دور العمارة الداخلية في تصميم المتاحف

أ.يوسف مفتاح يونس البرعصي
كلية الفنون والعمارة – جامعة درنه

الملخص:

أصبحت المتاحف ذات رسالة حضارية ووظائفها متعددة تشمل العلمية والثقافية والاجتماعية والتربوية والسلوكية وغيرها، وفي العصر الحديث أصبحت المتاحف من أبرز العناصر المعمارية في القرن العشرين حيث يجد فيها المهندسون المعماريون والإنشائيون فرصة كبيرة لإظهار رؤيتهم الفنية ودراستهم الأكاديمية التي تتناسب مع الطراز المعروض، وقد تم تصميم وبناء العديد من المتاحف في جميع أنحاء العالم خلال الثلاث عقود الأخيرة. (أمير، 2014).

يلعب التصميم الداخلي دورًا مهمًا في المتاحف، حيث إن دراسة التصميم الداخلي للمتاحف وما تحتويه وعلاقتها بالتطور التكنولوجي للتصميم الداخلي لهذه المتاحف، والاستفادة على الوجه الأمثل من التطور التكنولوجي، وتحقيق كل متطلبات المبني من توفير الشكل المعماري الخارجي ومعالجة الفراغ الداخلي له، أمرًا بالغ الأهمية للحفاظ على القطع الثقافية وضمان راحة الزوار والموظفين على حد سواء.

الكلمات المفتاحية: تطوير المتاحف / التصميم الداخلي للمتاحف/ تصميم متحف

ABSTRACT:

Museums have become a cultural mission and have multiple functions, including scientific, cultural, social, educational, behavioral, and others. In the modern era, museums have become one of the most prominent technological elements of the twentieth century, as architects and structural engineers find a great opportunity for their

artistic advancement and academic studies that are compatible with the awards exhibits. Many museums around the world have been designed and built over the last three decades. (Amir, 2014).

interior design plays an important role in museums, as studying the interior design of museums and what they contain and their relationship to the technological development of the interior design of these museums, making optimal use of technological development, and achieving all the requirements of the building in terms of providing the external architectural form and treating its internal space, is extremely important to preserve On cultural objects and ensuring the comfort of visitors and employees alike.

Keywords: development museum / museum interior design/ Museum design

RESEARCH PROBLEM:

The research problem lies in answering the following question:
How to develop the interior design of museums using technological development?

1. INTRODUCTION:

A museum is an institution that cares for (conserves) a collection of artifacts and other objects of scientific, artistic, cultural, or historical importance and makes them available for public viewing through exhibits that may be permanent or temporary. Most large museums are located in major cities throughout the world and more local ones exist in smaller cities, towns and even the countryside. Museums have varying aims, ranging from serving researchers and specialists

to serving the general public. The continuing acceleration in the digitization of information, combined with the increasing capacity of digital information storage, is causing the traditional model of museums (i.e. as static "collections of collections" of three-dimensional specimens and artifacts) to expand to include virtual exhibits and high-resolution images of their collections for perusal, study, and exploration from any place with Internet. The city with the largest number of museums is Mexico City with over 128 museums. According to The World Museum Community, there are more than 55,000 museums in 202 countries ("Journal of Museums Germany",n.d).

2. TYPES OF MUSEUMS:

2.1. Historical museums:

History museums and historic houses or sites constitute the largest number of museums in the US and, on average, have the lowest attendance (less than 20,000 per year). Many tiny towns have a town history museum or historic house, and these swell the number of museums, but reduce the average attendance. A few large history museums and sites draw huge numbers of people. Historic sites, like battlefields, often have collections on display inside buildings as well as interpretative signage and robust artifacts outside (" Journal of Museum Education",2003).

Fig.2.1. Historical museums

2.2. Art Museums:

Art museums display works of art by local, national, or international artists and many offer classes in the various disciplines of art. Art galleries are different. Just to be confusing, art museums display art in galleries and art galleries display works of art, too. But the term galleries usually refers to businesses that sell art or promote one artist. Art museums sell art and trinkets in their gift shop, but won't sell the art hanging on the display wall. Art museums come in all sizes from small to giant. In the US the average attendance for an art museum is about 60,000 people. (" Journal of Museum Education",2003).

Fig.2.2. Art museums

2.3. Scientific and Educational Museums:

Museums flags of literary, musical, educational, scientific, museums and museums of documents and stamps. Keeping the average attendance numbers of the other museum types in mind, consider that science museums draw about 250,000 visitors a year – some four times as many as art museums or history museums. ("Journal of Museum Education",2003).

ig.2.3. Scientific and Educational Museums

2.4. Industrial Museums:

Museums techniques and crafts and folk traditions, museums, transportation, museums and glass industries specialist museums.

Fig 2.4. Industrial Museums

2.5. Maritime Museums:

Maritime museums focus on ships and all things nautical. This includes the art, history, and science of people at sea. Usually it doesn't include marine life except for fisheries. Like ships on the ocean, ships in the air warrant their own museums. Air and space museums are quite popular and there are dozens of them scattered across America. Not to be outdone is land transportation with both car and train museums. Learn about maritime job opportunities in another section of Job Monkey. (" Journal of Museum Education",2003).

Fig.2.5. Maritime Museums

2.6. Agricultural Museums:

The tools and agricultural machinery, soil, animals, poultry and other museums.

Fig.2.6. Agricultural Museums

2.7. Cities Museums:

A definition of the city museum is in order. In this context it refers to institutions located in major metropolitan areas that collect and interpret the history of their city.

Fig.2.7. Cities Museums

2.8. Children's Museums:

Children's Museums gaming equipment and museums. children's museums exist to provide experiences, not to show off collections. They provide a more active experience – one that appeals especially to families. The science museum movement leaped forward in the 1960s and 1970s and continues to expand today. (" Journal of Museum Education",2003).

Fig.2.8. Children's Museums

2.9. Military Museums:

The Military Museums Foundation is a not-for-profit dedicated to educating the public, particularly youth, about military.

Fig.2.9. Military Museums

3. DESIGN MUSEUMS:

Include the general location and the design of all the elements and components of the museum General Site Design:

The development of facilities in the form of an integrated model of buildings and spaces to achieve Relationsrequired between the various components of the program from the functional point of view and Fine.

This includes the general location of the design:

1. Site selection
2. The study of functional relationships.
3. The optical modulation study.
4. Study of the roads and transportation (Jon ArtetaGrisaleña, 2017).

3.1. Site Selection:

Site selection for the establishment of great importance when museums have been followed in the past thirty years the establishment of museums in the heart of the cities with the provision of transportation to it, but with the increase in population density and increase the number of cars of different means of transport, it became difficult to establish museums in the cities (Klwsy,2004).

3.1.1. Should note that follows when designing the museum:

1. The museums should be close to the scientific, cultural places (such as universities, colleges, and schools), so that there is coordination between the scientific institutions, museums, because no less important in the mission from other cultural centers.

2. Although there is an objection to the establishment of museums within the gardens and public parks, but it has now become the most suitable popular places for the establishment of new museums, where the place is spacious and away from the dangers of fire, and thus provide protection from dust and exhaust of vehicles and fumes rising from factories and homes, what caused this factors of ill effects on the works of art inside museums.

3. Must take into account when establishing the new building of the museum will accommodate Different groups of effects and therefore need to take into account for flexibility in the design, in order to be viable for future expansion to accommodate other groups.

4. Must take into account the surrounding places exhibits inside the galleries until commensurate with shapes and colors,to allow

impressions art architectural decent standard of the contents of the museum of antiques and jewelry and others.

5. Must take into account the flexibility when designing museums, focusing not only on the facilities, but also to work on a show for the aesthetic values of art historical exhibits.

6. Must take into account the selection of appropriate places to display ancient paintings and contemporary paintings, until the visitor sees the difference between the two works. From here it is necessary to allow urban planning museums freedom and ease of movement when transporting heavy statues and that provides the ease and speed of change places exhibits. (Klwsy,2004).

3.1.2. How to set up museums:

Scientific and technical work of the museum has a special nature combines science many, in addition to the creativity of Fine and Applied Artists, The museum successful, which is based on the use of the correct technical foundations in Fine and Applied Art presents its rules specialized science manner psychosocial is, because the primary function of the regulator museum is that clearly understood that the idea presented, and then translated into flexible forms presented to the public in a manner that goal (Klwsy,2004).

3.1.2.1. The most important determinants that help establish a museum:

Determine the purpose of the establishment of the museum, contemporary Museums quality and special character and purpose. The purpose is to have a definition of a particular type of types of

museums, or Activity body or produced or modern methods used in its operations, or new projects and the importance of their activities in raising the standard of living or theconsolidation of the relationship between the body and the community and advertising to urge people to support the body and encouraged. The most important thing in this is a major purpose of the museum and one will be even greater chance of success.

Determine the public kind which will visit this museum and in terms of cultural, social, economic and age, gender, level of pupils in primary schools or kindergartens differs from the general public museum and qualitative Museum for university students and examples of the Natural History Museum, zoo, which includes a large number of stuffed birds, reptiles and rodents ("Saudi Arabia Building Magazine", n.d).

Study of the proposed location for the museum in terms of location for visitors, it must be soon or easy access to him, so as to facilitate a visit to the largest possible audience. In the case of the establishment of public museums, taking into account a suitable choice for the position, in terms of a place beside him stand cars or buses that carry tourists and visitors who wish to, so as not to be disrupted traffic ("Saudi Arabia Building Magazine", n.d).

It is necessary to study the place where the breadth of its relevance to the type and size of the exhibits, and in terms of natural or industrial lighting, and the system of distribution of the holes,

windows and doors and entrances and exits ("Saudi Arabia Building Magazine", n.d).

The study of the different elements that make up the museum and choose what to achieve its objectives, including the appropriate level for them patrons and studied in terms of their order in the place of the display and presentation: Is reservation in glass boxes or unsecured exposure, and whether you need to appropriate flooring? Because different views due to the type and nature of the items displayed and the aim of using them ("Saudi Arabia Building Magazine", n.d).

3.2. The study of functional relationships:

The design of the museum is the distribution of the elements of a particular program on the selected site achieves relations sound and suitable among the different functions components include places cars and entrances and exits and the wings and green spaces and water bodies and permanent buildings waiting in case of presence and internal conductors of footpaths and compounds and corridors service spaces assembly ... To reach these relations to solve the most appropriate should first possibilities available sites either side topographic optical or the presence of natural advantages and areas of archaeological exploited for the benefit of the design, and then try to suitability with the desired program most suitable site as possible and on the basis of the required conditions (Klwsy,2006).

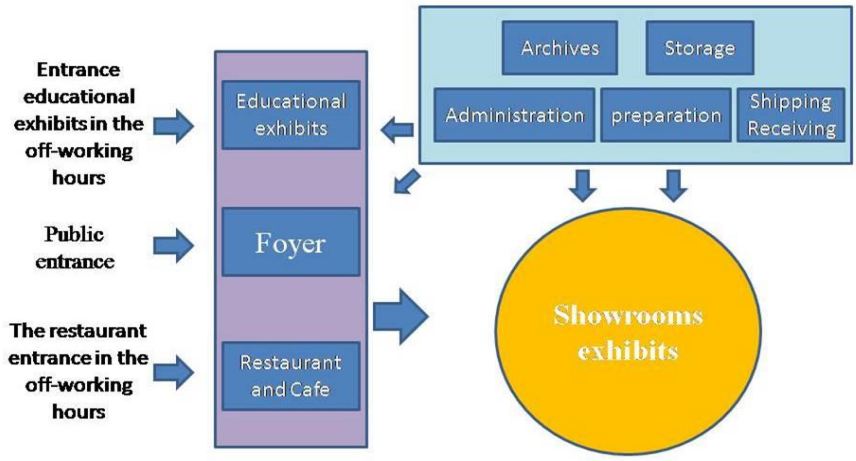

Fig.3.1. functional relationships

3.3. The optical modulation study:

The optical modulation prominent element in the design of the site includes:

1- Treatment site

2- Study visual relationships between buildings and spaces.

3- Furniture site.

3.3.1. Treatment site:

Begin to study visual processing site, either to be diligent in maintaining the site and confirm the eradication of what it spoil homogeneity and adding what confirms the nature of the site and highlighted, or the trend is to eliminate what confirms this character or modified (Klwsy,2006).

3.3.2. The study of the visual relationships between buildings and spaces:

There are two types of museums: with a unified design and free-styling. Optical design is not limited to the site to study during the day, but also must examine the various blocks of relationships, both of buildings or trees and blanks for the night, as it interferes lighting embodied buildings units vacuum and define their relationship, including surrounded by the website, it clearly highlights the blocks without extracted from the surrounding frame . The lighting creates a continuation seems to be disassembled during the day and emerge from Mover or aesthetic aspects of the transformation of the building the mass of heavy-lit night to light a light source at night ("Egyptian construction magazine", n.d).

3.3.3. Outdoor Furniture:

The Furniture location of the basic supplements visual study includes plants and fountains and columns of light and technical elements and give fountains and water bodies refreshing sensation and thin balanced with dry buildings and severity also provide places poetic pioneers, and care must be taken to design the form of fountains and commensurate in size with the overall scale of the view Ocean to give an expression of one and coherent helps to visually connect the site ("Egyptian construction magazine", n.d).

Fig.3.2. Outdoor Furniture

3.4. Factors that affect the design of buildings in museums:

There are two works in two basic affect building design:

Public Museum.

The nature of the exhibits.

The public is one of the most important factors that interfere with the initial design of any building museum status as identifies the museum and the nature and size of the extension and itineraries by type, but this is expected audience evaluation shall be based on the age of cultural, social and scientific level and the time can be spent in the museum to provide what he attributes to entertain, educate and often We find in the big exhibitions versatile material presented in order to satisfy the largest amount of tendencies and trends, as it is not measured by the success of the museum visitors frequently but only what extent do for them from the benefit and usefulness (Klwsy,2004).

3.5. This should include the design follows:

- Secure and protect the holdings in the emergency plan (fire -

natural disasters)

- Devices to ensure the safety of visitors and those in charge of the museum administration.
- Devices to control the entry and exit control parts of the museum.
- Fire warning devices (Klwsy,2004).

3.6. Protect the exhibits from erosion, which could affect the integrity, and the most important:

- Humidity.
- Direct light, whether from natural or industrial sources.
- Heat and thermal changes.
- Vibrations that may result from heavy traffic or heavy traffic.
- Air pollution and chemical change installed (Klwsy,2004).

4. LIGHTING:

4.1. Natural Lighting:

The natural lighting are important in my design museums, things have been characterized by its ease of operation and diversification, as well as highlighting features special exhibits: But experience has shown that this belief is not true and that daylight is the light inside the museums, in spite of various difficulties that block the light in different periods of the year is not arriving to certain areas within the museums.

Must take into account when building design to maximize natural light, and even if necessary sacrifice and other structural considerations should be noted here that These can permeate the museum lighting from the ceiling and side windows and therefore

must be considered in the design of the exhibits Format these windows in accordance with the requirements of lighting inside Exhibition hall. And natural lighting inside the museum is two types:

Overhead lighting.

Sidelight. (Klwsy,2004).

4.1.1. Overhead lighting:

Advantages:

Permeates directly to the exhibition halls not hampered by any of the obstacles, such as surrounding buildings or the presence of trees that obscure the lighting inside the building to control the amount of light falling on the paintings and exhibits in order to be safe from optical reflections and allows good visibility. Provide space walls and tapped in the display purposes (Klwsy,2004).

Fig.4.1. Overhead lighting

Fig.4.2. Overhead lighting

Disadvantages:

The amount of optical radiation spotlight over the exhibits and irregular lighting.

Disadvantages of design in heavy ceiling excess props built on these slots slots and the consequent of the fouling, and risk at the

fall of the props, as well as the seriousness of the expected rainfall, humidity and temperature sun... etc.

Irregular light coming from the roof of the hall to another; causing boredomVisitors on tours inside the halls of the many technical and constructional difficulties display that you need to create the roof, which allowed this type of lighting and the impact on other benefits its (Klwsy,2004).

4.1.2. Side light:

Advantages:

Good lighting on the side walls and the exhibits that are given in the middle of the room on the proper angles to the light source.

Fine highlighting elements and relationships of light and shadow in the historical paintings and pieces of sculpture. Maximize simplicity and economy in the design of the building. The use of traditional flat roofs, which converge from the surrounding area.

Provide good ventilation and proper temperature in the exhibition halls, so do not rely on adaptations.

The possibility of providing a variety of views for visitors, with views of the garden or patio internal display.

Get rid of the boredom and attract the attention of visitors to the outside display.

Disadvantages:

The inability to use the wall, which is located where for display purposes.

Wall fronting also not fit for display.

Exhibits with shiny or polished surface, they reflect the light source which impedes vision (Klwsy,2004).

Fig.4.3. Side light

4.2. Industrial Lighting:

Used in the case of the use of concentrated light.

The current trend is moving towards leaving the light and regular preference lighting focused on a piece or a collection of exhibits, in order to attract the attention of the visitor and find some kind of change and diversity (Klwsy,2004).

Fig.4.4.Overhead lighting

Fig.4.5.Industrial Lighting

Fig.4.5.Side light

5. MATERIAL:

Construction material vary depending on the goal of the museum, and the type of exhibits, for example, alabaster stone and brick is

one of the appropriate materials for the halls sculptures, wood can be used either in the halls displaying paintings.

You should always pay attention to choose the interior Siding materials to the use of materials that do not accept the dust, which do not change color to drop the variable light.There are many materials used in the museums floors of the most important materials used are wood and marble ("Egyptian construction magazine", n.d).

5.1. Wood Flooring:

5.1.1. Red Oak Wood:

Is thick solid wood able to resist damage factors but not the same white oak wood which is the ability of the most widely used option in the United States ("Egyptian construction magazine", n.d).

Fig.5.1. Red Oak Wood

5.1.2. Pine wood:

Yellowish brown in color and contains a lot of curled. Add to this that almost the same durability red oak wood ("Egyptian construction magazine", n.d).

Fig.5.2. Pine wood

5.1.3. Birch wood:

And ranges in color between red color, which tends to be dark brown yellow light, which is less rigidity of red oak wood yet it is solid wood ("Egyptian construction magazine", n.d).

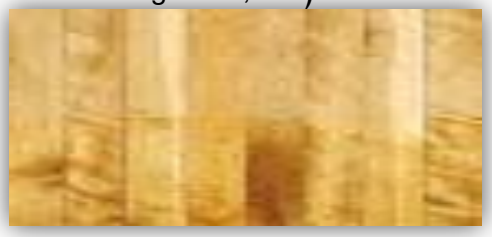

Fig.5.3. Birch wood

5.1.4. Wood White Oak:

It is brown in color and can be positioned within the gray, and the partitions in it similar to those found in the red oak wood.

Fig.5.4. Wood White Oak

Features wood flooring:

•wide range of colors and patterns.

•good surface moisture resistance.

•easy to keep clean.

•easy to work.

•the strength of the board is constant in every direction.

•Environmentally friendly and odorless ("Egyptian construction magazine", n.d).

5.2. Marble:

Marble is one of the most lavish and elegant flooring options available. It has a rich history, and has been the material of choice for designers, architects, and artists throughout all of human history. All natural, marble floor tiles are quarried from mountain ranges in countries around the world, and are available in a number of different finishes, sizes, and colors.

While marble is an elegant and sophisticated flooring option, it does require a certain amount of care and maintenance. It needs to be treated on a regular basis to protect it against spills and moisture. It is also susceptible to certain kinds of stains and damage (Klwsy,2004).

5.2.1. Caffe Brown:

is a marble with a brown background and white and beige veins.Quarried in Afghanistan, is a very simple and elegant marble and can decorate with sytle both indoor and outdoor environments (Klwsy,2004).

Fig.5.5. Caffe Brown

5.2.2. Nero Marquinia:

Is a beautiful deep black marble with white veins. Quarried in Spain is particularly suitable for luxurious ornamental projects and is often used combined with white veined marbles in checked flooring.Ideal to decorate with elegance and style interior design projects (Klwsy,2004).

Fig.5.6. Nero Marquinia

5.2.3. Damasco White:

Is a beautiful white marble with blue veins well distributed over the entire surface. Quarried in Namibia, is suitable for interior design projects (Klwsy,2004).

Fig.5.7. Damasco White

5.2.4. Calacatta:

Is a precious and exclusive Italian white marble, with deep light grey veins. Thanks to its sophisticated and elegant design Calcutta will elevate any project from ordinary to extraordinary (Klwsy,2004).

Fig.5.8. Calacatta

5.2.5. Daino Reale:

Is a beige veined marble. Quarried in Sardinia is also known as Breccia Sarda. Widely used for indoor book-matched flooring, for claddings, stairs and window sills (Klwsy,2004).

Fig.5.9. Daino Reale

5.2.6. Calacatta Gold:

Is a fine and precious Italian marble with a deep white background and gold and light grey veining. Available in any finishing, it looks sophisticated and elegant, perfect combination that allows a

magnificent use in any type of interior design project. Ideal for flooring, countertops, vanities and claddings (Klwsy,2004).

Fig.5.10. Calacatta Gold

6. HVAC SYSTEM DESIGN FOR THE MUSEUMS:

The culture of the modern communication changed the limitative concept of museum as simple stock of artworks; so, near the primary functions of stock, exhibition, collection, registration, management and administration, a new concept of museum as promoter of culture and communication, with the relative spaces aimed to laboratory, conference, restoration and study center, welcome, communication, is proposed. In this paper, considering literature and rule indications, a building with the above mentioned characteristics has been analysed, keeping distinct two groups of zones served by two different systems. Specific plant solutions correspond to these new functions, with the related problems concerning control of thermal-hygrometric and IAQ parameters, safety and energy saving (Redondi, 2004).

The design of the air conditioning system is only one aspect of a wider problem, which involves also the quality of the building envelope (thermal insulation and vapour barriers) and managerial

factors. The logic of design adopted in the case study proposes the differentiation of the spaces for the collections (exposure space and stock) with respect to the places destined to other functions (offices, bar, etc.), in order to limit the costs and the risks in preserving the artworks.

The conservation of the works requires stable conditions above all in the rooms for temporary exposures, where strong insurance ties imposed by the proprietary of the works exist, and in the stocks. The HVAC system must guarantee the control of the transient phenomena, the ambient microclimatic control (T and RH), the integration of the technology in the building structure (Redondi, 2004).

The control of the transient phenomena is strongly related to the variability of the thermal loads that the HVAC system must balance in operating time (Redondi, 2004). In particular, the fraction of the internal load due to the occupancy can create problems for the time stability of the ambient thermal-hygrometric conditions: in fact, this is an impulsive and not attenuated load because of the high occupancy variation. Such discontinuous flow of people can cause significant and sudden changes of the environment conditions; so the reaction of the HVAC system must be extremely quick in order to restore the design values of the thermal-hygrometric conditions for the conservation (Giusti,1999). The outside thermal load, instead, changes more slowly because the layers of most buildings destined to museums (heavy structure) induce a high thermal inertia and then

an attenuation of the instantaneous thermal gains: therefore the HVAC system is able to keep the design conditions without significant indoor changes.

The microclimatic ambient control involves a uniform space distribution of the thermal hygrometric parameters: in fact, it is not sufficient to keep stable T and RH average values (within the design proportional band), but a check of the microclimate near the artworks, spatially distributed in the ambient, is also necessary. Therefore, in the HVAC system design for the exhibition spaces, the diffusion of the air in the room, as well as the air flow rates to balance thermal loads, must be carefully considered in order to avoid the formation of stagnant zones and to realize a low speed air circulation. In fact, the exhibition rooms, characterized by heights between 4 and 10 m, can present, in case of not sufficient exchanges of air, meaningful temperature differences owed to reduced turbulence which involves uncontrolled convective movements not depending on the primary distribution. Therefore, this phenomenon has to be considered in the determination of the air flow rates, which must be increased opportunely.

In general, given an impulsive perturbation on the ambient T or RH or on the pollutant concentration, the time of restoration of the previous conditions decreases with the increase of the number of air exchanges, fixed the distribution system, and is function of the occupancy variation, which is the prevailing cause of the perturbation itself; fixed the supply air flow rate, instead, the transient

phenomenon period decreases for turbulent diffusion and not isotherm distribution systems (Giusti, 1999).

The control of the RH transient period does not feel the effect of the outside environment because the rooms must be kept in pressure with respect to outdoor in order to avoid not controlled pollution; so it is mainly function of the people presence. The ambient humidity control is really important, both in summer and in winter; the characteristics which affect stability and diffusion of the humidity are based on the partial vapour pressure, those related to temperature on the molecular activity. Therefore keeping in room different values of humidity ratio is more difficult with respect to temperature (Hartman, 1996).

In particular, the time of return of the initial conditions concerning pollutants concentration is exponential function of the air exchange number; in general, the number of necessary air exchanges to ensure the constancy of the thermal-hygrometric conditions is sufficient to keep the pollution level within acceptable limits (Giusti et al., 1999).

In order to keep stable the ambient conditions, it is necessary that HVAC systems remain constantly operating, at least as regards the exhibition spaces and the stocks; therefore, system typologies which allow considerable energy saving should be used.

The type of HVAC system used is critical to achieve project ambient goals. Minimum airflow values vary from 6 to 8 air changes

per hour (NBS, 1983; ASHRAE, 2003), so a constant volume system is usually preferred.

The problems normally overlooked are maintenance access and risk of the collection disruptions and leaks from overhead or decentralized equipment. Water or steam pipes over and in collection areas present the possibility of leaks.

All-air systems are generally preferred: a centralized air-handling unit keeps filtration, dehumidification, humidification, maintenance, and monitoring away from the collection.

Even if not precluded, air-water systems are rarely used for exhibition rooms, since they do not allow the handling of the load changes with sufficient quickness and the control of the polluting ones near the artworks; they can be used for foyer, bar and offices.

The all air systems, instead, allow a stricter control of T, RH and pollutant concentration. Moreover, they avoid in the exhibition space the presence of water pipes which involve the risk of damaging the artworks in case of break; on the other side, they present retrofit problems in historical buildings (Redondi, 2004).

A multizone air handling unit with zone reheats and humidification can be a stable and relatively energy-efficient solution. With proper layout and equipment, a multimode system can reduce the amount of reheat and can be very energy-efficient (Bovill, 1988); so constant-volume and multizone systems in collection spaces are preferred.

The variable air volume system is characterized by flexibility, less space requirements for the equipment, reduction of the operating cost; it can be conveniently used for various zones served by the same air handling unit, but it presents some limits related to the capacity in balancing the changes of the thermal loads, both sensible and latent, because it is rarely possible to reduce the air flow rate more than $25 - 30\%$ respect to the design one.

The adoption of adsorption dehumidification systems allows the reduction of the humidity also when the required dew point temperature is very low; so an easier handling of high latent loads is obtained. These systems are better as regards hygienic characteristics because the absence of condensed water strongly reduces the presence of bacteria, fungi and microbes. Absorption dehumidification systems, instead, should be avoided, because of the potential risk of acid particles (i.e. chlorine solutions) or drops released in the air flow, with consequent damaging risk for the collections (Redondi, 2004).

Outside air

Because the goal is the strict control of the ambient microclimatic parameters, excessive amounts of outside air can be economically problematic. Even when free-cooling is convenient, outside air can introduce particles and gaseous pollution. So, outside air must be the minimum amount required to provide fresh air for occupants and to pressurize collection spaces.

Air distribution:

High, monumental spaces are prone to thermal stratification; if this risk is real for collections, then appropriate return and supply air points may be required to ensure air motion across the entire space. Supply air should not blow directly onto collections.

Controls:

Sensors, thermostats and humidistats must be located in the collection space, not in the return air stream. Temperature variation is usually preferable to prolonged humidity swings. This strongly affects control design, because conventional control systems treat temperature as the primary goal and humidity as supplementary (ASHRAE, 2003).

7. FIRE SYSTEM:

7.1. Fireworks are divided into three sections:

1. Architecture: specialist acting fire safety
2. Electrical: specialist acting Fire Alarm.
3. Mechanical: specialist acting Fire fighting (Klwsy,2004).

7.2. Fire systems design depends on:

1. NFPA: United States Code in Design.
2. FOC: British code design (Klwsy,2004).

7.3. Fire fighting systems classification:

7.3.1. Water systems:

"**Fire system using water divided to:**

1. Sprays Water systems.

2. Fire cabins systems: inside the building.

3. Fire hydrant systems: in the street around the building" (Klwsy,2004).

7.3.2. Gas systems:

"Fire system using Gas divided to:

1. Fire Extinguisher.

2. FM-200, CO2, FE-13" (Klwsy,2004).

7.3.3. When to use water or gas in the fire systems?

Water cheaper and more economical and used in accordance with the economic situation. It is not reasonable to extinguish a place with money or documents with water, gas is used in this Case. That is why the two systems can be used together in the same building but different to elsewhere (Klwsy,2004).

7.3.4. For design water-fire system must know the following account:

1. Number of sprinkler.

2. Distance between sprinklers.

3. GPM (The amount of the required water availability and flow rate).

4. Water tank.

5. Size of pipe.

The number of machine sprinklers and the distance between them determines from fire seriousness degree (the rapid spread of flame) Increase the degree of risk, the distance between sprinklers should be Less.

7.3.5. Can be divided into degrees dangerous to:

Severity is divided into three sections according to the type of combustible materials in the code has been divided and to clarify the degree of risk for each type of building types.

7.3.5.1. Light Hazard:

Degree of seriousness of light leaves and plastic and wood: Churches – clubs – lecture halls – hospitals – libraries, except for the mega stores – Museums – restaurants – theaters etc.

7.3.5.2. Ordinary Hazard:

The code has been divided into two groups:

Group 1:

Parking – bakeries – Food Industries – electronic stations – Glass Industry – laundries – Catering.

Group 2:

Chemical plants – Dry Cleaning – horse stables – workshops – huge libraries – Mineral industries – paper industries – Post Offices – theaters – repair garages – the tire industry – Woodworking Machinery.

7.3.5.3. Extra Hazard:

"The code has been divided into two groups:

Group 1:

Hydraulic oils combustible – panels – presses that use inks have a flash point less than 37.8 degree – rubber – cotton industries etc.

Group 2:

Carbonated compressed industries – oil – detergents – Polishes – paints – processed asphalt industries" (Klwsy,2004).

7.3.6. Protection Area Limitations per Sprinkler:

Space that works by Sprinkler and the distance between them.

Protection Area Limitations per Sprinkler		
Hazard	Area (m2)	Distance between sprinkler (m)
Light Hazard	18.6	4.6
Ordinary Hazard	12.1	4.6
Extra Hazard	9.3	3.7

TABLE.7.1 (Area per Sprinkler)

Minimum distance between any two machines Sprinkler of not less than 2 meters up to doesn't affect negatively on neighboring Sprinkler (Klwsy,2004).

8. COLOR:

Interior designers tend to use color psychology to provide different style , colors that induce the desired mood. Choosing the right shades for the museum depends on the condition that you want to induce. Before opting for a certain combination of colors in the museum keep in mind this:

In recent years, neutral colors have become a real trend in museum arrangement. Bright or Matt shades of cream, beige, brown are very popular. Neutral colors are a good choice for museums especially because they can be successfully combined with almost any other color ("Saudi Arabia Building Magazine", n.d).

The best wall colors for museum, as they make the wall look peaceful: blue, lavender, green tones or even pink tones, if you want to create a relaxing and calm environment. Green means energy, calm, balance, security, stability and nature ("Saudi Arabia Building Magazine", n.d).

Blue produces a sense of calm, loyalty, serenity, authority, protection, contemplation, stimulates thinking, delay hunger and prevents nightmares. Purple is associated with fertility, happiness, creativity, but you have to use it in combination with other colors because it's a hard color (Jon ArtetaGrisaleña, 2017).

By applying such colors small rooms can be made to look larger. You can combine these with some pastel colors to cheer up the room. For example, if you're looking for creating a calm and peaceful yet classic environment, use aqua green mixed with mocha or dusty rose combined with light gray.

It is recommended to avoid shades of dark gray for the room, because they can induce a state of sadness and depression stress.

Red hot is one of the most colors and warmer temperatures, is linked to vitality and activity and adventure. Red and increase susceptibility to food and unappetizing. Although it lends an air of intimacy and comfort to any room, but it is a matter of feeling upset or small space.

Violet and purple royal these colors symbolize the property and the well-being of living, as a symbol of sensitivity, good taste, art, music and philosophy (Jon ArtetaGrisaleña, 2017).

RESEARCH RESULTS:

Through the research, we find that the following set of results were reached:

1. Study of the interior design of museums and how to develop and employ them. The good design of museum exhibition halls depends on many design principles and standards Which must be known before applying modern technologies to interior design.

2. Applying modern technologies in the interior design methods of museums creates a kind of interaction between the visitor and the exhibits. It creates a suitable atmosphere for the display by ensuring comfort for the visitor and achieving an element of dazzlement.

3. Taking into account the movement paths inside the museum exhibition halls helps the success of the design process.

4. The mobile interior design helps to easily change the shape of the museum's interior space and make optimal use of the pavilions' space the offer.

5. The use of smart materials in the museum’s interior design helps create new shapes for interior design elements.

6. Interactive displays help increase visitors' awareness of the types of exhibits, their history, and their origin.

REFERENCES:

ASHRAE, 2003, ASHRAE Handbook - HVAC Applications, Chapter 21, Museums, libraries, and
archives, pp. 21.1-21.16.

("Egyptian construction magazine", n.d).

Giusti E., 1999, Gli impianti di climatizzazione per gli ambienti museali, Condizionamento

dell'Aria Riscaldamento Refrigerazione, n. 9, pp. 821-831.

Giusti E., Gestri M.,1999, L'effetto del transitorio sulla conservazione delle opere d'arte, La

Termotecnica, n. 10, pp. 117-122.

Hartman T., 1996, Library and Museum HVAC: New Technologies/New Opportunities –

Heating/piping/airconditioning, part 1, n.4, pp. 57-60.

Hartman T., 1996, Library and Museum HVAC: New Technologies/New Opportunities –

Heating/piping/airconditioning, part 2, n.5, pp. 63-73.

Journal of Museum Education, Volume 38, Number 1, March 2013. 2013 Museum Education Roundtable. All rights reserved.

Jon ArtetaGrisaleña: "ABRIEF HISTO RY OF DIGITAL ARCHITECTURE"- Abstract of PhD Thesis: "The Paradigm of Complexity in Architectural and Urban Design" University of .Alcala, 2017

Klwsy, A.A, Klwsy, M.M (2004). Encyclopedia museums the first part. Egypt.

Klwsy, A.A, Klwsy, M.M (2006). Encyclopedia museums the Second part. Egypt.

NBS, 1983, Air quality criteria for storage of paper-based records. NBSIR 83-2795. National

Institute of Standards and Technology, Gaitherburg, MD.

Redondi G., 2004, Impianti HVAC nel recupero di edifici storici e museali, Costruire Impianti, n.1,pp. 63 -71.

("Saudi Arabia Building Magazine", n.d).