6, displays the 8-petal lotus with the name of Muhammad under the south-western and north-eastern arches of the tomb of Seyed Shams-o-ddin, and the 16-petal lotus with the name of Muhammad, Ali, and in the center Allah, which exist in the Soltanieh dome as well.

Fig 6 On the right is the 8-petal lotus in the Seyed Shams-o-ddin tomb and on the left is the 16-petal lotus in the Soltanieh dome

In ancient Iran, lotus (Niloufar-e abi) was the symbol of creation and life. The "Niloufar" festival was a ceremony that ancient Iranians held. They regarded lotus as a mythical flower, whose symbolic role is clear in the official and court festivals. The role of this flower can be seen in the reliefs of Persepolis (Dadvar & Mansouri, 2006: 104). The dominant colors of the decorations in Seyed Shams-o-ddin tomb are mostly lapis lazuli and turquoise. Blue in Iranian culture is the symbol of purity and spirituality. In the decorations of Islamic mosques, these two colors have been applied abundantly (Ostovar, 2012).

During different periods, Iranian artists made great effort to design and stylize the name of the prophet Muhammad in the most beautiful and accurate way. One of the best samples of this effort can be seen in the decorations of Seyed Shams-o-ddin's tomb. The visual role of the name of Muhammad in Islamic art is very important and influential, and could be considered as one of the most fundamental forms in Islamic sacred art. Along with the protection of the name of "Muhammad", and consideration of its symbolic significances, Iranian artists decorated their buildings and their other art works through rhythmic repetition of this name and created harmony between its parts based on the aesthetic principles of Islamic art. The accuracy of the repetition of the name of Muhammad (written in Persian letters) creates a kind of spiritual tranquility in space (Khazaei, 2008: 62).

The role of Shamseh in the form of a 5, 6, or 8 petal star with the repetition of the name of Muhammd, appeared again in Iranian architecture after the establishment of the Mongol Ilkhanid period in the 8th century, especially in the decorations of the Soltanieh dome with a great variety and beauty. At the middle of some of these shamsehs that have been formed with the repetition of this name, the name of Allah has also been written (Khazaei, 2008). These motifs of Shamseh have been created in the colors of lapis lazuli and darksome blue (Ibid).

Fig 7 The outline of a part of the motif of lotus in the tomb of Seyed Shams-o-ddin in Yazd

Lotus flowers in the tomb of Seyed Shams-o-ddin, which are 12, 8, and 6 petals, are in the colors blue, gold, and white. A sample of these motifs can be seen in Fig 8.
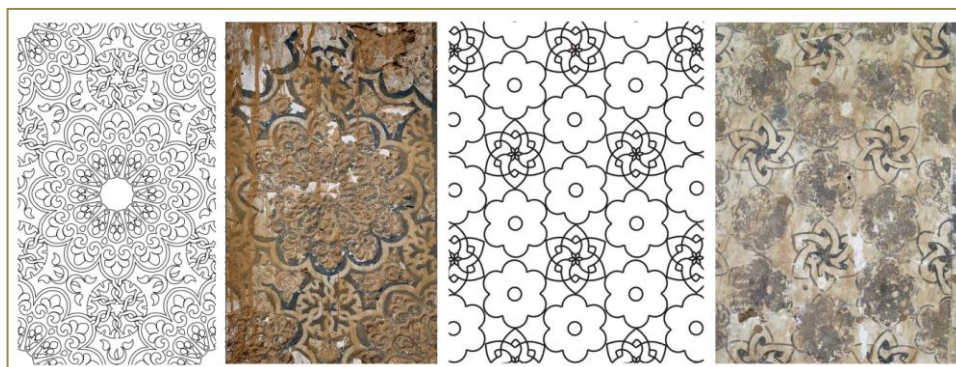
Fig 8 On the right is motifs in different spaces and on the left are the motifs in the south-western side and the north-eastern wall of the tomb

Another sample of arabesque design is presented in Fig 9, related to the entrance door of the tomb of seyed Shams-o-ddin, similar to what can be observed in the Soltanieh dome (Fig 10). The repetition of this motif in the continuation of the main divided lines in the façade, emphasizes the sections and gives each part of the building the sense of stability and balance. Sometimes arabesques traverse through the surface and sometimes they appear intensively in a part of the pattern. And at the end, a harmony is created between the whole and the details of the decorated parts. Arabesque, which is a decorative form, has become more complex through joining with other forms such as leafy arabesque, "Dahan- Adhdary", "Mari- goldary", etc. In this way, it increases the richness of Persian decoration.
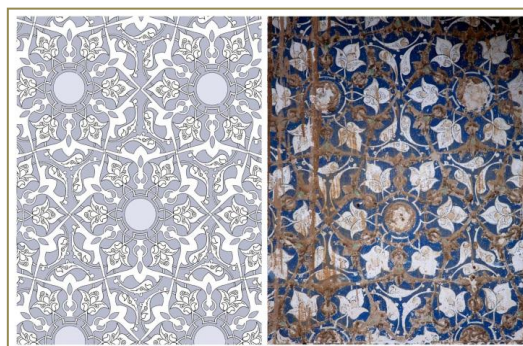
Fig 9 The motifs in different places of the tomb of Seyed Shams-o-ddin

Fig 10 Decorations of the Soltanieh dome.

4. Five and Eight Petal Shamseh Star

In the tomb of Seyed Shams-o-ddin, a few Shamsehs similar to the 5-petal star have been created on the north-west edge (entrance direction) and on the two sides of the entrance door, where the name of the prophet Muhammad has been repeated five times. They have been surrounded by circles that are a symbol of the sun, as depicted in Fig 11, and on the right side, the 5-petal star of Seyed Shams-o-ddin tomb has been presented. The rest of the images are related to the Soltanieh dome. Above the arches, on all four edges, there are two symmetrical 7-petal stars with the name of the prophet "Muhammad" repeated seven times. On the 8-petal star, located in the north-west side (entrance direction) and on the south-east wall (facing the entrance), the name of the prophet Muhammad has been repeated eight times. Surrounding them, the word of "Malek-o-llah" has been also repeated and increased its sense of spirituality. This form has been placed four times on each side. And again, we see an 8-petal star without the word of "Malek-o-llah". In Fig 12, we can compare the 8-petal star (on the wall) in the Seyed Shams-o-ddin tomb in Yazd with the 8-petal star in the Soltanieh dome (on the ceiling). In both of them, the Prophet Muhammad's name has been repeated eight times inside the circle, with this difference that in the Soltanieh dome the name of Allah exists in the center of the 8-petal star.

Shamseh in the form of a complete circle is decorated with "Arabesques" and "Khatayi" patterns, and its place, the same as Toranj, is at the center of the illumination. Of course, we already mentioned that Shamseh is a complete individual form and with the rays that fill the surrounding area, called "Sharafeh" (Machiani, 2007:15). However, Toranj is a pattern which is created from the straps and branches of the "arabesques" pattern and exists in various sizes; large, medium, and small. "Toranj is sometimes placed on the margin or the head piece of the illuminated pages and has many different names (Mojarrad Takestani, 1996: 27).

Fig 11 On the right side is the 5-petal star of Seyed Shams-o-ddin tomb in Yazd and the Soltanieh dome.

Fig 12 On the right side is the 8-petal star of the Seyed Shams ad- din tomb in Yazd and the Soltaneh dome.

Another example of Shamseh and Toranj is inside the Seyed Shams-o-ddin tomb, on the north-west (entrance) and the south-east (opposite side) edges of the walls which have been demolished by termites. In Fig 13, the Shamseh and Toranj have been repeated on the north-west and south-east edges and on the two sides of the arches.
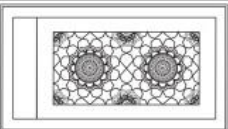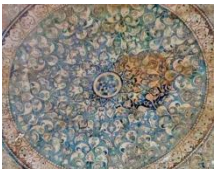
Fig 13 The 4-petal Shamseh and 8-petal Toranj on the north-west and south-east walls of the Seyed Shams-o-ddin tomb.

Table 1 The analysis of the Lotus design, and the 8-petal star in Seyed Shams-o-ddin tomb.

The various kinds of lotuses in the Seyed Shams-o-ddin tomb	6-petal (different spaces)	8 and 12 petal (right and left direction)	12-petal (right and left direction)	12-petal (entrance and opposite side)	12-petal (right and left direction)
8-petal star	8-petal star the entrance and opposite side	8-petal star the entrance and opposite side	5-petal star the entrance and opposite side	Under the arches, the 8-petal lotus flower has been repeated eight times with the name of the prophet Muhammad.	
Shamseh	Ivan (porch)	(Different spaces of the tomb)	(The entrance and opposite side)	(The entrance and opposite side)	

Table 2 Analysis of the patterns of Seyed Shams-o-ddin tomb and Soltanieh dome.

Decoration	Main design of Seyed Shams-o-ddin tomb	Contour drawing	Soltanieh dome	Description
Entrance arch				The arch of Soltanieh dome is very similar in structure and layout to the north-western and south-eastern arches of Seyed Shams-o-ddin tomb in Yazd
Arch				In the Soltanieh dome the 16-petal Lotus and the name Ali are confined in the center of the name Allah In the Seyed Shams-o-ddin tomb the 8-petal Lotus is repeated eight times with the name of prophet Muhammad
North-west (entrance) and south-east (opposite side) walls				The repetition of the name Muhammad and the 8-petal star, with the difference that in the Soltanieh dome the name Allah is placed in the centre
North-western wall (entrance), 5-petal star				
Motifs (in different parts of the building)				

5. Conclusion

This paper has introduced the aesthetic characteristics of the motifs in the tomb of Seyed Shams-o-ddin in Yazd, and has compared their similarity and conformity with the motifs of the Soltanieh dome. The decorations of the tomb of Seyed Shams-o-ddin are based on the form of lotus as the symbol of creation and life, and the application of the form of Shamseh, as the symbol of light, divine manifestation, and the names of God. These motifs and symbols are seen clearly above the surfaces of the ceilings and the walls.

The decorations of the tomb have a similar approach to the Soltanieh dome, in terms of architecture, plasterworks, lotus motif, and the holy name of Muhammad in the form of the petal star. They are also similar in their design and composition, as well as the method of applying the motifs on the walls.

The relief plasterworks, in the form of lotus around the decorations of the Soltanieh dome, have been covered by gold plates. These lotus decorations have been applied also in the tomb of Seyed Shams-o-ddin, but in the Soltanieh dome they have been realized more accurately. Furthermore, in the Ivan, the composition and structure of the plaster decorations have many similarities with the decorations of the book covers and pages of Qurans and other manuscripts from the Ilkhanid period, which proves the relation between the book illuminators and architects of this period.

It is worth mentioning that the construction of the Oljayto School and the great building of Soltanieh started from 702 AH and ended in 713 AH, while the construction of Shamsieh School was finished in 733 AH. Considering the fact that the Soltanieh dome decorations are older than the tomb of Seyed Shams-o-ddin, we can conclude that the decorations of the Seyed Shams-o-ddin tomb have been adapted from the Soltanieh dome.

Therefore, it can be said that the building of Soltanieh has been an appropriate model, both structurally and decoratively, for the other buildings which were built shortly afterwards. And after the end of their work, the talented art masters of the Soltanieh building have transferred the techniques and decorations to other cities, in proportion to their needs.

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Application of Laser in Production of Textiles Using Abstract Patterns

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Abstract

In the present era, neglect of basic skills and updated technologies in the field of art has decreased progress and performance. That's why superior technologies can play a vital role in the development of art. Laser is one of the technologies used to cut a variety of materials, including textile. Laser has sufficient power, precision, and high speed through the accumulation of energy and motion in a straight line. One of the applied arts in the field of textile design is the art of cloth making. In this article, textile fabrics are made by lasers in order to enhance the precision and speed, as far as the efficiency and quality of work can be promoted. Moreover, in art section, abstract art is used in order to create designs on fabrics, and abstract designs are provided using laser. Eventually, clothes were produced using abstract designs, and with the help of laser and textile making.

Keywords: Textile Making; Abstract Arts; Laser; Clothes Design

1. Introduction

In today's world time plays a significant role in human life, where they try to achieve their thoughts and ideas in the shortest time and with the highest speed. Therefore, it is important to have some information about industrial tools and time optimization methods. In this project, having information and familiarity with tools, as well as instructions of the tools can be regarded as an essential process which should be learnt step by step; therefore, the importance of the issue led to case studies and primary experiments.

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In the world of textile and clothes design, designers are always seeking new methods for textile and clothes production in order to respond to the needs of those who are involved in the temporary market of style and fashion. Therefore, different and special methods are used in textile designs which are continuously optimized in the production of textile, production time, use of materials, color diversity, and so on. As a result, if novel methods are not used, we will face a long path which is time consuming. Therefore, using plants and novel methods such as digital printing, cutting tools, laser, and so on, along with combining abstract patterns can be considered as a new step in textile and clothes design. Laser is performed by irradiation on the objects which are desired to be cut, and its combination with abstract patterns can make new patterns. Abstract patterns are generally those without any corresponding natural shapes or figures in the real world, which use metaphorical and unnatural colors and forms to express concepts. Therefore, the present study aims to take a new step in textile making, with the help of laser, its tools, and its combination with abstract patterns.

Textile and leather printing with laser or laser engraving on fabrics and leather has found numerous applications in the textile and leather industry for its multiple benefits. In the process of making leather products such as bags, shoes, gloves, different leather clothes, wallets, furniture coverings, and other expensive products, the surface of leather can be engraved. At present, metal frames are almost used to design the above mentioned patterns and this method is usually based on the producer's name or logo. However, laser can be used to engrave complex designs on leather. Moreover, laser can be used to engrave various delicate and sophisticated designs in textiles. This kind of engraving is impossible with traditional methods and only laser plants can do it. These plants can be used in the production of different cloth labels, decorative textiles, and toys in which textiles are applied.

2. Textile Making

Initiative, creativity, and unconventionality are required characteristics of the fashion industry, and creation of new fabrics using recycled and waste materials is one of the most innovative practices in today's fashion world. In the production of single and unique clothes, designers usually use techniques which create changes in the appearance of the textile, so that it is not similar to what is sold in the market. Textile making gives designers endless possibilities to create different clothes. Given that these days, people seek unique clothes which don't have any counterparts, textile changing leads to the differences among garments.

Different techniques and various materials such as yarn, threads, nets, guipures, suede, leather, metals, metal fibers, recycled materials, and so on can be used in textile making in order to create a new pattern. These new textiles are used for the production of different clothes such as dresses, scarves, bags, shoes, etc., while they are also applied in internal decorations, pendants, decorative boards, table coverings, and so on. Designers don't use textiles directly, due to the use of hand stitching, such as needlework, hand prints, and so on. Moreover, performing greet which means changing the textile is another way to give forms to it. In this method, small stiches on the textile give regular geometric shapes such as flowers or, conversely, irregular and wrinkled shapes.

Unconventional methods in using textiles give novel appearance to the clothes. The textile can be changed into a volume by folding it up, putting a few layers of it together or cutting and stacking up some of its parts. One type of textile making, which is familiar to many, is sewing pieces of fabric together and then preparing clothes from the resulting textile. This is known as forty-piece sewing and has been evolved in Europe since long time ago in order to use old clothes again; however, it is now done with new textiles (www.tar-o-pod.com).

3. Laser

The term "laser" which is an acronym for "Light Amplification by Stimulated Emission of Radiation" was first introduced to people in Gould's 1959 conference paper. He referred to "laser" as a suffix which could be used for light spectrums radiated by the device. No other terms were common except "raser" which was used for a short term to refer to radio frequency emitting devices (Hatefi, 2002: 35). Before the discovery of the laser in 1960, the concept "death ray" was familiar to readers of science fiction. However, today the term "laser" gives the same impression to people, and now lasers have many applications in the real world. They have made their way into factories, shops, offices, and even our houses in different ways. In simplest terms, the laser can be described as a source of light or radiation. However, the laser has many special features that distinguish it from other light sources such as the sun, candles, electric lights or fluorescent lamps.

The amount of energy that a laser can emit or radiate depends on its constructing material. Materials can be used in all states including gas, liquid, or solid, and at temperatures in the range of minus 100°C to several hundred centigrade degrees. Therefore, lasers can take different forms and sizes. They may be smaller than a point or they can be so big that some acres of buildings will be needed to include them. Although there is a wide variety in lasers, all of them work based on the same principle (Arvand, 2006: 23).

Energy radiation of light sources is known as "power" which is measured with watt. Obviously, selection of required laser depends on the amount of energy or watts needed for the work and the amount of available space. In some usages such as cutting steel sheets of welding metal sheets together, requires huge powerful lasers. On the other hand, these lasers are not suitable for delicate works such as eye surgery or reading laser disks in video devices. Most telephone lines between major cities are now connected with the help of lasers and optical fibers that are smaller than a pinhead, and are considered as signals sending information. These lasers are not suitable for welding (Taylor, 1996: 12).

During the 26 years of laser discovery, great achievements have been made in science and industry. Since laser features can be controlled with great precision, they can be applied for measurements which are impossible using other light sources. Moreover, they have hundreds of usages in industry and even in our daily life, although a relatively small number of people have clear background on the manner it is used and applied (Rajabi, 1996: 1).

4. Abstraction

The term abstraction in visual arts refers to sterilizing, summarizing and simplifying the form. The concept of abstraction from the perspective of "Paul Cézanne", father of Cubism: all constituting components of our surroundings can be eventually simplified into cubes, cylinders, spheres and cones which are squares, rectangles, circles, and triangles in 2D view.

4.1. Abstract Art

Abstract art refers to an art in which no natural shape or appearance of the world can be identified, and the art uses only metaphoric and unusual colors and shapes to express concepts. This term is usually used in figurative art and in its broad meaning can be referred to any kind of art which doesn't represent identifiable events and objects. However, it usually refers to modern art creations which reject any imitation of nature or simulation of it as it is commonly used in European art. In early 20th century this term was mostly used for art schools such as cubism and

futurism, since nature was expressed in simple or exaggerated forms – only an image of the original natural subject. In the paintings of these styles the most important issue was usually to record and narrate objects' realities and not necessarily their appearance. According to historians of modern art, Kandinsky was the first painter who produced completely non-expressive art around 1910, and then modern abstract art was expanded in different movements and art schools (Chilverse, 2001: 37).

An abstract work is a painting or sculpture which does not represent any individual, location, or object in the real world (even exaggerated and out of form). In this regard, the work is called exactly by what is seen in it: color, form, effects of brush, size, scale, and in some cases work process (Edward, 2005). Ever since humans began to create any work of art, their minds have been in a conflict between reality and abstraction within the framework of their works. Abstraction is one of the most basic principles in creation of artistic works, which can be observed in the works of different eras, from the caveman's time (such as those obtained from the Neolithic caves of southern France and northern Spain) to the works of modern times and trends in post-painterly abstraction.

Abstraction refers to specific mental work in psychology and philosophy. This mental work includes comparison of things after the mind understands similar items. Then from the shared feature, each object is put aside and the common feature is selected. Here, it is said that this concept makes the overall concept which is true about all objects, and is an abstract or is shown in an abstract sense (Asghar, 1995: 33).

Distinguishing aspects which make differences between humans are put aside and the common aspect is selected. Now, humanity is an overall concept true for all of them. Therefore, it can be said that humanity has been abstracted while they have distinguishing features specific to each of them (Hosuri, 1992: 6). In the same way based on what was said, it seems that abstraction refers to an overall concept which has been abstracted from external manifestations. For example, human and animal concepts are abstract. These concepts cannot be indicated in the external world, but the mind understands them as it was mentioned before. Overall, abstraction is a mental work and activity by which the mind can extract concepts from the external world, and is in turn called abstract (Reed, 1995: 11). This term can be referred to any art, in its broadest meaning, that doesn't represent identifiable objects or events, it rather refers to those modern art creations which are free from imitation of nature or its simulation as it is conceptualized in European art.

5. Process of Practical Work

It was necessary to investigate abstract patterns before starting practical work. Patterns were designed to the basic level of etude using books and figures of abstract patterns. Given the features of laser devices, which create no limitations on cutting of delicate patterns, designing can be done freely while exact and delicate details are considered.

Different patterns were created using abstraction, and the eventual patterns were confirmed and selected according to the opinions of experts. First, each pattern was selected from one or some motifs and then newer patterns and various combinations were obtained using different combinations and arrangements. Laser device reads vector and coded patterns and then starts cutting. Therefore, each confirmed pattern is entered into computer and is vectored using Ai as well as Corel Draw program.

6. Practical Implementations

6.1. Pattern 1

Examples of vectored patterns: Combination of one or some motifs to obtain the final configuration. In this case, the single motif and design of flower (in order to achieve the required composition) and laser cutting on fabric is used for integrating applications, including sweatshirts.
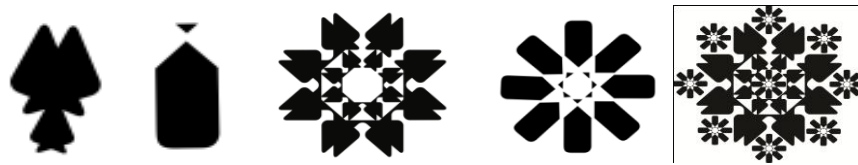

Fig1 Example of vectored pattern components

Fig 2 Example of vectored pattern components

6.2. Pattern 2

Examples of vectored patterns: In this example, a single flower with abstract patterns and designs with the new composition of the fabric was used as the margin.
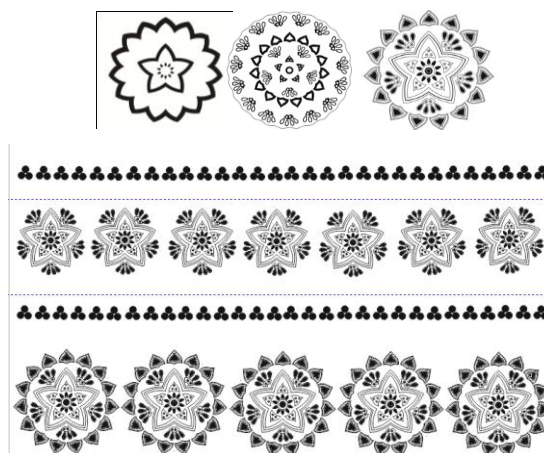

Fig 3 Example of eventual configuration

Fig 4 Eventual implementation of pattern 2

6.3. Pattern 3

Examples of vectored patterns: In this example, the abstract motifs and design elements are used. All the different motifs eventually integrate to achieve the required composition of fabrics for sweatshirts with different clothing designs.
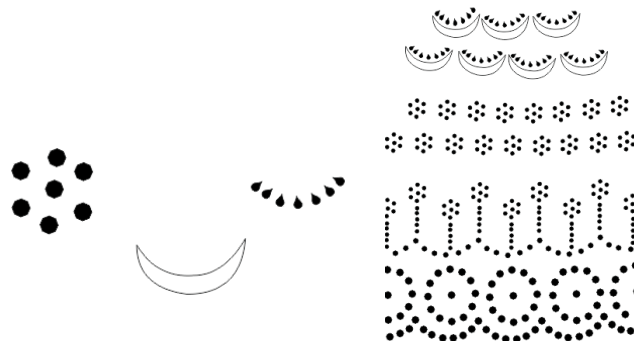

Fig 5 Example of vectored pattern components

Fig 6 Eventual implementation of pattern3

6.4. Pattern 4

Examples of vectored patterns: In this instance, various forms combine with different sizes and ultimately achieve the goal of integration with the aim of creating abstract designs.
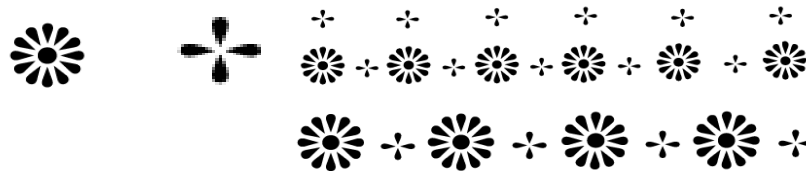

Fig 7 Example of vectored pattern components

Fig 8 Eventual implementation of pattern 4

6.5. Pattern 5

Examples of vectored patterns: In this sample, the elements and principles of composition are used for marginal motifs on clothes and deployment projects in different parts for sweatshirts; beads are also used as a belt in front of the sweatshirts to eliminate simple fabrics.

Fig 9 Example of vectored pattern components

Fig 10 Eventual implementation of pattern 5

7. Conclusion

In this study an attempt was made to apply laser as an up-to-date technology, along with its speed and high precision in order to create abstract patterns used in textile making. In this study, textiles used were not self-burnt or burnt by laser. Dresses and skirts were prepared with the textiles' designed patterns. Finally, designing of the textiles was done with great precision so that the resulting textiles had a high quality.

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