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المؤلف الرئيسي:	Mahmoud, Ruqayyah Abdo
مؤلفين آخرين:	Shaltout, Manal Abdel Hamid (Co - Auth)
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## Islamic Arches Are Source of Contemporary Architectural Creativity at the Sheikh Zayed Mosque in Abu Dhabi

**Prof. Ruqayyah Abdo Mahmoud**

**Emeritus Professor of Sculpture, Faculty of Art Education, Helwan University**

**Dr. Manal Abdel Hamid Shaltout**

**Director of the Museum of Egyptian Civilization, the Ministry of Culture**

[manalshaltot2@gmail.com](mailto:manalshaltot2@gmail.com)

### **Abstract:**

Architecture of mosques has been associated with the pillars of faith until the spiritual relationship between man and God has been confirmed, with all its moral and material meanings in a distinctive architectural character. Many unique architectural creations have been introduced throughout the Islamic civilization until our present times and many styles and forms have appeared and maintained the essence of the religion. The building of mosques in far distance of Asia is different in its architecture than that in the far west. Also mosques in Egypt do not look like a mosque in Damascus or Cordoba. It is the truth that has emerged as a result of the influence of design of the mosque according to its surroundings so as to acquire the spirit of the spatial place in order to create a strong link between the mosque and the external buildings. The mosque architecture has developed significantly due to many inspirations of the environment and the vocabulary of ancient and modern architecture, leading to changing in some religious architecture elements in terms of form and content, to highlight the aesthetic meaning of the cultural identity in Arab societies. Despite the civilization and communication, means of development as well as the rapid social and economic transformations, the architecture becomes the mirror that reflects the contributions of progress, development and change as well as the impacts of thought and perception streams and global behavior. Therefore, UAE has been interested in the establishment of mosques across its cities and regions, which exceeded 4000 mosques, and has promoted and enhanced their religious and cultural roles, using all the potentials and dimensions of modern technologies, taking into account the philosophy of modern architecture, as in the mosque of the late Sheikh Zayed bin Sultan Al Nahyan, Sheikh of the United Arab Emirates, which is considered as one of the finest and largest mosques in the world in the present era. It is also a religious architecture edifice that simulates in its design the reciprocal relationship among the elements of Islamic architecture and the natural environment features, while taking care of the functional aspect of each architectural element and maintaining the intellectual philosophical framework that exists in the formation of the arches of this mosque in an architectural system in which the architectural element is associated with the nature. Thus, the arches in the Sheikh Zayed Mosque are architectural phenomena in which the components of many civilizations combine in one modern architecture mold which needs a research and interpretation to identify the dimensions of this architectural phenomenon, because it is a strong physical evidence that the elements of religious architecture keep pace with the modern age culture, so that the national and global competitions continue to achieve the contemporary architectural creativity.

**Keywords:**

Islamic Arches, the system Contemporary Architectural Creativity, the Sheikh Zayed Mosque in Abu Dhabi.

**المخلص:**

تتشابه صياغات فنون العمارة في كل من البلاد العربية، لدرجة ان الكثير من مؤرخي الفنون يرى ربطهما معا في حضارة واحدة، وذلك لسهولة التأثير والتأثير بفن كلا منهما على الاخر، ومع تعاقب العصور الاسلامية قد برع الفنانون في فنون العمارة الدينية، حتى وصلوا بها الى ما لم يصل اليه غيرهم من اهل الفن في نطاق حضارى ذو طابع ديني متميز، لأن العمارة الدينية هي انعكاس للعقيدة بكل ما تحويه من معان روحية ومادية، ولذلك امر الراحل الشيخ زايد بن سلطان آل نهيان شيخ دولة الامارات العربية المتحدة عام 1998، ببناء مسجداً إسلامياً ضخماً في مدينة أبوظبي، لكي يحافظ على تأكيد مفاهيم وقيم الثقافة الإسلامية السمحة، ليعكس الرسالة الحقيقية للإسلام، وقد انتهى بناء هذا المسجد في عام 2008 م، حتى اصبح رابع أكبر مسجد في العالم لي طرح ابداعا معماريا فريدا في عصور الحضارة الإسلامية، كما يبدو كأنه معرض مفتوح يحتوي على دلائل مادية انصهرت فيها مكونات الثقافات الإسلامية ذات الطابع الديني المتميز عامة، وفي العقود الإسلامية خاصة بمسجد الشيخ زايد، التي حققت الجانب الوظيفي والجمالي، لتحاكي الإطار الفكري الفلسفي للعقيدة الإسلامية، في مجسمات تشكيلية تجمع بين الكتلة والفراغ، مع مراعاة ربط الأصالة بالمعاصرة، فمن هذا المنطلق نبعت مشكلة البحث التي تتناول تفسير ظاهرة الأبداع في العقود الإسلامية بمسجد الشيخ زايد في أبو ظبي، حيث تكمن مشكلة البحث في التساؤل التالي: كيف يمكن ان تكون العقود الإسلامية مصدر للأبداع المعماري المعاصر بمسجد الشيخ زايد في أبوظبي؟ ويتناول فرض البحث أن العقود الإسلامية تعد مصدر للأبداع المعماري المعاصر بمسجد الشيخ زايد في أبوظبي، حيث يهدف البحث الى أهمية التواصل بين الثقافات العربية من خلال لقاء الضوء على ظاهرة الابداع في العقود الإسلامية في مسجد الشيخ زايد بأبوظبي، مع الاستفادة منها في مجالى التعبير المجسم والتصميم الداخلى المعاصر، وتقتصر حدود البحث على تحليل العقود كعنصر معماري بمسجد الشيخ زايد في أبوظبي، حيث تتناول منهجية البحث المنهج الوصفي التحليلي في اطار نظري، وتعتمد أهمية البحث على إبراز جماليات صياغة العقود الإسلامية بمسجد الشيخ زايد في أبوظبي، حتى تحقق التواصل الدائم بين الثقافات العربية، وقد أكدت نتائج البحث على ان العقود الإسلامية تعد عنصر تشكيلي مجسم يجمع بين الكتلة والفراغ، بالإضافة الى ان العقود الإسلامية بمسجد الشيخ زايد في أبوظبي تعتبر مصدرا للأبداع المعماري المعاصر، ومن اهم توصيات البحث ضرورة الاهتمام بالتواصل الحضارى بين البلاد العربية من خلال المؤتمرات والملتقيات العلمية من اجل الابداع المعماري.

**الكلمات المفتاحية:**

العقود الإسلامية، منظومه الابداع المعماري المعاصر، مسجد الشيخ زايد بأبو ظبي

**Research problem**

The system of formation the vocabulary of contemporary religious architecture has differed in the Sheikh Zayed Mosque, which confirmed the strategy of difference and change in the formation of Islamic arches as a result of intellectual development that is compatible with the data of the modern age. In spite of this, some researchers and scholars has not address this important phenomenon with research and study, which requires to seek and interpret this architectural phenomenon in Sheikh Zayed Mosque, in order to get to know the characteristics of the artistic values of the Islamic arches element in contemporary religious architecture. Thus.

**The research tries to answer this question:**

**How can Islamic arches be a source of contemporary architectural creativity at the Sheikh Zayed Mosque in Abu Dhabi?**

**Hypotheses of the research:**

Islamic arches are source of contemporary architectural creativity at Sheikh Zayed Mosque in Abu Dhabi.

**Objectives of the research:**

1. The Islamic arcades are the source of architectural creativity at the Sheikh Zayed Mosque.
2. The activation of the phenomenon of architectural communication among Arab countries lies through the elements of Islamic arches.
3. To pay attention to the benefit of architectural field of interior design.

**Limits of the research:**

The research is limited to the analysis of some arches at Sheikh Zayed Mosque in Abu Dhabi.

**Importance of the research:**

1. To detect the aesthetics of Islamic arches at Sheikh Zayed Mosque in Abu Dhabi.
2. To contribute to architectural communication among Arab countries lies through the elements of Islamic arches.
3. It is necessary to open new horizons through the elements of religious architecture in the field of scientific research.

**Methodology of the research:**

The research methodology deals with descriptive analytical method in a theoretical framework.

**I-The system of modern architectural creativity:**

The modern architectural system, characterized by rationality, has developed with the emerging of a new color based on structural proportionality and spatial harmony. The aesthetic values in architecture have become subjected to free innovations which have imposed some new requirements and demands as modern architectural trends have advanced through calling for simplification and abstraction. New qualities have emerged in architecture in which iron, glass and reinforced concrete have been used as structural elements. This is the actual development of building methods and architectural thought. They are influenced by the concept of modern art through symmetry and proportionality. They are influenced by the concept of modern art through symmetry and proportionality, which depend on the beauty of the engineering bloc. The emergence of the Islamic religion has had a profound impact on changing the aesthetic view of the Arabs, for everything around them and they were aware of beauty in a simple perception and at the same time it is a perception whose source is the sensuality.<sup>1</sup>The Muslim view of taste was not based solely on sensory perception, but was connected to what is beautiful with an intellectual awareness that reveals the beauty of content. Therefore, the Muslim took care of the essence and the seeking for the absolute in order to move from the finite to the infinite in a moral horizon which elevates oneself to the world of spiritual beauty that the environment emerged through the Islamic religion what achieves balance in form and essence, in the vocabulary of the religious architecture elements. The arches as aesthetic architectural elements become an essential element in the composition of each mosque, through their

distribution in the space in a regular and mutual rhythm between the mass and the space so that balance is achieved taking into account that this balance is not fabricated, in particular in the façades and galleries, and in a planned geometrical distribution to enhance the balance and beauty of the building. The formation of arches is based on the organization of the mutual relationship between the mass and space, where window blanks are formed through the construction of arches on the architectural surfaces by combining the negative and positive masses, among which the space tension becomes between the separate forms <sup>2</sup> which is based on the beauty of the geometry blocks interspersed by the space. The mass is the basic unit in our perception of the 3 D forms that are characterized by the three dimensions. It is so strong that it confines an area of space with a certain size and it is the form that embodies the ideas and feelings of the artist. The sense of mass includes that it occupies an area in a space, perhaps absolute, limited or in a balanced manner between them. There are types of geometrical blocks, suggesting the existence of a rational organization with scientific measurement in the work of art based on geometrical form.

### **1- Mass and the modern architecture:**

The mass is the mirror of architecture, where it shows the rhythm and the balance of architecture. The architecture structure depends on the mass whether simple or compound, because the blocks of building are connected in balance, despite its different sizes and configurations, and they extend horizontally and vertically in the space. The blocks of different buildings should be influenced by the needs of the environment and functional performance, so that the architectural blocks are integrated in harmony and cohesion, to achieve their function in the space, such as the Pyramids of Giza, which are considered a kind of integrated architecture, consisting of three large pyramids in the space (Fig.1) with a number of small pyramids next to each other which seem as an abstract geometrical form so that the artist looks at them mentally as they are based on the mathematical and geometrical logic. Architectural masses can be divided into simple biomass, which are represented in the masses <sup>2</sup> that depend on the formation of spherical curves in the space with clear form, and the complex biomass consisting of various curved blocks linked to each other in rhythmic and balanced way. The architectural geometrical masses depend in its architectural form on the geometrical forms and these masses are the dominant type in the formation of architectural masses in a clear expression that reflects the architectural geometrical form.

### **2- Space and the modern architecture:**

The space is "the empty place that exists between the components of the forms and its surroundings. It is a type of form as it is not something different from the form but an ethereal form in which it is easy to move" (1). In addition, the space is the incubator of the mass in a co-ordination that achieves the artistic value between the space and the mass, where the mass does not overwhelm the space, and the space does not weaken the force of the mass, that is to say, there is a proportion between them. There are many functions of the space element: 1-to determine the outer line of the edge of mass and construction to show their body and, 2-to make light and air move around the mass and building, and 3-to confirm the existence of the mass and building or the total of masses and buildings especially in architectural forms. It is expected to find an internal space indicated by this dome as the space and the architecture are the main means of expression of architecture for all technological advances. It is possible to divide the

architectural space accordingly into the space surrounding the architectural construction and the interior space of the architectural form and it is in the form of different spatial masses. Thus, any space is designated by the masses and without masses there is no space in the formation of internal spaces which are determined by the parts of the building and external spaces that arise among the different parts of buildings with each other and with next buildings.

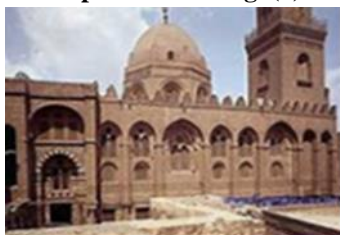
The inner space consists of several types, including the limited architectural space, which is composed of architectural masses limited to the outer space, and the successive architectural space that leaves one side of the building completely open, until the space runs from interior to outward, as well as the dynamic architectural space in which the arches intersect with the vaults and combine in strong lines which make the surfaces of the walls and the cellars seem as mere fillings which complete the bearing structure. With the development of architecture, many trends have emerged including those which are characterized by great rhythmic sensations in the space and discover new forms that reflect the environment, at the intersection point among many planes that create the space and give sense that the building is racing backwards with the space. From this point, it is possible to define the types of the modern architecture in the bio architectural formation, which means the forms that are clearly related to the organic curvatures in the parts and vocabulary of the biological architectural form, such as domes (2), which are concerned in its formation with intrinsic features inherent in the nature with the diversity of its formal composition, and the geometrical architectural formation which is concerned with architectural formation related clearly with the geometrical system (3), in the parts and vocabulary of geometrical architectural formation in the religious architecture, which suggests the rational, standard and scientific organization.



**Fig. (1) Giza pyramids in the space**



**Fig. (2) Bio-architectural design**



**Fig. (3) Geometrical architectural design**

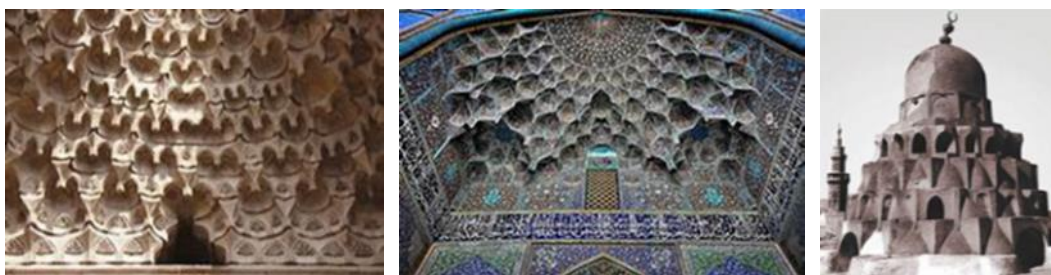
## **II: System of arches in religious architecture**

Architecture is one of the most important aspects of civilization because it consists of constructions and buildings made by man to occupy a certain place for utilitarian purposes. Architecture is man-made and exists with him as it is a reflection of the environment with all its material and moral meanings. The architecture is constructed from masses and spaces in proportionality in different areas. Based on this, it can be drawn a procedural definition of architecture as it is the art of dealing with masses, spaces and volumes in a functionally successful design. The scientific facts have proved that Muslims have mastered the art of

architecture in all its forms as they benefitted from previous civilizations and developed them according to their Islamic religion in order to discover the aesthetics of the arches at the Sheikh Zayed Mosque in Abu Dhabi. It will be dealt with the types and elements of Islamic architecture as well as the history and types of Islamic arches, in addition to the Islamic arches as architectural ogees and building the arch as an architectural ogee with explanation of Islamic arches formation philosophy.

### 1-Types and elements of Islamic architecture:

There are many types of elements of Islamic architecture in the constructions and buildings made by man for certain purpose. The architecture consists of four types: civil architecture such as houses, homes, palaces, schools, etc., military architecture such as castles and forts, funerary buildings such as shrines and monuments, and the charitable architecture such as Aspela (fountains), Ktateeb (religious schools), as well as religious architecture such as mosques. The Muslims used in their architecture various architectural elements such as Muqarnasat (**Stalactite**) (Fig.4) columns, balconies, arches, minarets, domes and architectural ogees, which are used as construction elements and decorative labels in the religious architecture through their innovations in this field to achieve what is not reached by other people of art in any other culture.



(Fig.4) various architectural elements such as Muqarnasat

### 2-History of Islamic arches:

The Islamic arches were not coincidental; they were based on planned geometrical basis and geometrical proportions, which indicate the genius and skill of the architect as well as his understanding of the functional and construction requirements as architectural elements with a function which began with the dome and developed with the advancement of the vaulted ceilings and cupolas. Arches are mainly to carry the ceiling and to increase the height of ceilings and domes in the buildings to alleviate the load and pressure on the walls. Arches assist in the distribution of galleries and around the naves in the mosques and the organization of spaces for the establishment of openings of doors, windows, and others, in addition to the exploitation of the internal and external space in the architecture. The artist used different types of arches, including horseshoe, ring and pointed arches which exist in the Umayyad Mosque in Damascus (Fig.5). This type of arches spread in India, and the horseshoe arches spread in both Morocco and Andalusia. In Egypt, the horseshoe arches spread in the architecture of the Tulunic period (Fig. 6) and its examples are seen with a slight circular increase at the beginning of the arch at the Mosque of Ahmad ibn Tulun. The curved arches were used in the Fatimid period (Fig.7) in the windows of the Al-Azhar and Al-Hakim Mosques. The first appearance of these arches was in the Great Mosque of Córdoba, the Umayyad Mosque in Damascus and the Fatimid Egypt's Architecture in the Islamic Architecture.



Fig. (5) Umayyad Mosque in Damascus



Fig. (6) The horseshoe arch of Ahmed Toulon in the mosque

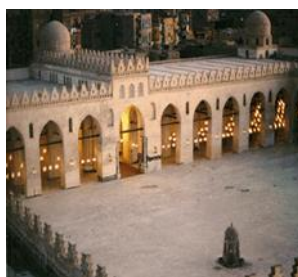


Fig. (7) Arches of the Fatimid era, Al Azhar Mosque.

**3-The types of Islamic arches:**

The arches have various types and forms in Islamic architecture (fig.8), including the pointed arches, the horseshoe arches, the trio-lobes and five-lobes, circular and semi-circular, double and curvilinear and triangular, and convex and concave arches. These types are curved architectural elements which are supported on two columns. The usage of these types of arches spread in Morocco and Andalusia, in the Great Mosque in Cordoba and the Umayyad Mosque in Damascus as well as the Fatimid Egypt architecture.

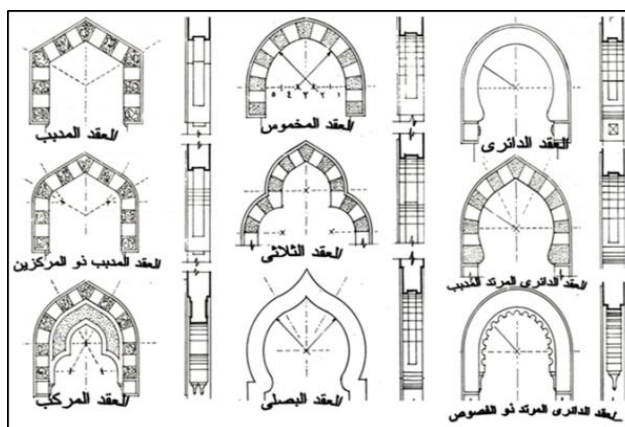


Fig. (8) Some types of Islamic architecture

**4-Islamic arches as architectural decorations:**

The arches are fundamental and important architectural elements in religious architecture, which are used as an architectural ogee Fig. (9), since they are an element consisting of a structural architectural unit with a curved body regardless of the type of arch. The arches are carried on natural stone or marble pillars in order to be strong enough to bear the ceiling and give an aesthetic form. The arches appeared in Persia and Mesopotamia and they were made of clay and bricks. The arches were not known in the ancient Egyptian civilization where the architect was content with placing rectangular stones above the high columns for constructing



openings while the Roman architect was used to make the height of the arch from the ground to the interior is equal to the double of its width in order to give the arch and the lower aperture an aesthetic architectural proportion as well as to achieve the basic architectural objective for which the arch was created. The arch geometrically is a curved line between two vertical lines, starting up from the top of one and down to the top of the other <sup>1</sup>. It is used in carrying ceilings, to distribute galleries, to alleviate the load and pressure on the walls and to emphasize the aesthetic role to give the decorative features on several buildings.

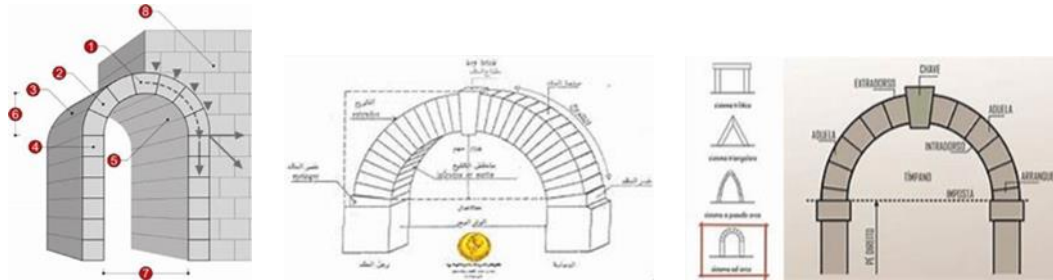


Fig. (9) The parts that make up the arches

**5-Construction of the arch as architectural decoration**

The arch is built in one of two ways: the first is done by placing wall mantles starting from the base, leaving an opening in the first course of the wall narrowing with the second. Thus, the stones stand out as the wall rises to achieve the curve of the arch. The second method is done by lifting the frescoes on a wooden scaffold which is removed after the completion of the arch. It is made of pieces of wedged stones, in a form that makes it more cohesive whenever the pressure is pressed on top. In addition to the wedged stones, a stone is added on each side which is called the seat. Other wedged stones are added to complete the circle of the arch and other stones are stacked so as to descend with the arch from both sides on the buttress of the construction or the capital of the pillar bearing the arch and are called the two legs of the arch. The construction requirements for making the arch need fine polishing stone and it is preferable to use wooden pallet between the arch and the pillar, to ensure the distribution of the weight of the arch in balance on the whole capital, taking into account the symmetry resulting from the corresponding and the symmetry among the arches with each other and the symmetry among parts of the same arch to achieve the golden ratio in the formation of the arch between the width and height by 1: 1.5 to add an aesthetic touch in the mosque through the distribution of types of the arches Fig. (10) Such as twins and overlapped arches to achieve proportion among the width of the arch and its height with the whole area of the mosque space.



Fig. (10) Twins and overlapped arches

### **6- Philosophy of Islamic Arches Formation:**

The philosophy of the Islamic arches formation is based on absolute abstraction, which aims to "confirm the essence of forms"<sup>1</sup> which was influenced in its formation by the Islamic faith. This is a reason of its beauty and development as the Islamic arts are based on the absolute abstraction without imitating the nature and its biological aspects so that the interest can be in content and meaning together. The abstraction emerged as a result of the change of some concepts of the doctrines of art in the late eighteenth century, until it reached the cubism that shattered the external appearance in the work of art, and re-installed it without denying it and employed abstract forms in sculpture area so as to deal with the mystical point of view which moves from the particles to the totals and from the finite to the absolute, in a coherent repetition which does not lose its expressive character. Rather, it presents existing relationships among the forms in a visual creation that achieve integration and totality between the visual and expressive values. If the plastic values are appropriate to the point, line, shape, area and space, and the expressive values are simplicity, freedom, power and self-surrender in the formation of the artwork without revealing the "particles" that own these different relationships, that is why both the abstract form and the architectural element are similar in the content, which consists of substantive concepts and contents that achieve balance between the vocabulary and philosophy of the form. The abstraction in the formation of architectural elements means the overlap of these values through a comprehensive and integrated thinking in order to put a new form of its own philosophy until it became a key axis in the construction of the mosque where the architectural beauty of the tangible world is reflected in the moral world. The artist was able in the formation of arches to transcend the material and rise to the level of Sufism, until he is separated from the physical presence to see more than what many other see when looking and contemplating beyond the form of the arch as an aesthetic architectural element calls for the pursuit beyond the material truth from an organization of thoughts, emotions and contemplations by returning to the external world <sup>(1)</sup>, to an organization that reveals new rhythms which lead to aesthetic relations that were not in the account so that the material may be submerged and its secrets are revealed in an eternal beauty which includes all things. The arches are characterized by meticulous composition, luxury, grandeur and infinite splendor which express the absolute in a tangible sense where the content meets the form in the arch to become an art that shows the idea in a direct expression that connects the square and the circle, and suggests depth through the relations of the tangency, intersection and overlap, where the rhythm and balance are reflected, and evoke some sincere feelings and emotions of passionate nature. There is a complete conception of existence in the Islamic faith and it is seen in the philosophy of the formation of the arch which is committed to combine two parts: the first is the functional purpose and the second is the aesthetic feature. The arch was associated with the function at the beginning of its inception but with the development of the interest in the aesthetic side has increased until this aesthetic side becomes the basis of formation with retaining its functional form. Thus, the arches become an architectural symbol which owns a plastic and emotional effect.

### **III- The aesthetic system of arches at Sheikh Zayed Mosque:**

The mosques in the history of the Islamic call are of great importance as they are the «houses of Almighty God» where Allah is being worshiped alone, day and night and they are the places of psychological comfort for Muslims, reassurance of their hearts, and tranquility for their souls, cleansing their intentions, rising their spirituality, strengthening their determination and

transcending their will for science and work. The Prophet (peace and blessings of Allah be upon him) used to say to Bilal (may Allah be pleased with him) when the time for prayer came: O Bilal let us be comfortable with it." The mosques are one of the most prominent types of religious architecture that reflects the characteristics of the architectural styles prevailing during the periods when the mosques were built. Therefore, Sheikh Zayed bin Sultan Al Nahyan ordered the construction of his mosque in 1998 to be an Islamic edifice to establish the Islamic culture and its tolerant religious values, and to become center of religion science in the capital Abu Dhabi. The Mosque of Sheikh Zayed is the third largest mosque in the world in terms of the total area of 412.22 thousand square meters after the Holy Mosque and the Prophet's Mosque. The Sheikh Zayed Mosque has reached a high degree of creativity (Fig.11), in the organization of the vocabulary of various architectural elements, such as minarets, domes and arches that appear when seeing the vertical perspective from outside the mosque (Fig. 12). It was built in an area that rises 11 meters above sea level and 9.5 meters above the level Terrain (Fig.13). The regular rhythm between minarets, arches and domes appears from outside (Gig.14), from above and from the horizontal perspective. The mosque can accommodate more than 7,000 worshipers inside it, the outer space can accommodate about 40,000 worshipers. The mosque is located at the eastern end of Abu Dhabi near the Arabic Gulf. The total cost of the project is two billions and 167 million United Arab Emirates Dirhams.



Fig.(11) Architectural creativity of the mosque at the floor level



Fig.(12) The vertical perspective of minarets, domes and arches



Fig. (13) The mosque rises 9.5 m above the ground level



Fig. (14) The mosque can accommodate more than 7,000 worshipers inside and the outer space can accommodate about 40,000 worshipers. The mosque is located at the eastern end of Abu Dhabi near the Arabic Gulf.

### **1- The aesthetic characteristics of Sheikh Zayed Mosque:**

The UAE is concerned with the preservation of historical cohesion by promoting the urban environment, to create a civilized fabric that meets the requirements of the modern age. The great mosque combines the architectural creativity of this prominent Islamic edifice between Moroccan architecture and Mughal architecture. It is similar to the Banshahi mosque built in Lahore, Pakistan. Its dome is built similar to the dome of the Hassan II Mosque in Casablanca. Its minaret was designed according to the Arabic style. The mosque is distinguished by four minarets in the corners of the outer nave. The minaret is about 107 m high and is fully covered with white marble. The main pillars in the main nave are 24 columns which carry the huge ceilings and domes. The column is designed to be divided into four parts bearing the arches of the domes. These columns are covered with white marble decorated with shells of pink and vegetal motifs making them beautiful and glamorous in the inner gallery. The inner area of the mosque is 50 by 55 m with the height of the ceiling is 33 m above ground, and the height of the main dome rises to 45 m. The floor of the mosque is covered with the largest carpet in the world, covering an area of 5627 m and its weight equal to 47 tons. It is uniquely and manually as well as artistically designed in Iran. The main dome of the mosque is the largest dome in the world, with a height of 83 m and an internal diameter of 32.8 m. It is decorated with unique vegetal decoration in plaster fiber reinforced (Fig.15), in addition to the use of some of the written decorations. The number of other domes are 85 one with different sizes to cover outside galleries, and main and lateral entrances (Fig.16). The design of the external courtyard floor of the mosque was considered to be a massive concrete tile system mounted on concrete sections (Fig.17) and it was decorated with the finest types of marble decorated with colorful vegetation. The mosaic was used to cover the area of the whole nave of 17 thousand m., which is one of the largest open spaces in the mosques in the Islamic world. The number of pillars of the outer courtyard in the hallways surrounding the nave are 1048 columns covered with marble decorated with semi-precious stones and with floral decorations and colorful flowers, and have metal crowns of gold plated. The corridors of the exterior of the mosque are surrounded with lakes reflecting the facades of the mosque and magnifying its beauty, where the white and golden colors shine under the sun, to be replaced at night by a sophisticated technological system of lighting that mimics the stages of life. The night lights of the domes vary from day to day according to the lunar movement throughout the month (Fig.18). At the beginning of the month, when the moon is a crescent, the light is dimmed and it becomes brighter when the moon is complete. The floors of the mosque are covered with white and green marbles in the corridors that lead to the nave. The columns of the outside corridors are of white marble decorated with semiprecious stones and the capital of the column is decorated with gilded aluminum formations in the shape of palm branches or fronds (Fig.19). The interior design of the mosque is characterized by floral and inscription of stucco and wood decoration on the walls and ceilings. The designer used direct and indirect lighting in the lighting system of the mosque, through seven chandeliers with golden touches of 24 carats, including the outstanding great chandelier in the main hall, which is 15 meters high and weighs 9.5 tons. It is the world's largest chandelier in terms of design, size and weight. It is designed in a manner consistent with the interior design of the mosque and the indirect lighting is used behind the stucco and writing decorations perfectly. There is also in the mosque an important great library, which includes rare collections of great books. There are 28 different types of natural materials, such as stone,

marble, gold, crystal and ceramics, were used in the construction of the mosque as they have to carry great weight and can bear hard use, weather factors and time .



Fig.(15) domes of Sheikh Zayed Mosque



Fig. (16) Perspective of domes.



Fig. (17) Decoration of the outer Nave with plants.

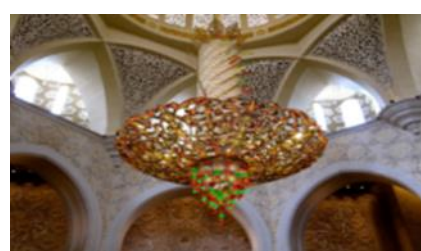


Fig. (18) Mosque courtyard and night lighting in Sheikh Zayed Mosque in Abu Dhabi

## 2- Aesthetics of arch architecture in Sheikh Zayed Mosque:

The architect of the Sheikh Zayed Mosque was able to create the arches in which all the culture of the Islamic architectural elements throughout the ages was combined leading to its liberation from traditional forms to contemporary forms. Its formulation is created with the natural source and aimed at abstraction in rhythms and configurations combining engineering and nature in the arches architecture. He developed a new architectural system in the formation and architectural construction for the arches which become in the Sheikh Zayed Mosque architectural formations that are characterized by classical abstraction, as much as the functional aspect needs, until the arches become a symbol of contemporary architecture. It can be called the "Nakhili arch", which combines in its architectural form between the column, the capital and the arch in a composition similar to the columns of palm trees and capitals of Palm fronds, taking into consideration the functional side, to use the pointed and backward arches inspired by the architecture of the Arab Maghreb in the mosque architecture, and in the composition of the lower dome box which consists of a set of arches based on columns, where each column consists of four pillars with one golden capital inspired by the ancient Egyptian art as well as the openings of doors and windows. The circular arch is used in the necks of domes and minarets which carry the ceilings and domes with the distribution of galleries inside and outside the Sheikh Zayed Mosque which achieved the artistic value in two dimensions: the expressive

dimension and the plastic dimension, through the distribution of arches in the space, that reflect the aesthetic rhythm, balance, proportion and uniformity of art throughout the Sheikh Zayed Mosque in Abu Dhabi.

### **3-The arches and the value of rhythm:**

The value of the rhythm in the outer spaces of the Sheikh Zayed Mosque is shown in a distinct and an unlimited repetition to confirm the relationship between the arches and the other architectural elements in a regular rhythm that emphasizes the depth of the melody in the musical system through the phenomenon of symmetry which resulted in the tight distribution of arches in the Sheikh Zayed Mosque through the realization of the value of the rhythm between the arches of aesthetic appeal emphasizes the of sequential depth in and outside the mosque, which has no counterpart in other types of architecture, linking his philosophy and can make the value of regular rhythm appear in the arches in various forms.

### **4- The arches and the value of the balance:**

The value of architectural balance in the arches is achieved between the masses and the space in the Sheikh Zayed Mosque in Abu Dhabi, through the deep awareness of the composition by the architect who was able to make the arches balanced, so as to achieve a sense of stability and steadiness, when looking at this great edifice that generates in the soul contact with the place by the movement of the arches with the minarets and domes which ensure a sense of luxury and spirituality by balancing the colors and decorations surrounding the arches in a delicate and elegant style with the architectural decorations, especially in the capital of the arch through the golden color, which emphasizes the deep feeling of happiness and pleasure in soul.

### **5-The arches and the value of ratio and proportion:**

The architect achieved the ratio and proportion by three types: either in terms of quantity or quality, and the combination of them. The quantity is said to have a numerical ratio. The quality is said to have geometric ratio. The combining of these two types are said to have a musical composition ratio. This meaning is shown in the proportion of the arch to the proportion of the rest of the architectural elements that combine the quantitative ratio in the sizes of masses from the base of the column of the arch until the key of the arch. The quality proportion represented in the forms of geometric masses in fixed and variable ratios, can achieve musical harmony between masses and spaces in the Sheikh Mosque Zayed in Abu Dhabi.

### **6- The arches and the value of artistic unity:**

The architect achieved the value of artistic unity through the value of rhythm, balance, ratio and proportion between arches of distinctive character, which retained the unity of architectural design through ages to express the unity of the faith that symbolizes it. It is a kind of unity that achieves diversity and dividing the facade into successive geometrical arches and the transition occurs from surface to surface in the continuity which achieves the unity without deletion or addition, which was dominated by religious thought with a spiritual depth in the formation of the arches in an integrated unity that confirms the flow and harmony of the architectural formation, which combined the past classicism with the spirit of the modern times in order to confirm the sense of wealth and luxury in the contemporary architectural system, which is reflected in the Sheikh Zayed Mosque in Abu Dhabi.



Fig. (19) The aesthetics of external and internal arches at Sheikh Zayed Mosque in Abu Dhabi

#### Fourth: Conclusions:

1. The Islamic arches are the source of architectural creativity at the Sheikh Zayed Mosque.
2. The arches at the Sheikh Zayed Mosque combined the architecture with the nature.
3. The contact between the architecture and the nature in the Sheikh Zayed Mosque was a source of innovating **the palm arches**.
4. The palm arches of the Sheikh Zayed Mosque are a source of creativity in the religious architecture.
5. The arches of the Sheikh Zayed Mosque have become a symbol of contemporary architectural creativity.
6. The palm arches in the Sheikh Zayed Mosque combined the formal values with the expressive ones.
7. Islamic arches have acquired some expressive characteristics in the contemporary architecture.

#### Recommendations;

1. It is necessary to continue to study and analyze other architectural elements in the Sheikh Zayed Mosque.
2. It is important to take care of all that is new in the Islamic architectural heritage among the Arab countries.
3. It is essential to achieve communication with different experiences in Arab countries through scientific conferences.

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