The Relationship between quasi neoclassical façade and Sustainable Architectural Principles intended to Optimize Energy Consumption (Case Study: Tehran Region1)

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One of the main concerns of today's world is energy; therefore, a mission for experts is to try to optimize energy consumption and to make sustainable development happen. The subject of the current study is the relationship between the today common architecture of Tehran's luxury buildings as quasi -neoclassical buildings with sustainable architectural goals. Therefore, in order to investigate the neoclassical views of the unrestricted statistical population in this research, neoclassical-style buildings of Tehran's region 1 have been selected. The sampling method for this research is a probabilistic one. For this purpose, 5 out of 10 areas in Tehran's region 1 were selected randomly and sample size was determined according to the assumptions of the research statistical model and the sampling size determination formula. In this regard, three buildings with a quasi-neoclassical facade were randomly selected from each area. As the samples were selected, the principles of sustainable architecture were identified and a table was provided for the buildings whereas each principle held 5 scores. On this basis, each of the pseudo-neoclassical buildings each building was scored according to sustainable architecture and finally all of the buildings were analyzed by description and results were driven. The present research leads to finding answering to the following questions: 1. Do the prevailing quasi-neoclassical buildings in Tehran conform to the principles of sustainable architecture? 2. Does the prevailing architecture of northern parts of Tehran match the energy conservation laws?

keywords: *quasi-neoclassical architecture, sustainable architecture, energy conservation, sustainable development, facade decoration*

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1. INTRODUCTION

Today, many clients are particularly interested in buildings with neoclassic facades. The desire to be luxurious, different and glamorous buildings is increasingly seen in Tehran's luxury buildings as the phenomenon of globalization is rising. On the other hand, for men of the past; architecture and cities were products created by limitations forced by climates and construction and also based on collected beliefs of the individuals. But men of today have allowed their self to abuse nature to compensate for their weaknesses and made it the best source to satisfy their needs thanks to technology. In fact, what today is considered as sustainable development is a reformist revision of modernism and tradition to find a middle ground. (Maddahi; Shojaee and Yazdanparast, 2009) [1]. Building energy consumption accounts for 41.9% of the total energy use in Iran in 2016. The main sources of energy consumption are: natural gas 73.51%, Petroleum 9.4%, electricity 15.26% and other sources1.82% [2]. Average energy consumption in the residential sector compared to the same conditions in Europe is over 2.5 times higher and in comparison with cold regions in Europe is over 3.5 times higher. [3] This shows the importance of this sector in energy efficiency policies. The hypothesis for this research is as follows: 1-1: There is a reverse relationship between the construction of quasi-neoclassical buildings and the use of minimum available resources. 1-2: Quasi-neoclassical buildings are not compatible with sustainable architecture and its principles. 1-3: There is a meaningful relationship between using quasi-neoclassical decorations and increasing capital expenditures in buildings.

2. MAIN BODY

A. Basic definitions

A.1. Neoclassical architecture

What in the eighteenth and nineteenth centuries revived the concepts and views of the Renaissance architectures was the formation of Enlightenment movements in Europe. The neoclassical movement, which quickly turned to the style of international neo-classicism, had cast a shadow over all kinds of art including architecture, from 1840 to 1750. (Bani Masoud, 2013-179) [4]. The motive for the mentioned movement was the rejection of Rococo. Neoclassicism considered ancient and classical times as a means of understanding the changes in the contemporary world, and its employment seriously and with a moral rigor, made a strong connection between this movement and academism. Neoclassicism is closely related to the Enlightenment in eighteenth century and the French revolution. Neoclassical art claimed to play an important role in shaping morality and behavior. The extensive archaeological excavations in Italy and Greece have led to finding information about the ancient world, especially ethical and aesthetic values and led to a much greater understanding of history and historical changes. In the year 79 BC, a large volcano explosion, which was higher than the Neapolitan Bay, drove the Pompeii town and the smaller and richer city of Herculaneum under the ashes. These cities were buried, abandoned and forgotten for centuries. A part of Herculaneum was discovered in sixteenth and seventeenth centuries. In the year 1738, a Spanish engineer started the first coordinated drilling (Bani Masoud, 2010) [5].In 1748, the he also discovered Pompeii. The gradual exploration of these two cities brought tourists from everywhere in Europe to see a series of fantastic buildings with frescoes, mosaics, and everyday used objects and, most importantly, the remains of people frozen in time. The discoveries posed fundamental challenges that encountered opinions about the culture of the ancient Romans. A small sculpture, which was commonly considered the peak of Romance's artistic success, was found in excavations. The discovery of a large number of frescoes with different values, sometimes containing explicit sexual content was a surprising discovery for many perceptions in the eighteenth century. In addition, the drilling technique of that time was almost like looting and raised strong criticisms especially by the German historian Johan Joachim Winkelmann.However, the discovery had a clear effect on neo-classicalism (Bani Masoud, 2013-179) [4]. Neoclassicists were not only seeking to revive past styles, but also tried to use art to create a society that is both modern and noble(Litel, 2011-67) [6]. Reasons for the formation of Neoclassicism in eighteenth century are:

- People were bored with Gothic, Rococo,Alwai and church architecture.
- Attention focused on man as a basis of everything.
- Showing a reaction to the extreme in Baroque and Rococo style.
- Developments in archeology.

A.2. Quasi Neoclassic in Iran

Nasser-al-Din Shah, on a visit to European countries after observing the appeal of neoclassical buildings in the eye of people at that time, returned to Iran, brought postcards of newly constructed European museums, and ordered the construction of buildings like them. No architects accompanied Shah on his trip to Moscow, Austria, Germany, France and Britain, Ottoman Empire, Qajar architecture slacked awareness regarding Palladian, Jones, and Vitruvius. As a result, because of the lack of familiarity with principles of Neoclassical architecture and what inherited from the classics, they created strange buildings in Iranian eyes that had no harmony but contained European luxury, which was popular among Qajar aristocrats. This Picturesque mode, which was a method of constructing without a style, was a sign of luxury and lack of scientific principles for construction. With the start of Nasser-al-Din Shah travels to Europe and entrance of European advisors to Iran, Aristocrats were tending to settle in luxuries buildings and castles designed with European and Neoclassical approach. This change of values that started from the elite was a means to distinguish them from the rest, which appeared in the physical form of architecture. (Ghobadian, 31, 2003) [7]. Then, using those ideas in the time of Reza Pahlavi, the Neoclassical architecture was also introduced to the Iranian people. With the beginning of modernity, interest in neoclassical architecture declined and, after the Islamic Revolution, during the war, interest in revival of the traditions almost became forgotten. With the popularity of Neoclassic in the late twentieth century, the Iranian people also tried to accompany the movement after the end of the war, but the lack of sufficient information as well as the separation of Iran from the international community led to creation of buildings that had no similarity to Neoclassicism. The style of the mentioned buildings is known as the Persian Quasi-neoclassical architecture (Ervand Abrahamian, 2008) [8]. In addition to that, first university of architecture was established and members of its board consisted of Andre Godard, MaximeSiroux, RolandDoubler, Nikolai Markov, Alexander Moore and only one Iranian named Mohsen Forooghi. Tehran University was completely run by Parisian way and the government was so inattentive to it that as soon as Iranian students arrived, they passed their courses copping elements of ancient Greece and Roman Empire Neoclassical elements. As a result, in addition to Shah's encouragement for Neoclassical architecture; our students andelites also graduated with a mind full of Western patterns and promoted this approach in society. Cultural reasons for tendency towards Neoclassic style are as follows:

- Tendency towards aristocracy
- Tendency to show the deference
- Tendency towards Western culture and boredom with monotone architecture

Without a doubt, deformation in architecture is the result of a decline in aesthetic values in cultural bed of Iranian society of today.

Analyses of the building energy consumption in Iran

Residential building energy consumption accounts for 41.9% of the total energy use in Iran in 2016.

As part of the building energy resources, natural gas and petroleum products account for73.51% and 9.40% respectively, electricity 15.26% and renewable energies just 1.82%. Figure 2 illustrates the proportion of share of fossil fuel resources, including natural gas and oil products, comprising the largest share of energy resources in the building sector. Considering the negligible share of renewable energy among energy sources a stricter response is obvious [9].

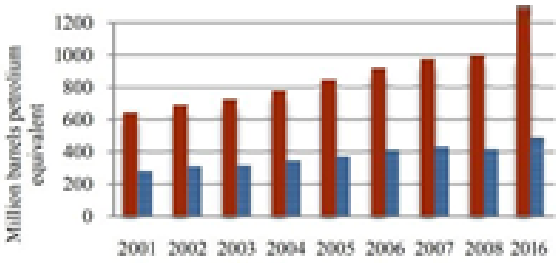

Fig. 1. Building energy consumption in Iran

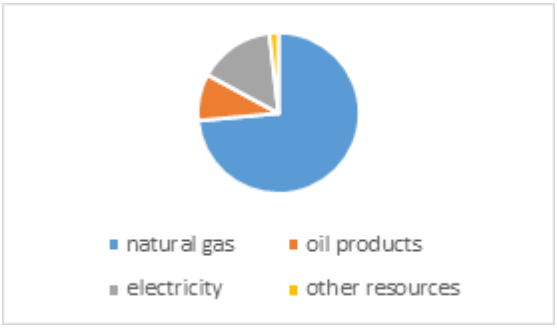

Fig. 2. Share of energy resources in building sector in Iran

Applying a proper and reasonable management of consumption, not only can provide the economic growth of the country, but also will lead to a more sustainable supply of energy for all users.

A.3. Sustainable architecture

The use of sustainability concepts and the goals of sustainable development to reduce energy waste and environmental pollution in architecture have raised a subject called sustainable architecture. In this type of architecture, not only the building adjusts itself to the climatic conditions of the area, but also makes a mutual connection with it. "(Mahmudi, 2013, p. 8) [10]. The relationship between man and nature is classified into four categories: sanctification, control, use and responsibility. In primitive societies, nature was an unknown phenomenon. Man considered himself obedient to natural energies and admired it. After the agricultural revolution, man has controlled nature by discovery of laws and it self, in order to satisfy his needs [11]. At the same time, while enjoying natural energies, man tried to preserve its sacredness by regard to religious beliefs (Shahcheraghi, 33, 2016) [12]. With the occurrence of the Copernican-Galilean revolution, and as a result of negation of the centrality of the earth in the world, man distanced himself from nature and viewed it with an objective and rational thinking. Bacon considered the pursuit of nature in order to overcome it, and Descartes considered man to be the owner of nature. (Jahanboglu, 26,2005) [13]. Thus, some theorists speak of the end of nature. "The end of nature" means that the natural world has become a large scale and has become a kind of "peripheral environment made by man." (Giddens, 195, 2009) [14]. Today, the issue of environmental protection has become a global movement that results from an increase in man's consciousness about this issue, so that many government agencies, non-governmental organizations, and even some parties and organizations around the world are only formed and operate for this goal. The mentioned changes of man-to-nature attitudes have a profound impact on his attitude toward the phenomenon of location as one of the elements of identity that makes the environmental crisis linked to the identity crisis [15].

Theories and principles of sustainable architecture

The principles which is introduced as the principles of sustainable architecture by English architects Brenda and Robert vale in their book named: "Green architecture: Design for an energy conscious future", are some of the simplest and frankest frameworks for Green Architecture. They emphasized much on learning native architecture, the architecture that lies in the experience of many generations living in a particular region and its specific climate. These principles are respectively as follows: (Vale, Brenda, Vale, Robert (1992) [16].

Principle one: Energy conservation

Each building should be designed and constructed to meet the minimum requirements for fossil fuels. [17]. The necessity of accepting this principle in the past is undeniable without doubts and according to the way of construction, and perhaps only due to the huge variety of materials and technologies in modern times, such a principle in buildings has been forgotten.

Principle two: Working with climate

Other principle of green architecture is working with climate. Buildings must be designed in ways that make use of climate and local energy sources. The shape and manner of deployment of building and the location of its interior spaces can be in a way that improves the level of comfort in building, while at the same time reduces the amount of fossil fuel use through the correct insulation of structure. The design tradition was not limited to the heating in order to create comfort inside the building, but in many climates, architects are required to design cool spaces to create favorable conditions inside the building. The usual solution in present day, is the use of air-conditioning systems, which is only an inefficient process in facing the climate, while at the same time accompanied by high energy consumption, it is a mistake in spite of the low energy cost that because of energy verse, leads to contamination.

Principles three: Reducing use of new resources

Each building should be designed in such a way that minimize the use of new resources and, at the end of its service life, create a source for new structures. Although the orientation of the mentioned principle] like other principles referred to, is towards new buildings, it should be noted that most of the existing resources in the world are used in presently built structures and restoring and upgrading existing buildings to reduce environmental impacts is an issue of equal importance to the creation of new structures. Changes in some of the old buildings for new applications may cause specific costs and problems. However, the benefits of re-utilizing these large buildings alongside each other and within an urban environment may overcome these problems and costs. Renovation of existing buildings in large

and small cities can also spare resources that would be used to destroy and rebuild the buildings, thus prevent the destruction of community.

Principle Four: Respect for users

Green architecture respects all the people who use the building. This principle seems to have little connection to the pollution caused by global climate change and destruction of the ozone layer. But green process of architecture which includes respect for all common resources in construction of a complete building, does not exclude man from the mentioned combination. Man makes all buildings, but in some structures, the truth of presence of man gets the respect. We can address more respect for man and work force needs in two separate ways. For a professional builder, it is important to consider the safety and healthiness of materials and building processes as important for the all of the society as it is for workers and users of the building. Another form of involvement for man that should be taken to consideration is the positive participation and interference of users in design and construction process. A large number of buildings have benefited from this energy, and the results have been satisfying in creation of large buildings.

Principle five: Respect for the site

The Australian architect Glenn Muscat states this strange proposition: "The building should touch the earth in a calm and light manner". This statement contains feature of the interaction between the building and its site, which is essential for the green process. A building that consumes energy with greed produces pollution and is alien to its consumers and users, never touches the earth in a calm and light manner.

Principle Six: Holism

All the green principles need to be involved in a holistic-oriented process to build constructed environment. A green architecture should include a sustainable form of urban environment rather than to be a single building. The city is far beyond the set of buildings; in fact, it can be seen as a set of interacting systems and with a careful look at these systems, we can portray the face of future city. (Kamran Kasmaei, 2011, p. 5) [18]. Studying the principles of sustainable architecture from Brenda and Robert vale's point of view, we conclude that in addition to common design factors such as beauty, proportionality, texture, shading, light and facilities to be considered, design teams should pay attention to long-term environmental, economic and human factors and consider its basic principles as follows:

Variety and diversity:

The diversity and variety is one of the factors that create greater equality and justice in any system, which is one of the most basic goals of sustainable development. In urban neighborhoods where uses of building are the same, and since residents need cars, the energy consumption increase and air quality is reduced. While designing different applications in neighborhoods in a specific context, will reduce up to 44% of consumer and municipality costs, and air pollution will drop by 45%.

The Climate:

In the architecture of every era and region, knowing how to match a building with a particular climate is one of the important architectural issues. Understanding the climatic factors affecting a building, including: sunlight, temperature, humidity, wind, rainfall, and controlling it in design, is considered the first step in this section. This principle has the greatest influence on the orientation of the building, which includes the consideration of three main elements of nature:

- Sun: affects the orientation of the building. The elongation of the building along the eastern-western axis maximizes the heat acquired from the sun. In addition, it is effective to consider the annual orbit and height of the sun, when designing the surfaces of external walls and the location of windows and shades.
- Wind: The volumetric shape of the buildings should guide cold winds in cold climates and lead it to the house in warm climates.
- Green elements such as trees and plants: Plants can protect the building from excessive sunlight and disturbing winds, and be effective in domestic air conditioning.

Building coverage and thermal mass of building materials: The higher thermal mass of walls and ceilings increases the transfer time of the heat between the interior and exterior. Using two-layer coverage can take the highest amount of heat from sun per day and put it to use at night.

- Color: The color of external surfaces affects the heat acquired from the sun. Bright colors are preferred for warm climates, dark colors, and absorbent materials for cold climates. : The type, kind, dimensions and location of the window, and the type of glass and its profile have a significant effect on the heat acquired of the sun. In the end, these will reduce the costs of energy consumption of the building.
- Shading tool: bulges and overhangs of the building roofs, awning, sunshade and curtains are tools that can be used to prevent unnecessary heat from the sun.

Restoration of cultural and native identity: creation of a sustainable culture requires the revival of the social sense of communication and association with the natural world. In this regard, paying attention to native existing architecture is a solution, because most of them are in line with the local climate and culture. Also, considering these issues in effects raising the sense of place in any person who is involved:

- Use of domestic material as much as possible
- Using local techniques and workers
- Using native symbols and elements influenced by the local spirit.

Building volume and location of interior spaces in buildings

The ratio of the lowest external surface to volume (VSR) is the ratio equal to the total volume of the building divided by the total area of the external walls of the building. That is, the geometry of a building is better be in such a way that the amount of outer surfaces be as at least as possible.

Area-to-periphery ratio (APR):Is the area of a level divided by its periphery, or in other words, the level area divided by the length of the peripheral walls. The higher the value, the greater the energy efficiency of the building is. A circular or rectangular building will have the best APR.

Interiors layout to take advantage of natural cooling benefits: This option includes matching the building with the conditions

that could bring in the mildest summer breeze. In this case, the proper layout of the windows will flow these breeze, providing that the design of vertical air conductors as roofs, dome etc., be properly done to work effectively.

Interior layout for solar heating: use of material with a high thermal capacity to absorb and maintain heat in the coverage of the walls or the use of large surfaces with large windows on the south side is effective in observing the highest amount of heat from the sun. Eastern front with large windows will increase the building's acquired heat during morning hours, and shading and fewer windows on western fronts prevent surplus heat in the afternoon.

Space layouts get the most benefit from natural light: This option involves using natural light instead, electric light that will result in reduce of energy consumption. Skylights, openings, and wall windows will be the means of allowing direct natural light directly or indirectly into the building, which depends on the appropriate quality of light as well as the performance of the desired space in building.

Building Material: Building material is considered a key factor in sustainability. Of course, choosing these materials requires a lot of evaluation and weighting by designer. For example, in case of the choosing wood or steel sheet to cover a surface, the choice of wood costs less money and produces less environmental pollution, while steel sheet is more durable and can be recycled, but it produces environmental costs.

Recyclable material: In this case, by estimating the service life of building, material can be reused after service life of building is over. Paying attention to the origin of building materials: Is material obtained from anon-renewable source. For example, if the material is wood, does using it damages the sustainability of the source (forest). While today, many engineered woods are made of lower quality trees and their wastes. In addition, the proximity of the source of material and consumption location is an important point.

Attention to the thermal capacity of material: This factor is the same as the duration of presence of energy in a building material.

Attention to the manufacturing method used for the material: Whether the manufacturing process of material involves hazardous environmental waste or how manufacturers reduce this damage has a significant effect on the choice of materials in a sustainable architecture.

Attention to the toxicity of building material: today it is proven that many building materials spread toxic steams and cause illnesses in residents. Formaldehyde adhesives, resins, oil colors, and vaporizable organic compounds and fluorocarbons (VOCs) that are found in adhesives and paints can cause these problems.

choosing natural materials whenever possible: To produce these materials, less energy is consumed and they contain less pollution. Of course, it is important to note that the over extraction of these materials causes the instability of their source.

Attention to the longevity of material: Sustainable materials do not require a lot of repair and permanent replacement in the life cycle of a building.

Coordinating with the context:

This topic is summarized as follows:

- Attention to urban location and accesses
- to consider the alignment lines of the site in the design of the building.
- Paying attention to the effect of the building on the surroundings, such as shading, blocking wind flow, overlooking areas (maddahi, 2012, p. 23) [19].

Finally, by reviewing all issues raised in the sustainable architecture discussion, we reach to the conclusion that the following are the most important principals of sustainable architecture:

- paying attention to the life of people
- to preserve life of people in the present and future
- using materials that are homogeneous and stable with their environment at the time of their production, application and even destruction
- Minimum use of fuels for energy and the maximum use of natural energies
- Minimum destruction of the environment
- Physical and psychological improvement of the life of people and all living organisms
- Harmony with the natural environment

Accordingly, in general, the principles to follow in this kind of architecture include:

- Understanding the sense of place, residing space and blocking interference in it
- Use of natural energies, such as solar energy and wind power
- Use of natural, domestic, recyclable and durable materials
- Collecting and using water, especially rainwater, and using water from lakes and sea
- Thermal, acoustic isolation and proper isolation of the building
- Natural ventilation feature through the ceiling
- Correct lighting and proper design of openings (Georgy Mahlabani, 2010) [20]

Principles of Neoclassical Architecture

The classical period generally refers to the era of Pericles, Phidias, or the historical period between 323 and 450 BC. In fact, the classic language is a collection of technical vocabularies and precisely coded and classified details. This language comes from the unified form of the Greek Catholic temples built in sacred places, some of which remain unchanged until today. (Summerson John, 283,2009) [21]. In the "Ten Books" of Vitruvius, the main basis of classical beauty is divided into six theories:

Achievement of desired harmony with regard to classical architecture has been possible by sating loyal to the golden proportions within and outside the building, in addition to the system of column building. The five systems of column building have similarities and differences that are compared and studied via following picture.

Table 1. Principles of Neoclassical Architecture from Vitruvius Viewpoint

A) Ordinative (order, system)	proportionating the details in separate building sections
B) Dispositive(arrangement)	The equivalent of today's layout in map, viewport, perspective
(C) eurhythmative (rhythm)	This is the result of reasonable proportions and the effect of proper proportions on the observer's point of view.
D) Symmetry (symmetry)	is a harmony resulted from building components and separate sections of a building that favors a stable overall form.
E) Decoration(propriety)	Proper appearance of the building, meaning the building is suitable for its use.
F) distributive (management)	excellent management of the material and site with precision and financial management in calculating building costs

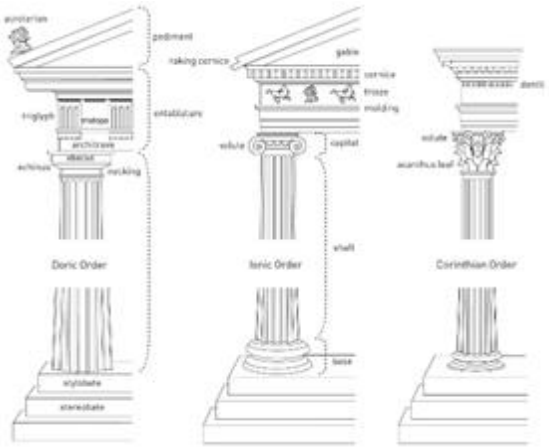

Fig. 3. Table of respect of architectural proportions in outside and inside of Parthenon [22]

B. Introduction of Case Studies

The region1 of municipality, located in Tehran's highlands with an area of 49.6 km2, is home to more than 487 thousand people based on statistical data. The geographical specifications of this area is limited to the 1800-meter high altitudes of the Alborz mountains South Mountain range from the north. It is spread from the south to the Chamran highway, between the Azadi Hotel and Modarres highways and the Ayatollah Sadr Bridge, and from the west to the valleys of the river Darakeh, and from the east to the end of the Artesh highway - the cement factory and the source of oil in the north east of Tehran. The region one of Tehran is divided into 10 districts; the neighborhoods are described in the following figure. In the present study, due to the spread of neoclassical buildings in the mentioned district, Tehran's region one is selected as a case study.

The sampling method of this research is a probabilistic one, in other words, it is a multi-stage random sampling. For this purpose, 5 out of 10 districts in Tehran's region 1 were selected randomly and sample size was determined according to the assumptions of the research statistical model and the sampling size determination formula. In this regard, three buildings with

Fig. 4. Division of districts and neighborhoods of the region one of Tehran

a quasi-neoclassical facade were randomly selected and studied from each neighborhood. Thus, the research group is comprised of 15 quasi-neoclassical following buildings.

C. Table for evaluating case studies based on sustainable architecture

The following is summary of the features of the sustainable architecture from the theorists' point of view. Each section holds five grades. 0= Invalidity 1 and 2 = Very poor validity3 = Poor validity 4 = Good validity 5 = full validity Of the total score of 70, the average acceptable score is 35.the score of each row is calculated as follows:

Maximum use of solar energy = the description of criteria parameter A scores

5= orientation and spread in right direction, minimum fusel fuel use, appropriate windows, appropriate shades, photovoltaic cells

4= orientation and spread in right direction, minimum fusel fuel use, appropriate windows/appropriate shades

3= orientation and spread in right direction, minimum fusel fuel use, appropriate windows

2=orientation and spread in right direction, minimum fusel fuel use

1=orientation and spread in right direction

0= using none of the above

Using wind energy and air conditioning= the description of criteria parameter B scores

5=The proper volumetric shape of the building, the capacity of natural air conditioning via roof, appropriate windows, using

wind energy and turning it into other energies, letting desirable wind flow into the building, blocking undesirable wind flow from entering the building

4= The proper volumetric shape of the building, the capacity of natural air conditioning via roof, appropriate openings, appropriate windows, using wind energy and turning it into other energies,

3=The proper volumetric shape of the building, the capacity of natural air conditioning via roof, appropriate openings, using appropriate wind energy and turning it into other energies,

2=The proper volumetric shape of the building, the capacity of natural air conditioning via roof, appropriate openings, appropriate windows

1=The proper volumetric shape of the building, the capacity of natural air conditioning via roof,

0= Using none of the above

Using stored rain and other climate phenomena waters=the description of criteria parameter C scores

5= Storing rain water from roof, storing climate phenomena waters and using it for watering plants, storing water from gutters, proper slope, advanced drainage system

4= The water from client phenomena and using it for watering plants, storing water from gutters, proper slope, advanced drainage system

3=Storing water from gutters, proper slope, advanced drainage system

2=Proper slope, advanced drainage system

1=Advanced drainage system

0= using none of the above

Proper material in accordance with thermal capacity and appropriate color = the description of criteria parameter D scores

5=Using thermal isolation inertia suitable for building shells, double coating for the building, coloring the exterior surfaces suitable for the climate, material with a high thermal capacity, effective thermal mass for the shells considering their location in the building

4=double coating for the building, coloring the exterior surfaces suitable for the climate, material with a high thermal capacity, effective thermal mass for the shells considering their location in the building

3=Coloring the exterior surfaces suitable for the climate, material with a high thermal capacity, effective thermal mass for the shells considering their location in the building

2=Material with a high thermal capacity, effective thermal mass for the shells considering their location in the building

1= Effective thermal mass for the shells considering their location in the building

0=Using none of the above

Appropriate thermal, sound and moisture isolation = the description of criteria parameter E scores

5=Using suitable sound isolations, using moisture isolation suitable for building, considering thermal connections, sealing suitable for the building

4=Using sound isolations, using moisture isolation suitable for building, considering thermal connections, sealing suitable for the building

3=Using moisture isolation suitable for building, considering thermal connections, sealing suitable for the building

2=Considering thermal connections, sealing suitable for the building

1=Sealing suitable for the building

0= Using none of the above

Using recycled material =the description of criteria parameter F scores

5=Using recycled material in facade and finishing, using recycled material in the structure, using recycled material in the landscape, using recycled material in heating and cooling, making changes to old buildings and reusing them

4= Using recycled material in structure, using recycled material in the landscape, using recycled material in heating and cooling, making changes to old buildings and reusing them

3= Using recycled material in landscape, using recycled material in heating and cooling, making changes to old buildings and reusing them

2= Using recycled material in heating and cooling, making changes to old buildings and reusing them

1=Making changes to old buildings and reusing them

0=Using none of the above Using domestic and recycled = The description of criteria parameter G scores

5=Using domestic material in frame, using domestic material in structure, using domestic in the finishing, using domestic material in the decorations of the building, using domestic material in the mechanicals of the building, using domestic material in the electronics of the building

4=Using domestic material in structure, using domestic in the finishing, using domestic material in the decorations of the building, using domestic material in the mechanicals of the building, using domestic material in the electronics of the building

3=Using domestic in the finishing, using domestic material in the decorations of the building, using domestic material in the mechanicals of the building, using domestic material in the electronics of the building

2= Using domestic material in the mechanicals of the building, using domestic material in the electronics of the building

1= Using domestic material in the electronics of the building

0= Using none of the above

The minimum use of material and the proximity of the mine of the material = The description of criteria parameter H scores

5= Minimum use of material in the finishing, minimum use of material in the structure, minimum use of material in the landscape, mine proximity, considering renewability of the material

4= Minimum use of material in the structure, minimum use of material in the landscape, mine proximity, considering renewability of the source of the material

3= Minimum use of material in the landscape, mine proximity, considering renewability of the source of the material

2= Mine proximity, considering renewability of the source of the material

1= Considering renewability of the source of the material

0= Using none of the above

High durability and service life of the material = The description of criteria parameter I scores

5= More than 30 years of service life

4= 20-30 years of service life

3=10-20 years of service life

2=10-5 years of service life

1=5-3 years of service life

0= Less than years of service life

Human dimensions and considering the human = The description of criteria parameter J scores

5= Health and safety for the workers and users, positive sharing in the design process, satisfaction of the users, human dimensions of the spaces, considering the material production process, considering the nontoxicity of the material

4= Positive sharing in the design process, satisfaction of the users, human dimensions of the spaces, considering the material production process, considering the nontoxicity of the material

3= Satisfaction of the users, human dimensions of the spaces, considering the material production process, considering the nontoxicity of the material

2= Human dimensions of the spaces, considering the material production process, considering the nontoxicity of the material

1= Considering the material production process, considering the nontoxicity of the material

0= Using none of the above

Considering the effect of the building on domestic texture = The description of criteria parameter L scores

5= Minimum use of the site, Proper combination for the texture, using topography of the land in designing the building, considering the shadow of the structure on the neighboring buildings, considering to avoid the wind blockage imposed on the neighboring buildings, considering overlooking areas to the neighboring buildings

4= Using topography of the land in designing the building, considering the shadow of the structure on the neighboring buildings, considering to avoid the wind blockage imposed on the neighboring buildings, considering overlooking areas to the neighboring buildings

3= Considering the shadow of the structure on the neighboring buildings, considering to avoid the wind blockage imposed on the neighboring buildings, considering overlooking areas to the neighboring buildings

2= Considering to avoid the wind blockage imposed on the neighboring buildings, considering overlooking areas to the neighboring buildings

1= Considering overlooking areas to the neighboring buildings

0= Using none of the above

Maximum use of green elements= The description of criteria parameter M scores

5= Using vegetation in the façade, using vegetation on the roof, using vegetation in the landscape, using vegetation in the shared areas, using vegetation in the inside spaces

4= Using vegetation on the roof, using vegetation in the landscape, using vegetation in the shared areas, using vegetation in the inside spaces

3= Using vegetation in the landscape, using vegetation in the shared areas, using vegetation in the inside spaces

2= Using vegetation in the shared areas, using vegetation in the inside spaces

1= Using vegetation in the inside spaces

0= Using none of the above

Considering the neighborhoods and the city= The description of criteria parameter N scores

5= considering the location in the city, site accessibility, considering the neighborhoods, considering the domestic elements and symbols inspired by the domestic sprite, the variety in applicability of the neighborhoods

4= Site accessibility, considering the neighborhoods, considering the domestic elements and symbols inspired by the domestic sprite, the variety in applicability of the neighborhoods

3= Considering the neighborhoods, considering the domestic elements and symbols inspired by the domestic sprite, the variety in applicability of the neighborhoods

2= Considering the domestic elements and symbols inspired by the domestic sprite, the variety in applicability of the neighborhoods

1= The variety in applicability of the neighborhoods

0= Using none of the above

D. Evaluation and Analysis

Considering the case studies selected from Tehran's region 1 and evaluating them via principles of sustainable architecture, we sum up as follows:

A. Most of the neoclassical buildings built in Tehran's region 1 have obtained the average score from the solar energy factor. Therefore, neoclassical architects pay attention to lighting as well as decoration. However, the classical decorations, overhangs and inward curving of the facade devotes vast area of it to stonework and non-transparent material.

B. For wind and natural energy use, it is needed to have the face to face windows and other optimal ventilation features, but there are limitations in urban neoclassical building that blocks the appropriate usage of wind flow

C. In existing buildings, rainwater is only guided to the outside or to the sewage through the water-canals in roof, which at least could have been guided to the gardens and other parts of the building that are able to put this natural energy source into maximum use.

D. Due to the high thermal conductivity of stone compared to other material such as concrete and wood products, constructional polymers, etc., to use stone means to waste a lot of energy, unless proper isolation is done very well.

E. In existing buildings, no recycled material are used, this could endanger many sources of rock and cement.

F. In facade of neoclassical buildings, without considering the location, stone and façade cement are usually combined with each other, in many cases these materials are not local and are supplied from mines in other cities and after processing is done in cities and other countries. Therefore, the place of production and the place of consumption are very far from each other.

G. In neoclassical facades, commonly materials are much more used than usual due to their high ornamentation and overhangs covered with stones.

H. The durability these kind of is long and usually rock and cement are durable for many years.

I. To illustrate the glory of many pillars, columns, entrances, and other quasi-neoclassical, architectural elements are designed beyond human dimensions, which violates the principle of respect for the user in a sustainable architecture.

J. In most neoclassical facades, skilled stone workers should be employed, that due to their small number, specialist forces in this field cannot be local in most cases.

K. As explained in this article, one of the goals of constructing quasi-neoclassical facades in Iran, is to reveal the difference and luxury of the building from the surrounding structures. So the impact of the building on the texture is not mainly considered in this architectural style.

L. In none of the facades listed in case studies, there is any space considered for plants and green elements in the facade. Whereas today in sustainable architecture, vertical gardens are proposed as a solution to increase green space in urban facades.

M. Neoclassical building facade does not particularly pay attention to the city and the surrounding textures, and neighborhoods are not considered as an important element in the design. Quasi-Neoclassical buildings are, in many cases made completely different from the surrounding buildings.

Table 2. Evaluation of Case Studies via Principles of Sustainable Architecture

Building number			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Energy conservation (minimum fossil fuel)	Maximum use of solar energy	A	3	4	4	3	4	2	3	4	4	2	2	1	4	3	4
	Use of wind energy and air conditioning	B	1	2	1	2	1	2	1	2	1	3	1	1	1	1	1
	Using and storing the rain water	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Working with climate	Materials with appropriate heat capacity and color	D	2	3	3	3	2	1	2	3	3	3	2	3	3	2	2
	Suitable thermal and sound and moisture isolation	E	3	4	3	4	2	2	2	3	2	2	2	3	2	2	3
Reducing the use of new resources	Use of recycled material	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Use of domestic and recyclable material	G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Minimum use of material and proximity to the mine	H	3	2	2	3	2	1	3	2	2	2	0	1	3	2	2
	Longevity and durability of material	I	3	3	4	4	4	4	3	4	4	4	4	3	4	4	3
Respect for users	Human Dimension	J	4	4	3	2	4	2	4	3	4	4	3	2	3	2	2
	Workers and local techniques	K	2	3	1	1	2	1	1	2	2	2	1	1	2	2	1
Respect for site	Pay attention to the impact of building on the texture	L	1	1	1	2	1	1	0	1	0	1	0	0	1	1	1
Holism	Maximum use of green elements	M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Considering the																

3. CONCLUSIONS

Considering the assessment of the quasi-neoclassical buildings in Tehran and not achieving the minimum score of 35 from principles of sustainable architecture in any of the buildings, we conclude that these buildings have a considerable distance from principles of sustainable architecture and wastefulness in using material, the preference of the form and the facade on the performance and lack of observation of the appropriate human dimensions, lack green spaces in the facade and all the other factors that obtained less scores than the average score, confirms this. Thus, the relationship of quasi-neoclassical buildings with the principles of sustainable architecture, which is the first question of present study, is to be as answered that by obtaining low scores from principles of sustainable architecture, facades are made regardless of current towards the sustainable architecture. In addition, to answer the second question, it is possible to say that it seems the current architecture in the northern parts of Tehran is significantly far from energy conservation. In confirming theories that led to this research, we should consider that there is a reverse relationship between quasi-neoclassical buildings and the minimum use of resources. As buildings become more luxurious and more quasi-neoclassic, the use of curves, stone fences, pediments and other decorative elements increases, which will increase the use of materials unconditionally. Also, as already said, the second hypothesis of the research is also correct. The more decorated quasi-neoclassical buildings are, they become more distant from the principles of sustainable architecture including the use of minimum resources, minimum recycled materials and maximum green space. Finally, regarding the final hypothesis of the research, there is a direct relationship between the use of quasi-neoclassical facades and decoration, and increase in capital expenditures. The more decorative the neoclassical facades become, more material and capital are consumed economically. At the end, with respect to the set of cases mentioned, we conclude that the common quasi-neoclassical style in Iran is not consistent with the principles of sustainable development. Due to the urgent need for energy resources and optimum usage of them, the unconditional prevalence of this kind of architecture can have irreparable effects on urbanization and urban spaces in the future.

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