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Theorizing building technology in environmental architecture: towards adaptive methodology

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Abstract
Across successive Eras, Architectural thought was continuously trying to conform with the development of available technological tools related to the field of modern building technology and trying to apply it in order to shape differing building patterns. In the beginning of the third millennium, Architecture combined with information and digital revolution, especially after applying technological tools for technical building operations and manufacturing modern building materials through appropriation with design requirements and the application of Ecological, Green, and sustainable Architecture concepts. In accordance with environmental vision, this paper discusses global changes in architecture through deductive and analytical study to the importance of environmental design and nature conservation for supporting scientific invention, new fabricated materials and building technologies, which will provide a modern environmental language for Architecture and Urbanism with their own criteria. According to this vision, this paper introduces a new Approach of environmentally Adapted Architecture with Creative Structural Systems Thinking, (Innovative Thought Methodology).

Keywords
Building Technology, Ecological System, Design Process, Environmental Design

Introduction

Technological development affects people both positively and negatively. The positive effect is to increase human knowledge and abilities, while the negative impact is the negative effects of direct application of technology without analyzing it and trying to understand its meanings. Also, the design of any building is inspired by the responsiveness to climate - technology - culture and the surrounding environment, with the possibility of compatibility between constants and variables to reach the environmental equilibrium within contemporary architecture.
In this case, the building systems, construction methods and materials must be adapted to the environmental context in which they exist and within it, there is a need for adaptation of climatic and environmental as well as adaptation from the technical and social aspects in align of compatibility with construction technology for current millennium, (Wasfi, 2014). The study of environment through its natural and social aspect and built environment, although human relationship with them must have a direct impact on the formulation of architecture. There are few creative architectural works on the Arab countries with an ecological design that deserves respect and appreciation, regarding to global changes and caring about environmental system and conservation have increased through design process by caring materials selection, systems and methods of construction.
Hence this paper explains how to reach the appropriate strategy that oriented towards environmental balance;

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see appropriate environmental technology and natural sciences as an essential tool and source for innovation and reassessment of design and construction methods that reflect the general interest in green architecture. This will be regarding to environmental measurements, which are critical in determining the precise intellectual balance of the architecture, and influencing the final form of mass and architectural space, as it does not reflect the changing social requirements and specifications of the appropriate materials and elements only, but help us to achieve contemporary environmental architecture according to building systems, methods and materials of construction Appropriate Technology.

Scope and limitation

Regarding to current awareness among the whole world about our earth and CO_2 emission increasing; this paper introduce a new methodology for innovative merging of building technology and techniques to buildings with satisfying current efficient design needs through integration with natural surrounded environment. Design phase and construction phase are started with site considerations, soil & physical considerations, climate considered, also considers techniques and materials available etc., it is collectively a perfect passive designing system with climatic loads and energy consideration.

Environmental architecture has been developed and practiced by the scientists & people over generations, they are tried, tested and practices which sustains over the ravages of time using locally available materials or high techniques and materials for their building erection which respond to climate without disturbing the environment. The bioclimatic creative design methodology that exploits advantage of environment aspects through the correct utilization of design components and building technology for energy saving and also to guarantee agreeable conditions into structures.

Research methodology

This paper addresses via an analytical and deductive study to indicate the different types of environmental architecture, through new building materials and structure by relating them with design considerations. To evaluate the commitment of these architecture types for sustainability, an evaluation with level of ecological indicators was built up. It is about understanding the energy consideration of environmental system; it is to understand the design techniques and practices of Arab architecture & its native climate. After understanding the problems a new vision for creative mythology of innovative environmental design through building technology will be introduced.

Technological factors affecting Architecture space

Construction is an essential component of architecture as it is responsible for the materialization of architectural thought in a physical form that allows the building to resist the forces affecting it as gravitational forces, like internal loads and strong external nature (McDonough and Braungart, 1998; Giurea, 2016). Thus mass could reach stability and balance. Structural thought forms group of cognitive sciences that caring about the art of architecture and built environments, whether they are concerned with construction systems, materials, means of implementation and techniques.

The role of building technology is forming through analyzing construction compatibility with the formation of the mass, function objectives, available building materials that could be able to embody these building products in their physical form. Also goes beyond that to include the method of implementation, the tools, devices, equipment available, and its relationship to economic potential, and more important is to abstract construction elements of the environment takes them from materials, structural system and thus define the tools and necessary equipment to complete the construction process. In addition, the necessity of matching appropriate construction of space and period, so that it goes beyond being just an attempt to search for a skin of the building as it represents a particular cultural expression of a particular society, and therefore the construction methods used have clear vision and indicators of the scientific, technological and economic aspects available to the community.

Towards a comprehensive concept of building technology

The term technology is not just a tool or means used by man to solve his problems and control his environment, but is a process that should expand to include the social & environmental conditions that gave rise to this tool or means as well as the various aspects of social behavior with regard to its application, and within this concept technology has four dimensions: technical, environmental, organizational, and cultural/ethical. This definition sought to emphasize on the fact that it is useless from technological application unless it is accompanied by an organizational modification of the

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social structure in which it exists. So, technology cannot be immune from the value system resulting from the cultural and social dimension of society through existing environment, which exposes the conditions of its creation and imposes restrictions on its application. The value system must change and adapt in response to the social variables created or induced by the technological variable.

Architecture is structurally formed

Regarding to physical -visual architecture characteristic, it always urges us to look for new things in the world of building construction. Each building construction material and each structure system act an essential role in the architectural form, as well as the culture and physical characteristics of the site (Giurea, 2016; Samy, 2017).

In the context of global variables, Arab architecture have to keep pace with the development resulting from these variables by raising the level of innovative capacity of architects and those interested in the field of construction industry so that the Arab architecture does not remain dependent on other architectures through the consumption of foreign technologies. Architecture in general is one of the most important visual images that must be preserved in order to have a local spirit without losing the spirit of the age in the framework of applying modern technology without reproducing the old and without imitation of others. We must prepare ourselves for a new architectural age, an era in which those who deeply understand the technical development of construction technology and locally reside within the framework of the idea of guided identity and orientation of identity in the urban environment to which the construction system belongs.

Architecture and Environment

Through history, the human formed a harmony with architecture, the relationship between man and architecture ranged from the positive to the negative regarding to different civilizations formed by man in a way to reconstruct the earth (McDonough and Braungart, 1998). The concept of the natural environment for man has varied in different ages and peoples. This concept is associated with cultural heritage, customs, values and religious rituals at other times. The view has evolved to pay attention to the environmental returns of natural environment, starting from the consideration of a gift from God must be preserved to be a garden that can be enjoyed by man and then to the attention to environmental vocabulary and natural resources supported by Landscape Architecture and Green Architecture where the impact of the environment and its natural characteristics the most notable of these are organic shapes and irregularities. When the dominant concept and the ruling thought shifted from the concern for the natural environment to the technological, scientific and industrial development, it resulted in neglecting the natural environment and causing harm to it, which led to a comprehensive deterioration of the natural environment. In recent times, technological advances have been encouraged to deal with nature, give strength to reshape and deal with it and adapt to its characteristics, components and elements without colliding with it.

More recently, there has been a growing recognition of the key role of man in shaping the biosphere and his responsibility for its development, also the need to take into consideration intangible things such as human understanding of its environment and quality of life. Ecology has become a science of natural and humanities; it is a natural science involving man and human science involving nature (DeKay and Brown, 2001). Where the term environment refers to the nature that surrounds the human in all its implications, which is affected and influenced by man, responds to them, resists or interacts with, (Ingrid et al., 2010). The environment in which we live is formed in the midst of a complex interplay of interactions between three major systems, the Biosphere, the Sociosphere and the Technosphere (Steven, 2000). Architectural responsibility in its broad concept is not only honest in fulfilling the wishes of the client but also the sense of life that the architect participates in formulating and the sense of responsibility towards future generations, it is moral responsibility towards the environment is the highest level of environmental awareness in architecture.

Ecological System

Ecology is a commonly used concept in the natural sciences in particular, which means «the relation of living organisms to the environment in which they live», and the word ecology is derived from the Greek origin of two syllables oikes means «house» or «home» or place for accommodation and living, the word «Logus» means living organisms and their surroundings. Ecosystem is an accurate and balanced system in the integrated environmental unit, which consists of living and non-living components in a specific place interact with

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each other in the framework of a precise and balanced system according to self-dynamic that continue to play its role in the restoration of life and aims to achieve the balance and continuity of the relationship between human It is the interactive relationship between physical components and biological components in a specific place (Hyde, 2000). The fundamental value of understanding ecosystems is therefore a key tool in the study of complex environmental variables, in addition to being the basis for recognizing the aspects of integrated functional relationships between environmental elements and environmental planning, (Wines, 2000). It serves as a necessity for People of the globe collaborate in improving their lives because ecology is the complementary science to man and nature.

Impact of incorporating the environmental dimension in the design process: (necessity – challenges)

Regarding to positive as a consequence and awareness of the effects and interrelationships between buildings and environment (DeKay and Brown, 2001), the attention of architects and planners has been directed towards studying the phenomena and processes that occur as a result of human changes in the built environment of different sizes architecturally and urbanely, which was followed by the emergence of new concepts governing the design process, (Steven, 2000). Architects start to evaluate their works based on design considerations related to the actual importance of the building's response to the environment, then create an architecture its goal is compatibility with the environment. Consequently, these considerations have got the same attention as the fulfillment of functional requirements, forming values, building economics, and it became necessary for the architect to have a comprehensive awareness and understanding of the environment through their concepts in order to produce a compatible architecture. The importance of incorporating the environmental aspect into the design process comes as a direct response to the enormous challenges facing the environment and the obligation to protect them in providing structural formulas that meet the various functional needs and within the framework of the conscious handling of construction technology provided by the era in which it exists to complement the functional system and give a positive effect to the environment in which it exists. The constructional format shall be compatible with the environmental entity and shall not lag behind the technical aspects of the age in the field of building technology, which are represented in building systems, construction methods and materials. A large part of the imbalance in the environment lies with those working in the engineering field, especially in the areas of architectural design, urban design and urban planning.

The role of building technology in theorizing of environmental architecture

Applying building technology in environmental architecture

Growing evolution of architectural thought in the current era has produced forms and architectural trends that did not exist before, they appeared based on technology techniques in the field of construction, information and digital regarding to the growing keenness on architectural trends towards communication with the surrounding environment, which resulted in a sophisticated urban fabric and differ in all their dimensions, forms and measurements from the previous.

Here, it should be noted that taking into consideration the environmental and social aspects of man, don't mean the omission of scientific and technical aspects and other design constrains. Some may think that the methods of environmental architecture are merely a transfer of local and inherited in an artificial way, but on the contrary, it is in response to the requirements of the era in the context of growing and aware of its technical potential in the context of cultural interaction with the social and human needs, with awareness of the inherited and heritage content in which these contexts exist Constructivism, (Mazzoleni, 2013).

Biogeometrical Architecture. The concept of Biogeometrical architecture emerged through the development of technology. Modern theories of physics have testified significant changes in the concepts exposed to the interacting forces in the universe called "energy", which led to radical changes in the formulation of different sciences, (Jerry, 2015). This change in concepts included the definition of architectural spaces as it contains a group of bioenergetics reactions within it which in turn affect the human using these spaces. The architectural space of the energy concept is a space containing many levels of energies that were not aware before and now we are aware in this current era. Also, architectural vocabulary are methods to form a space or the formation and creation of energy within

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the architectural spaces regarding to the dynamic integration with the structural system through all its implicit component that shaping this energy in its final formulation, and this energy has a negative or positive impact on the user of the space, since th**e** whole universe is energy, any form is energy and has energy emanating from the wave and molecular arrangement. Colors also have energy depending on the color wavelength. Minerals and materials are different forms of energy, and the architect deals with these vocabulary in that it is a language to form architecture, while it is also a language to form energy, it is necessary to be aware of the effects of this energy on the user of the space to be able to design spaces that lead to the biological balance of man and thus help him to do his function in the best way. The main objective of this architectural direction was to adapt technology to man, and create a friendly relationship between architecture, technology and man, according to technological advances, man is no longer able to stand up to accelerated development. So, the architectural idea of bioengineering (which is the language of space formation) is based on the fact that: however, space is affected by air quality, is also affected by the shapes and angles used in its design. This science is concerned with the study of the impact of shapes and angles on the fields of living energy and gives increasing solutions to their harmful effects and to enhance their positive effects according to positive interaction with the environment and benefit from building technology (Berkebile, 2007; Jerry, 2015) (Figg. 1 and 2).

Figure 1. *Biogeometrical architecture; architect selection for angles and colors to achieve a balance in energy within the spaces (left)- tourist village in Ain Sokhna from inside and outside the units, (right)- the tourist village in Hurghada, architect: Ibrahim Karim (www.biogeometry.com).*

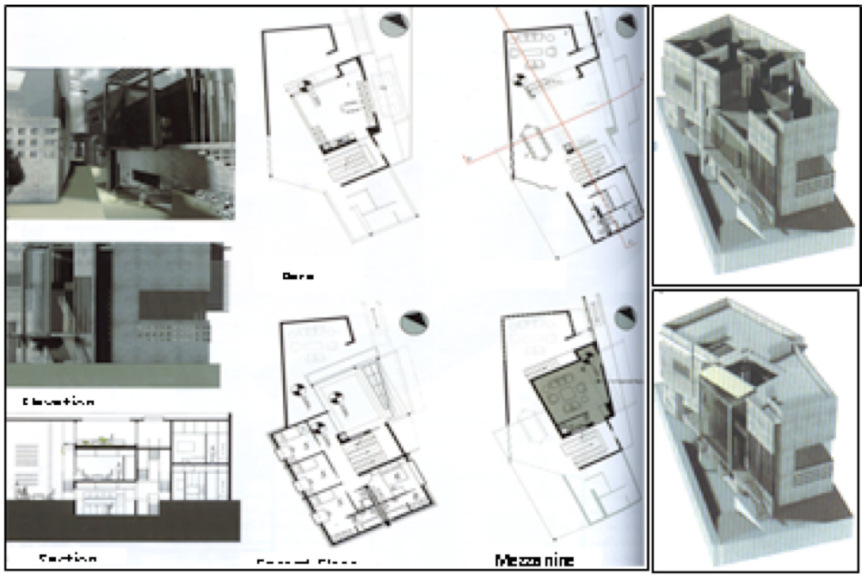

Figure 2. *An innovative model consisting of the composition of biogeometry of blocks, in an experimental attempt to add a new touch to the reality of the modern Saudi housing with limited space, , Saudi Housing Competition, Saudi Construction Magazine - Issue "165" - May 2004.*

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Thus, biogeometry science is the science that allows us to know how to completely get rid of the architectural pollution that we are suffering so badly, as well as pollution resulting from increased use of networks and electromagnetic devices in buildings, (www.biogeometry.com).

Green Architecture. It is an old concept of ancient human, and some sources indicate that the beginning of urbanization was when the concept of the garden appeared before more than 200,000 years ago (Hyde, 2000). The current green architecture is an attempt to interact between the environment and technology, especially in the field of construction to produce interactive buildings, without ignoring the humanitarian needs. Green architecture is considered the best trial of current architectural directions that tries to return humanitarian needs as a core part in design dilemma, thus it returns man to nature and oriented to have security, tranquility and personal safety. As a result, man feels a sense of tranquility, comfort and relaxation, all of which lead to the fulfillment of some of the most important human needs**.**

Green architecture is an architecture that adapted to the surrounding environment and integrates with all its parameters, fill the shortage, repair its defect, and take advantage of this periphery and its sources, finally it does not harm the environment with its waste. One of its success factors is to try not to have waste at all; hence the name of green architecture was abstracted. It is the architecture that achieves the least environmental damage from the structural and economic perspective by reducing the size of the facilities, loss of materials and cost (Wines, 2000). Therefore, green architecture is the way to the design of ecological buildings because it is a highly efficient system, it is a functional building system aligned with its biosphere and its ecological scope, through the management of inputs and outputs of this system with minimal negative effects on the environment and energy consumption, whether in the construction, operation or demolition of this system, achieving efficient performance of the functions, activities targeted and innovative architectural expression, (Berkebile, 2007). It has three properties:

- *Growth and regeneration* are not fully developed but growing as they age.
- *Their outputs are inputs* that perform normal balance cycles.
- *Take full advantage* of the surrounding environment to get its resources as much as needed.

For architects It is important not to focus only on the idea of technology and to divert attention from understanding the nature of the place, cultural diversity and social change. Balanced thinking sees ecological technology based on natural science as a primary source of innovation and should be reflected in binding laws when building permits are taken into account during the design process. This Thought formed with Respond to:

- Climate
- Technology
- Culture
- Site

Consequently, the construction method that achieves the required functional needs of the building through the following:

- Use of appropriate technology.
- Selection of building materials available in the surrounding environment.
- The materials should be inexpensive in terms of how much energy needed in its production.

Moreover, green architecture is flexible to accommodate the expected future variables in any of the elements of the building controlling system as if it were an organism. The elements of green architecture apply advanced building technology systems, which include Photovoltaic Cells, solar panels, thermal glass and all modern technologies to save energy. It is the architecture that achieves the least environmental damage from the structural and economic perspective, (Fig. 3).

Sustainable Architecture. Architecture can't be merely transformed just to meet the functional needs, architectural design in not only for fulfilling the functional needs of man but although must preserve resources in this land in order to achieve balance in everything (between art and function - between technology and environment). Architects must adapt modern technology to match environmental standards for achieving the required environmental balance that ensures a stable life on Earth, hence the idea of sustainable architecture, (Wasfi, 2014).

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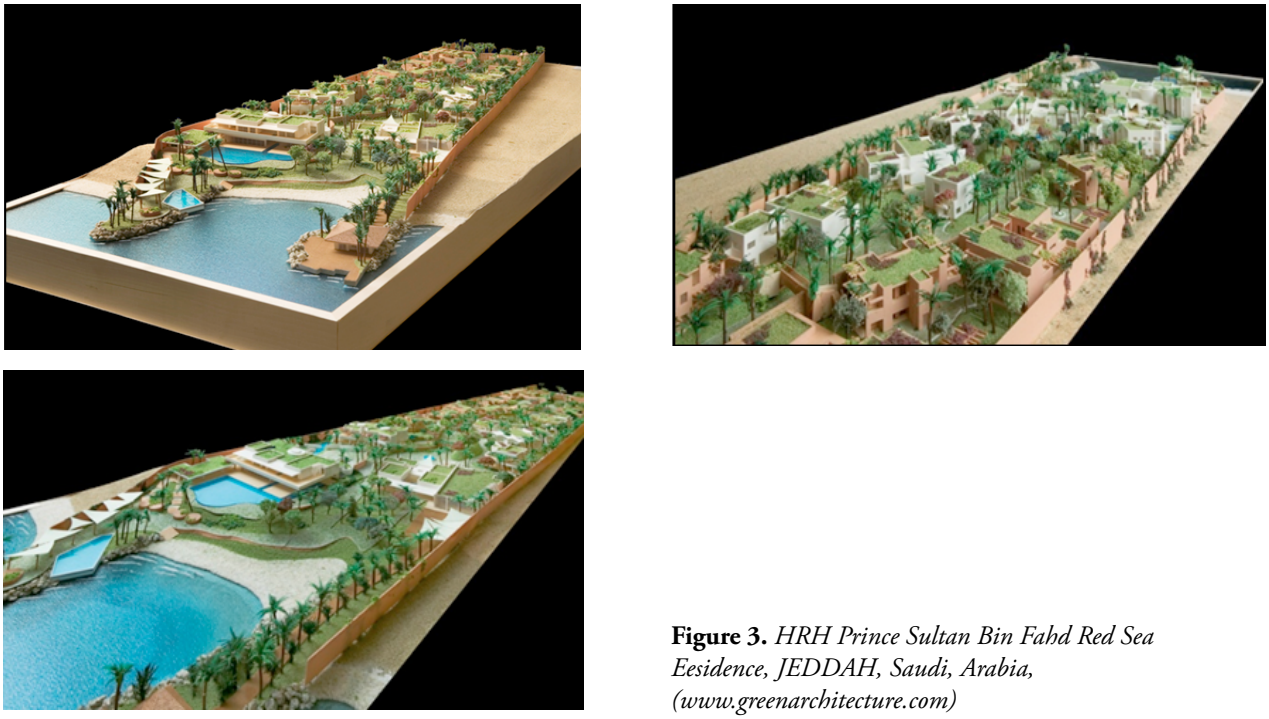

Figure 3. *HRH Prince Sultan Bin Fahd Red Sea Eesidence, JEDDAH, Saudi, Arabia, (www.greenarchitecture.com)*

It is clear that sustainable architecture with a more comprehensive and more general concept than green architecture. The idea of sustainability means the compatibility between economic performance, social responsibility and conservation behaviors in order to achieve a close link between economic development, social development and conservation of the environment to ensure the continuation of development process for the benefit of future generations.

Sustainable development is a strategy whereby societies seek economic trends that benefit the local environment to sustain life. Sustainable architecture is therefore an architecture that supports ecological balance by relying on ecological construction systems and building materials that can be reused to minimize the depletion of natural resources. Environment, culture, architecture, technology and many other elements form a comprehensive global system that needs a balanced view (Fig. 4).

It meets the needs of the present generation without compromising the ability to meet the needs and requirements of future generations. Sustainable architecture includes basic principles:

- the idea of sustainability and recycling of construction materials to preserve natural resources and strive for a technically and culturally conscious architecture that respects the environment and maintains its balance.
- integration of nature, environment and modern technology so that the building emerges as a micro ecosystem that combines greenery with buildings.

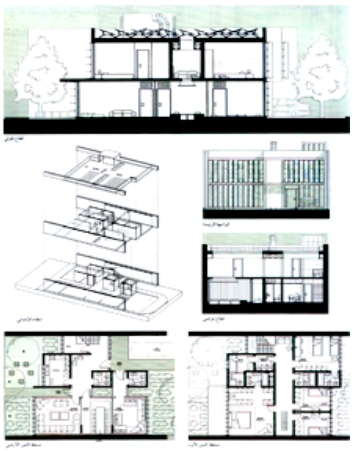

Figure 4. *Sustainable dwelling in which the idea relied on load-bearing walls and is connected to the external environment and characterized by the existence of self-sustainability using solar cells in the surface, Saudi Housing Competition, Saudi Construction Magazine – Issue "165" – May 2004.*

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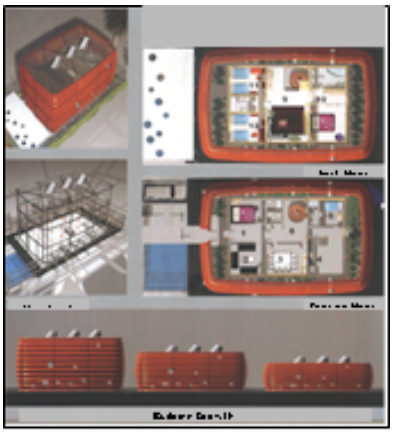
Sustainability goals are based on advances in construction technology its high-tech techniques in all its components as well as advances in conservation and reuse technology (Fig. 5).



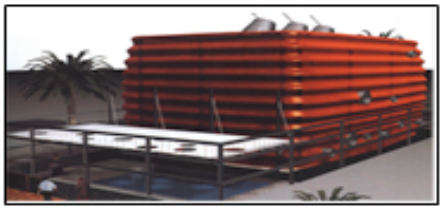


Figure 5. *A sustainable house with a protective cover from the external environment and the possibility of extension of several floors as ideas for future architecture, Saudi Housing Competition, Saudi Construction Magazine - Issue "165" - May 2004.*

The USA Green Building Council (USGB) has developed a new LEED (Leadership in Energy and Environmental Design) system that demonstrates, organizes and defines the key components of sustainable design in an easy-to-understand and comprehensive. It provides certificates as to whether the building will meet the requirements or not. Buildings are awarded one or more points when they demonstrate that they are appropriate or exceeding the technical requirements, the points being given are levels, about four levels of certification and thus this system has created a revolution in the direction of sustainable design.

Eco Technology Architecture. It is an architecture that tries to exploit the technical data without neglecting the environmental and social dimension, which means Ecotec versus High Tech. for example the use of environmentally friendly technology at all levels of the construction and operational process of the building. New materials and concepts in architectural design allow for improved energy performance and reduce the adverse impact of materials used in environmental construction. There is positive evidence and advances in the physical form of architecture either in the development or development of new materials and products (Fig. 6), or in the use of traditional materials in different ways. As part of the process of applying environmental standards, thermal performance standards and environmental systems have increased the measurement of energy in buildings when they use new innovative products and devices that have been developed for outdoor coatings or paints of buildings: semi-transparent insulation, photovoltaic cells that improve shade and daylight regression systems. Also new methods of environmental treatments have been developed from innovative types of glass and facade construction methods**.** In addition, the emergence of the exterior covers principle with multiple environmental functions in adaption of the technical harness of modern technologies of buildings taking into account the internal thermal mass of the building, as part of the environmental control of the building**.**

Figure 6. *The British Pavilion in Expo, Arch. Grim Shaw- The building shows light structural elements designed from light steel and glass to resist the hot summer climate, as well as the installation of photovoltaic panels on the building, the huge water wall in the eastern side of the building and pass down through the wall painted in a water bath to form a trench around (https://grimshaw.global/projects/british-pavilion-expo/).*

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This means that the outer shells of the building are responsive to the surrounding environment thermally and climatically under the use of automated methods and modern systems to control the internal environments and integration of high-grade with the controlled surrounding environment. Thus, this direction respects the site in the context of high balance with environmental factors inside and outside the space, technologically and not naturally.

Smart Architecture. Smart Architecture is the result of attempts to integrate architecture-related elements such as building materials and technology as an integral component of architectural output, including heating, air conditioning, communications and human factors, (Samy, 2017)**.** Smart architecture is about using the minimum operating cost to achieve maximum internal comfort. Smart architecture takes advantage of the great shift in the information and communication revolution. Accordingly, smart architecture is an integrated environment for human comfort, integrating all this with the latest technology, knowledge and development in materials and construction methods. In other words, it is the smart building that contains technological applications so that these applications benefit from each other through the exchange of information. Intelligent architecture thus offers integrated solutions for the diversity of designs, the optimal use of resources, functional materials and technology in general and construction technology in particular, and finally find a precise method of design simply and the design is economical and environmental in the production of purposeful behaviors of increasing users' comfort in the production, creativity, safety and control of energy sources and cheap cost of individual thermal comfort, (Fig. 7).

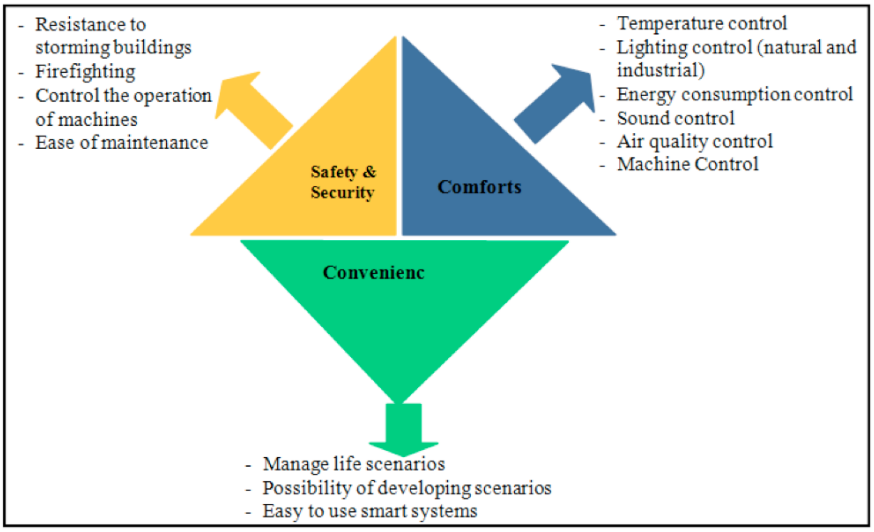

Figure 7. *General idea of smart buildings, developed from: (Samy, 2017) and Saudi Building Magazine - Issue 184 - January 2006).*

Thus, smart buildings can be applied through four basic elements (construction - systems - services - management) and the interrelationship between them is most important item that helps users to realize their goals of cost, comfort, security, flexibility and achieve structural effectiveness as a whole, in balance with of positive integration and design system, this is the basis on which all these products are built, (Krishna and Thirumal, 2015).

They are the coordinator of the interaction between all these elements so that the building will finally show its fulfillment of its purpose and for which it was established. Architecture is no longer content with the direct «humanitarian» function, also the techniques used in construction are no longer merely construction techniques, but there is a technical world that makes the building «electronic» that could be controlled remotely. It is clear that there is a mutual influence between technology and architecture (Krishna and Thirumal, 2015), as the architectural need propelled the technology to unprecedented spaces and contemporary technologies have made architecture out of the spontaneity it was. Therefore, it is not possible to view smart buildings as only using telecommunications and remote control techniques to manage different systems this will be so limited vision. Also, the role of architectural design and its close relationship with modern technology must not be overlooked, (Samy, 2017). The architectural design must be consciously integrated with the technical dimension embedded in the functional structure of the building, (Figg. 8a and 8b).

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Figure 8a. *In the Prophet's Mosque in Madinah domes and electronic tents control and interacting with environmental variables, especially with regard to building technology integrated with the environment, especially with regard to building materials suitable for the hot dry climate, represented by the material Teflon manufactured from tents.*

Figure 8b. *Environmental response and smart spaces, The Building Research Establishment (BRE) Office Building, shows the solar chimneys and details of the solar station as well as solar fenders moving aesthetic dimension (*DeKay and Brown*, 2001).*

The way smart systems work in buildings depends on the presence of a central computer similar in functionality to the human brain, this computer is connected to an integrated network similar to the human nervous system, branches of that network throughout the building where there are sensors distributed throughout the perimeter of the building, All internal systems of the building are connected to that network to be integrated network similar to the backbone, where can control all building systems such as air conditioning system, security system, computer systems and others. It is not only that the building is smart that all the systems in it are interconnected, but that these systems must be integrated with the various special needs in place, (Table 1).

Target	Examples of moder technologies used	Modern technology levels	
Use a single computer system that controls and monitors energy and security processes and integrates the effectiveness of management facilities	***Adaptive Control***	**Energy Efficiency**	**Management Facilities**
	Chiller Optimization		
	Optimal Energy Sourcing		
	Fire Alarm	**Life Safety Systems**	
	Smoke Detection		
	Emergency Control of Elevators, Doors		
	HVAC		
	Closed Circuit Television		
	Card Access Control		
Reduce cost by subscribing to equipment	***Audio-Visual Systems***	**Telecommunications Systems**	**Information System**
	Video Conferencing		
	Telephone systems		
	Satellite Communications		
	E-Mail		
	Computer Aided Design	**Workplace Automation**	
	Centralized Data Processing		
	Information Services		

Table 1. *Principle of Smart Architecture.*

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The approach of environmentally adapted architecture with creative structural thought

The ecosystem works according to a natural system, it is in a closed loop vital and homogeneous in what is known as the environmental balance, which is oriented by nature, works according to laws and interrelationships that lead to find a balance between all the elements that are interdependent, (Fang and Jiao, 2013). That allowing them to play their role in an integrated manner, and because of human intervention in the approach to manipulation and interaction with the assets of the universe, this has led to the occurrence of what is called "Open System". There have become inputs and outputs of the system, which in turn led to the emergence of various environmental problems with the lack of integration between the rest elements of building system, especially construction technology. It is therefore necessary to search for new thoughts in planning and architecture, hence the advocacy for the of environmentally compatible architecture concept appeared through compatibility with available building technologies. It is a design concept with life cycles; takes into considerations the impact of the building on balance systems in different locations to achieve comfort, human interaction with the natural environment, its use of natural resources and the techniques used in these resources must be seen as parts of a single integrated system. This does not mean leaving ecosystems untouched without interference, On the contrary, an environmentally conscious intervention that develops them according to their needs. By taking advantage of the available technology of current era and preserving its natural balance and protecting it from deterioration, it is the regulator. Now we are on the threshold of a qualitative leap to achieve architectural design not only at the level of the shape and functions of buildings, but in the way and methodology of thinking, interaction and communication between the environment and building technology, that is, we consider a methodology that deals with the building as a highly efficient system, an integrated approach scientifically, psychologically, symbolically, culturally and humanely. The contemporary concept of architecture compatible with the environment and building technology goes beyond the functional concept of architecture and extends to its impact on ecosystems. Therefore, it is necessary to include the environmental aspects into design and construction process in a realistic and not pretended way, which is the most desirable in the Arab world, that is located mostly in the hot, hot humid or hot dry region with special design considerations, that should be reflected on the design contexts of the building and the structural system. Thus, the methodology for environmentally harmonious architecture can be developed through two axes:

Environment Inclusion through the Design Process. Design process is the first Innovative stage for the creation of structural entities, thus by taking into consideration the environmental aspects; this will totally change the creative thinking of design process and make many changes to multiplicity and complexity of components that will be considered in design process. The most important is to convince customers of the benefits through the efficiency of environmental design as evidence for the importance of the environmental implementation in design process. Currently, there is a directory called Green Building Pay which is the main objectives of design process, and contains the following set of axes (Smith, 2001; Fang and Jiao, 2013):

- Integrated design principles should be the core of building owners› calculations.
- Effectiveness of applying all design elements to formulate the building output by clarifying and supporting the initial stages of design alternatives within the framework of construction processes and equipment.
- Re-orient design thought towards encouraging passive systems, to reduce dependence on traditional systems of energy consumption "Active Systems".
- Customers need to explain in detail the nature of the operation of buildings, especially administrative and public, which gives the possibility for enhancement of practical environmental programs.
- The use of advanced construction technology is not always appropriate but the most important is the selection of appropriate construction technology to reach the best balance between; energy efficiency, user comfort, ease of performance, maintenance, and at the same time meets the most demanding needs throughout the year.
- The importance of the Economic aspect through design and construction process.

Construction Technological Framework. Regarding to the high-tech millennium that we live now with Growing attention about our environment, it's very important to include environment through design process, this forces us to pay attention to local studies for creating building technology that compatible with environmental conditions and follow-up global studies

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in those areas with the aim of reviewing the latest scientific innovations, roles, methodologies to learn from, choose what suits us, leave what does not suit us. The most important is the attempt to pragmatic innovation, where this follow-up is more scientific than applied so as not to be affected superficially enough to transfer the outer shell without transfer and understanding of the substance which blurs features or local architecture identity. The use of contemporary construction technology, especially building materials, is a process with many stages and determinants, which more importantly, is the use of them without study or understanding of these determinants may result in failure to incompatibility with the environment, etc.. Regarding to this vision, that requires the application of many studies and knowledge of their natural characteristics as well as environmental determinants of the biosphere in order to produce building technology adapted to the environmental conditions of the tropics covering most of the Arab world.

Conclusion and Recommendations

The research discussed several aspects and ideas about the methodology of activating the role of building technology in contemporary environmental design, that through the importance of linking buildings environmental design science with various fields of natural sciences and structural technology. This systematic scientific interaction among them leads to many suggestions, which could be *New Creative Architecture Methodology through Environmental Vision,* (Fig. 9).

In addition, the process of building environmental design that includes thermal control strategies of the building is linked not only to other climatic and environmental conditions surrounding the building, but also to the solutions already applied to the elements of living nature in the place. To reach an advanced stage in the understanding and application of the various principles of environmental design from an integrative

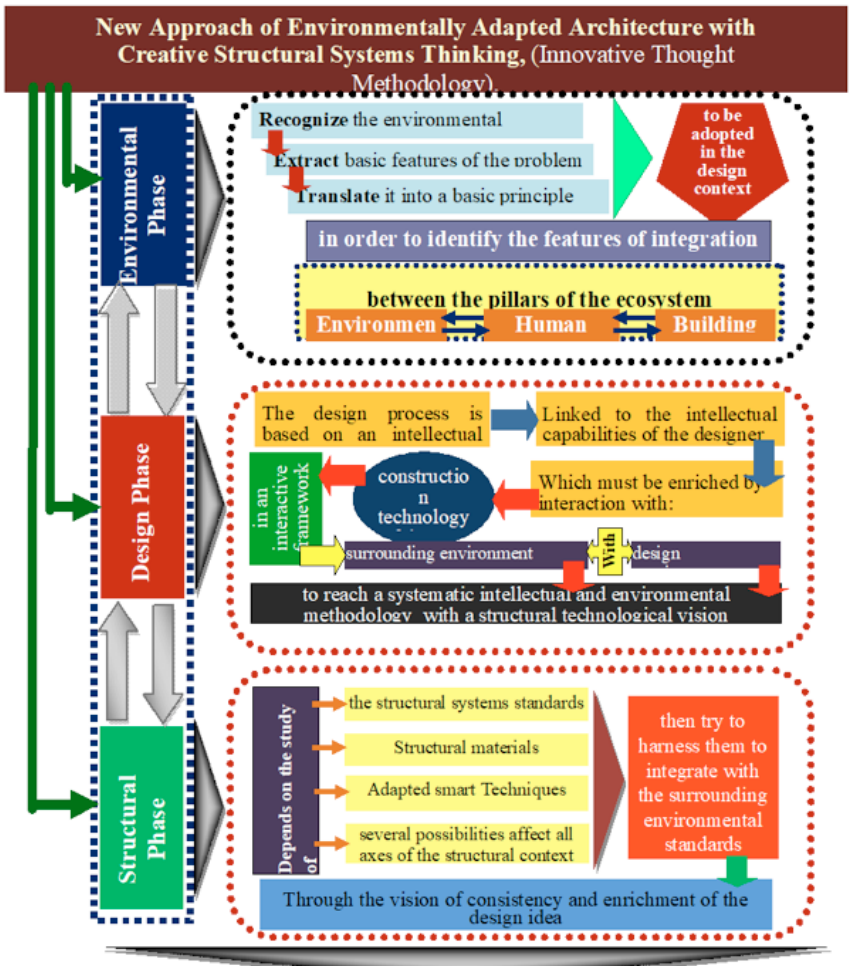

Figure 9. *The approach of environmentally harmonious architecture*

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vision through building technology in an innovative way, also to emphasize their relationship with architectural design process of creative architectural product, the research emphasizes on the following recommendations and methodological procedures:

1.The imperative activation of adaptive strategies and environmental system derived from reliance on environmentally friendly building technology, which takes the natural sciences as the basis for innovation.

2. Increase public awareness of the negative effects of traditional buildings as well as modern architectural trends that may avoid some environmental aspects during the design and construction phases.

3. It is important to review the methodology of architectural design as well as the methods, materials and techniques of implementation from an environmental perspective with a modern evaluation vision within the framework of green architecture that depends on innovative non-traditional sources of energy and also within the framework of rationalization.

4. It is important to increase the awareness of architects and architecture students about the importance of environmental aspects in the design process and the reliance on ecological design and integration with building technology within the intellectual balance between all aspects of design, which is reflected positively on the architectural product (external mass - internal space), in a consensual vision balanced with societal roles and cultural heritage.

5. The existence of a strong scientific base in the university study and research based on the concept of environmental design integrated with construction technology, and the development of comprehensive programs to solve the problems of the environment and conservation.

6. The importance of a targeted media methodology that works to create adequate public awareness of the issue of environmental conservation and the role of environmental design interactive with contemporary construction technology and the resulting benefits as a kind of user participation.

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