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**Factors affecting contemporary architectural design and its
relationship to the Pharaonic architectural heritage
(In order to establish evaluation criteria for the architecture of
different civilizations)**

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Abstract:

There are many factors that influence contemporary architectural design, and despite their multiple and different classification methods, they can be divided into three main factors: physical, human and civil factors, in addition to contemporary factors. The research seeks to study the effect of these factors on the architectural heritage of the Pharaonic civilization, in order to answer the question: Did these factors have an impact on the architectural heritage of the Pharaonic civilization as it affected contemporary architecture? This is to test these factors as evaluation criteria for the Pharaonic civilization and the rest of civilizations in general.

Research purpose:

The factors affecting the architectural design process - through which the design components of the architectural work are understood - are categorized in more ways than one. These factors are used to evaluate the contemporary architectural product, and the research seeks to evaluate architectural heritage works according to these factors in order to obtain evaluation criteria by which the architectural products of different civilizations can be evaluated.

Research problem:

Evaluating architectural work without looking at the factors surrounding the design and implementation process is a kind of inequity for the architectural work and for the architect itself. The refore, the research seeks to monitor the factors affecting pharaonic architectural work in general. The assessment of the ancient Egyptian architectural work is based on these factors.

Research methodology:

In order to achieve the goal of the research, the research takes the historical approach in order to monitor the factors affecting the ancient Egyptian architectural work and the extent to which these factors affect the ancient Egyptian architectural product.

Keywords:

Architectural design, Pharaonic architecture, design determinants

الملخص:

هناك العديد من العوامل المؤثرة على التصميم المعماري المعاصر، وبرغم تعددها واختلاف طرق تصنيفها، إلا أنه من الممكن تقسيمها إلى ثلاثة عوامل رئيسية هي: عوامل مادية طبيعية وعوامل إنسانية ومدنية، بالإضافة للعوامل المعاصرة. البحث يسعى لدراسة تأثير هذه العوامل في الموروث المعماري للحضارة الفرعونية، وذلك للإجابة على سؤال: هل كان لهذه العوامل تأثير على الموروث المعماري للحضارة الفرعونية كما أثر في العمارة المعاصرة؟ وذلك لاختبار هذه العوامل كمعايير تقييم للحضارة الفرعونية خاصة وباقي الحضارات عامة.

الهدف من البحث:

العوامل المؤثرة على عملية التصميم المعماري -التي يتم من خلالها فهم عناصر التصميم المكونة للعمل المعماري- يتم تصنيفها بأكثر من طريقه. يتم استخدام هذه العوامل في تقييم العمل المعماري المعاصر، والبحث يسعى لتقييم الأعمال المعمارية التراثية طبقاً لهذه العوامل.

مشكلة البحث:

تقييم العمل المعماري دون النظر إلى العوامل المحيطة بعملية التصميم والتنفيذ هو نوع من عدم الإنصاف للعمل المعماري وللمعماري نفسه. لذا يسعى البحث إلى رصد العوامل المؤثرة على العمل المعماري الفرعوني بشكل عام. وتقييم العمل المعماري المصري القديم بناء على هذه العوامل المؤثرة.

بعد رصد العوامل المؤثرة على التصميم المعماري، وكيفية استخدامها في تقييم العمل المعماري المصري القديم، كما تستخدم في تقييم العمل المعماري المعاصر، فالبحث يوصي بأن تعتبر هذه العوامل التسعة هي عوامل مرجعية يمكن استخدامها في عمل دراسات مقارنة بين عمارة الحضارات أو الحقب الزمنية المختلفة. كما يمكن قياس نقاط القوة والضعف في عمارة كل حضارة وذلك بمعرفة العوامل التي تم مراعاتها و الأخرى التي تجاهلها معماريو هذه الحقبة. يمكن بدراسة مدى احترام هذه العوامل في عمارة الفترات التاريخية المختلفة التعرف على أسباب اندثار الموروث المعماري لبعض الحضارات، وبقاء هذا الموروث في حضارات أخرى.

بشكل غير مباشر وضح مدى إهتمام المعماري المصري القديم بكل هذه العوامل المؤثرة على التصميم المعماري، واستخدامه لها كمحددات تصميمية، الأمر الذي منح لعماراته الخلود والبقاء و أبقاها ملهمة لأزمنة طويله.

الكلمات المفتاحية:

التصميم المعماري، العمارة الفرعونية، محددات التصميم

1. Factors affecting architectural work:

Factors affecting the architectural product can generally be summed up in three main factors, each of which has three subs:

- Physical factors:
(Geographical, Geological, Climatic)
- Humanitarian and civil factors:
(Social, Religious, Historical).
- Contemporary factors:
(Science, Economics, Industry and technology) [7]

Depending on these elements and their change, the characteristics of the recipes and components of the architectural work change, changing the geography of the site changes the

characteristics of the neighborhood and the characteristics of the population, which obliges the designer to match these new qualities and characteristics and thus the characteristics of the architectural product change as these nine influences change.

2. Physical factors affecting Pharaonic architecture:

The physical factors influenced the architecture of the ancient Egyptian, and we note the apparent impact of geographical, geological and climatic factors on these architectural works as follows:

2.1 Geographical factors:

Egypt contains a fertile strip extended along the banks of the Nile from the south to the north and the river is divided northly by the delta component: it overlooks both Mediterranean sea and red sea, which helped it to flourish world trade and external contacts, which thus reflected on the prosperity of civilization as well as its river which was valuable in the fertility of the earth and on its banks the most important historical cities and pyramids were erected. [6]

The Nile river was surrounded by sandy deserts and hills that added geographical diversity and added a different urban environment to the fertile environment of the Nile Valley. [8]

With the diversity of geographical regions in Egypt, different cities have emerged in all these regions, and each city has different characteristics of its architecture. Teba architecture appeared in Luxor, in the eastern bank life activities and the west for burying the dead, in the 11th and 17th dynasties, different from the Sakha Architecture in Kafr Al-Sheikh governorate. Also, a different architecture appeared in the architecture of Tanis, in San Al-Hagar, in Sharkia Governorate. All these differences are due to the difference in the geographical region. [10]

2.2 Geological factors:

The natural materials available in ancient Egypt were a distinct feature of Egyptian architecture, consisting of stone, bricks and wood.

Stone: Available in Egypt and varied and not used in buildings only, but for decoration and personal ornaments also and the most important stones used is lime stone and for the construction of long beams used the red and grey granite and then used in the late periods sandstone where the best Egyptian temples were built. For the quality of materials, the Egyptian architectural relics remained lofty for this time.



Pic1- Temple of Karnak, <https://en.wikipedia.org/wiki/Karnak>

Due to the availability of materials, the Egyptians have reached advanced methods of exploration of stones and minerals, transporting, lifting, cutting and polishing, which led to the advantage of Egyptian architecture by the giant scale. The Pharaonic large forms, whether a pylon or an entrance, are huge in their details because they are relatively weak sandstone in the formation. [11]

Bricks: Sun-dried bricks were used to build palaces, houses, most buildings, temples, etc. and was good as a thermal insulator.

Wood: Wood was used initially until its use in buildings became limited later. [6]

2-3 Climatic factors:

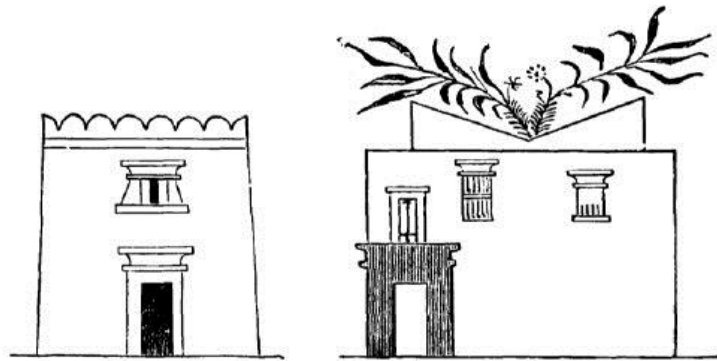
Climate stability and the absence of natural disasters led to the disappearance of violence, rebellion and anxiety among the ancient Egyptians. In their beliefs, he affirmed that good always overcomes evil and compassion over weakness (for example, unlike Greek and Roman civilization). It also showed in their civilization's manifestations of communication and stability. It also made their political lives calm and gave the feeling of adequate resources without the need for external supplies. Environmental and climatic stability helped distinguish artistic and architectural production by the simple and straight lines and clarity of expression. The dry climate in the Upper Egypt region had a major role in preserving the effects of the pharaohs, in contrast to the delta region that was exposed to flood water with a rise in the level of groundwater moisture. [12]

The climate in Egypt was characterized by a mild dry throughout the year, and this influenced the architecture of ancient Egypt, making it often open to the sky. This was evident in most of the temples, such as Luxor Temple and Edfu, as was characterized by a lack of rain, which made the coverage of the buildings all horizontal.



Pic2,3- Luxor temple https://en.wikipedia.org/wiki/Luxor_Temple

As the effect of winds and their direction appeared on the shape of the building plans, the wind catchers appeared to exploit the desired winds. The ancient Egyptian also took care of providing stone barriers in the cooking areas in residential buildings.



pic4 – pharaonic small houses <http://runeberg.org/nfbd/0393.html>

3. Human and civil factors affecting Pharaonic architecture:

Human and civil factors are among the most influencing factors on architectural design, due to their relationship to the user of the architectural space. This user is influenced by social factors from his human surroundings, in addition to religious influences from his belief that he owes. It is also affected by historical factors passed on by his predecessors.

1-3 Social factors:

The Egyptians used the system of government and the various powers that exist to manage the affairs of the country. Egypt also knew the system of local administration, and the pharaonic civilization of Egypt was greatly affected by religion. The ancient Egyptians came to some religious ideas that ranged from the multiplicity of gods to reaching the idea of a single God in which Imenhotep IV called Akhenaten who occupied a prominent place for the philosophical idea and his The social and industrial situation was shaped to a large extent by Egyptian laws that are far from flexible, which forced a large number of manpower, army and family segments to train to raise their level of practical skill in building huge buildings. The system of rule in Pharaonic Egypt was based on divine will, whereby the pharaohs of Egypt attributed themselves to the gods as a pious trustee.

Since the gods are old and stable and do not change, he added pictures and shapes to these gods, so I took static molds that are not subject to change and alteration. Moreover, since the pharaoh was the son of God, this gave the pharaoh a special attribute that elevated him from the ranks of humans. This consequently, he added an artistic style, whether in sculpting, painting, and engraving, that the Pharaohs appear in larger sizes than other humans, as well as in conditions that have respect, dignity, and sanctity so that it does not appear as An ordinary person appears. This matter helped to give Pharaonic architecture, sculpture, and art the character of unity of character and expression and ensured him a characteristic of continuity in forms and templates and did not make him vulnerable to alteration and alteration. [12]

2-3 Religious factors:

Religion and belief played a major role in preserving the continuity of civilization in ancient Egypt, especially during periods of the nation's weakness and its occupation. Also, the origins of science in ancient Egypt, such as architecture, sports, embalming and medicine, had religious origins and were exclusive to the priests of temples, so the fundamentalist method represented an effective means of preserving these sciences. As all sciences, arts, and architecture were related to temples, therefore, no progressive, liberal, or developed trends were given the opportunity to take their role and the winds of change were not allowed to fundamentally affect the civilizational origins of ancient Egypt, and this is also reflected in architecture and arts of various kinds. [13]

The link between religion and architecture is clearly embodied everywhere and in every age, and the traditional rituals of the Egyptian pharaohs and their ambiguity were reflected in architecture, especially in shrines and temples, there was no separation between God and the king and the phenomenon of the gods and their relationship to the sun, moon, stars, and worship of some animals was a characteristic of that era.

The belief of the ancient Egyptians on the return of the soul to her body led to their care for the body after death, so they erected and built valuable shrines and transferred their valuable possessions to it and buried them with their bodies. It was created specifically for the use of kings and priests, and the great monuments were established, such as the pyramids, for the purpose of preserving life after death. The houses were considered temporary places to live in life while the grave is the place of permanent immortal residence. [6]

3.3 Historical factors

Egypt was distinguished by a historical hierarchy of successive families ruling ancient Egypt, which created for each historical period an architectural pattern in building and temples orientation and their internal elements. [7]

In the pre-dynastic era, the ruins of some houses and cemeteries appeared. In Marmadat Bani Salama diversified the forms of housing and building materials. The house was built from mud plaster in the form of an oval base, and the floor of the house fell from the outside by a value of a quarter of the height of the house in order to install the walls of the house and protect it from wind, as it was There is housing in the house, both inside and outside of it.

The other variety was also constructed in the form of an oval of woven linen near the farms. As for Naqada, he found a miniature model of a house that was believed to be the true dimensions of 8 x 5.70 m, and its walls were sloping sides wider than its base, for structural

purposes, and the house was built of clay. There is a narrow entrance in the middle of the wall and forming its sides, and above it is a lintel of wood, and it has an upper opening for lighting, and above the door there is a cylinder of wood wrapped over it a mat that acts as a curtain when pulled down, to provide privacy for the home. The back wall also has two small windows with a frame of wood, and the house is decorated with an interior courtyard around which rooms are located and the roof of the house is flat. The patterns of these houses are almost the common pattern throughout the history of ancient Egypt. [12]

In the era of the beginning of the families, three large cities appeared, the most famous of which is the city of Anabi Hajj (which was named after it for centuries in the city of Memphis) and was surrounded by a fence of stone to protect it and control the movement of entry and exit from it. The country is new to unity.

It can also be seen from the grandeur of the tombs that we infer the grandeur of the palaces, which unfortunately nothing remains, and it is noted that the entrances to the palaces consisted of three sections of a large royal door and two small entrances one on the right and the other on the left, and the palaces were built of mud bricks and supported its pillars and shoulders and lintels of the openings with stones Also, it appears that its walls were covered with colored mats, which serve as shutters in our time. In the palace there are gardens and indoor water pools. This description is not limited to the dwellings of this era but extends to apply to most of the earthly buildings in all Pharaonic Egypt. [13]

The era of the Old Kingdom was marked by its magnificent tombs and magnificent pyramids that spread around its capital, Memphis. This era witnessed the beginning of the widespread use of stone in architecture. Perhaps the first building to rise on the surface of the earth is a stone building, the Pyramid of Djoser in Saqqara, which was built on top of his tomb. The pyramid built on average a large architectural group of six worldly and religious buildings with an area of 251 thousand square meters.

In the era of the Middle Kingdom, the star of Thebes began to emerge as the capital and home of government, as it is characterized by the creation of palaces and houses, and it is noted that the palaces of this era included housing places, offices, factories, barns, warehouses and housing for workers, employees and manufacturers.

In this period, the pyramid of Lahoun, which the city of Lahoun was associated with, whose remains remained to this day, the city of workers, engineers, and artists who contributed to the construction of the pyramid, was also built in the city. Laborers. This era witnessed irrigation and land reclamation projects, and internal security stability helped the arts to flourish. [3]

In the era of the modern state, the immortal buildings and temples were erected in ancient Egyptian architecture, where the Hatshepsut Temple, the Ramsium Temple, the Abu Simbel temples, the Abydos Temple, the Habu Temple, and the expansions of the Karnak Temple and the Luxor Temple were erected, all of which are considered huge architectural edifices that express the progress of the construction arts as well as the strength of the ruling systems and the richness Pharaohs and the abundance of state resources. This era witnessed a reconstruction movement to create new cities, as Akhenaten established 1367 BC. His new city is in the Tel Amarna area, while King City 1308 BC. He created a village in what appears to be the first attempt to rebuild the desert. Ramses II also (1290 BC) established a new political capital in the north of the country, east of the delta. This era was accompanied by prosperity and progress in the arts of sculpting, engraving, and photography, which depicted historical events from land

and sea warships as well as from commercial travel events and political relations with countries, in addition to public life inscriptions in the country and various activities in it in addition to religious drawings that represent worship to the gods and presentation Offering and other things related to ancient Egyptian arts. [12]

4. Contemporary factors:

Scientific and economic influences, in addition to the industrial and technological factors and influences, are among the factors that affect the architectural design process. In this part, the research seeks to monitor these effects on the architectural design process in Pharaonic Egypt.

4.1 Scientific factors:

Egyptian civilization is one of the most appreciative of science, not only this, but it also gathered its parties in one building. The world is still progressing unable to explain how it was built, as well as a constructive cause (the Great Pyramid).

The Egyptians exerted great efforts to achieve a sound timing system that allows the regulation of economic and political affairs, so they divided the week into seven days, and the astronomy into a constellation (an imaginary belt in the sky that includes the paths of the sun, moon, and stars). The constellation, with its twelve signs, each divided into 30 degrees, served as a tool to monitor the movement of the sun, moon, and planets. They also divided the year into three chapters: the flood season (from mid-July to mid-November), the planting season, germination and emanation (from mid-November to mid-March), and then the harvest and drought (from mid-March to mid-July). The duration of each semester was four months. The Egyptian priests tracked the positions of the planets and recorded their observations for centuries in a row. They managed to create the annual calendar in prehistoric times, particularly in the last stage of these ages. [9]

This remarkable scientific achievement later became the best cultural heritage, and the greatest legacy of ancient Egypt to the civilized world. The priests considered that their astronomical studies should remain a secret science. The Egyptians have noticed the appearance of some bodies in their sky during the period when the Nile waters rise and overflow its sides. The appearance of the star known as the "sirius" was a special matter for them, as they linked the phenomenon near the flooding of the Nile in the summer of every year, and the appearance of this star in the eastern horizon before sunrise on a certain day of the year, and the rise of the star indicated to them the coming of the flood. By repeating their observations, they were able to calculate how long it took to appear this way and found it to be 365 days. Thus, the ancient Egyptians invented the annual calendar on the basis of the full cycle of the sun. In Egypt, the best ancient calendar was established, based on some knowledge and responding to urgent needs, especially in the field of agriculture. [4]

Architecturally, Arabs long ago concluded that the Great Pyramid was constructed to be an astronomical observatory, and an explanation opposing this view was made only at the end of that century. The Arab interpretations mention how the smooth sides and smooth internal passages can be used to make an observatory. The British Astronomer Proctor Richard Anthony also found a Roman document saying that the Great Pyramid could use a good observatory, if constructed at the level of the large vestibule, and this required a large square terrace in order for ancient astronomers to record the movements of the stars. [1]

At the beginning of the twentieth century, the French scientist Antoine Bovis discovered that the animals that crept into the king's burial chamber in the Great Pyramid, and died in this chamber, their bodies did not rot, but rather a mummification occurred to them. Thus, "Bovis" seemed to think whether the geometrical shape of the pyramid was related to this phenomenon, and if the king's burial chamber had a location where the energy of the pyramid's field reached its maximum density. Bovey built a pyramid about one meter in height with the same proportions as the Great Pyramid and positioned it so that the axis of the north-south axis is oriented in the same position as the Great Pyramid. Bovis put a dead cat at the center of that pyramid, twice as far away from its top as it is from its base. That is, with the same position as the king's burial chamber, he discovered that the cat had not rotten, but mummified. [14]

4-2 Economic factors:

Pharaoh in ancient Egypt was the absolute monarch of the country, and he had full control over the land and its resources. The king was the commander in chief of the army and head of government, who relied on bureaucratic officials to manage his affairs. The temples formed the backbone of the economy. Where her role was not limited to the role of worship only but was also responsible for collecting and storing national wealth in a system of grain stores and reservoirs managed by supervisors and then redistribute them. [13]

The diversity of economic resources in ancient Egypt and the concentration in the hands of the Pharaoh and the priests of the temple is easy to state that the construction of a rich architecture, also allowed the strength of the economy of the state to provide labor and to cover the costs of use in this architecture building. It also facilitated the presence of strong trade relations with neighboring countries, to provide all necessary materials that are not available locally through import. Exploration and extraction of minerals makes it easier for an Egyptian to identify different types of building materials during an exploration and to know their properties accurately. This made it easier for him to use these materials in the construction of his contemporary architecture. [3],[7]

4.3 Industrial and technological factors:

Ancient Egyptian temples and cemeteries are one of the most important evidence of the progress of the construction field in ancient Egyptian times. The construction of temples such as the Hatshepsut Temple was huge projects in the past. This project and others have implications for using advanced technology to produce these delicate architectural and sculptural elements. [2]

In Christopher Dunn's book, he states that on his visit to Egypt his huge statue of Ramses in Memphis caught his eye, and he noticed that the two nostrils of the statue are almost the same. Dan considered this to be an indication of the skill of the Egyptian sculptor, and in 2006 he returned to Egypt and undertook a study in which he focused on the head of the Ramses II statue at Luxor Temple.

The study was based on analyzing hundreds of pictures taken from different angles, and reached a conclusion: that there is a congruence between the right and left eyes, the right and left ears, as well as the eyebrows and the nostrils, 100% complete geometry between the two sides of the statue. This result led "Dan" to the assumption that that statue was not carved by a human hand. The human hand, no matter how accurate it is, has an error rate, and that this statue was carved by three-dimensional carving machines.



Pic5 - symmetry of statues in Egypt, (Dunn 2010)

Christopher Dunn re-examined other statues of Ramses II in Memphis and the British Museum to come to the same conclusion, the perfect symmetry between the two halves of the face. [5] Ancient inscriptions show the great relationship between humans and the universe through the sun, moon, stars, cosmic energy paths and everything they knew about astronomy at that time. [15]

Pharaonic architecture in various parts of Egypt proves the existence of advanced industry and technology, as well as its impact on architecture from the mechanisms of cutting, transporting, and building materials. In addition to the techniques of extracting and forming minerals, as well as the technology of making colors that have survived for millions of years in the architecture of the ancient Egyptians.

5. Summary and recommendations:

After studying the factors affecting the architectural design, and how they are used in assessing ancient Egyptian architectural work, as they are used in evaluating contemporary architectural work, the research recommends that these nine factors are considered to be reference factors that can be used in making comparative studies between the architecture of civilizations or different periods of time. It is also possible to measure the strengths and weaknesses of the architecture of each civilization by knowing the factors that were considered and the other that the architects of this era ignored.

By studying the extent to which these factors are respected in the architecture of different historical periods, one can learn about the reasons for the disappearance of the architectural heritage of some civilizations, and the survival of this heritage in other civilizations.

Indirectly, he explained the interest of the ancient Egyptian architect in all these factors affecting the architectural design, and its use of it as design determinants, which gave his architecture immortality and survival and kept it inspiring for its long times.

Factors affecting contemporary architectural design		Are they effecting the Pharaonic architectural?
Physical factors:	Geographical	effective
	Geological	effective
	Climatic	effective
Humanitarian and civil factors	Social	effective
	Religious	effective
	Historical	effective
Contemporary factors	Science	effective
	Economics	effective
	Industry and technology	effective

Table1 - summary of research

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