

Integrated environment & technology system **- Re-create the interior space through construction casing-**

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Abstract:

Environmental System is the best design direction to access interstitial space compatible with the nature of the user and surrounding environment, whereas it presents a solutions and designed curriculum dealing with environmental circumstances, as the nature of climate, materials, social and cultural systems.

So, dealing with these systems as a rigid and specific nature makes it far away of environmental concept of design in which depends on changing nature of space and time, then, integrative approach between environmental specifics and technological system in the design , is one of objectivity entrance depends on flexibility and change according surround environmental circumstances.

Buildings always prepared from many components, a desirable s control devices, as the interior design controls to determine dimensions of openings and make interior circumstances compatible with surrounding environmental control system in paces, building as human skin, a layer to protect our bodies and our environment.

Construction casingis the border line an interior contact happened with outside, the place allows to pass energy, material and organisms through contact with inside and outside, it occurred a dynamic design interact with naturally energy forces

The importance of the study includes the followings:

- § Recognize Technological features which compatible with natural environment, and its impacts to re-create interstitial space throughout builder casing.
- § Demonstrate the impacts of Interactive dimension of technology (Passive, Active, Complex), both traditional and advanced to integrated and respond with surrounding environment.
- § Importance of environmental systems as a designed specific for interior space.
- § Try to access to an integrated designed curriculum between environmental and technological system throughout four-wheel system of performing surfaces.

Research has pointed to answer the following questions:

- § How to access mechanism, design methodology linking environmental requirements and contemporary trends through technological possibilities?
- § Is it possible to achieve integration between demonstrated data and nature throughout four-wheel system of performing surfaces in traditional and technological environments through several hypotheses?

Through the basic hypotheses:

- § The best design could be reached, and the most comfortable for the user in interior space, whenever integration is achieved between environmental features and building design harmonically, whether it is done traditionally or technologically.

- § Design methodology could be re-read throughout operational systems before formatting.
- § Links comfort borders of interior space the relationship between environmental circumstances and technological system.

Key words: *Compatible technology, integrative approach, Dynamic casing, passive, Active, complex, system, four-wheel system of performing surfaces.*

Study methodology depends substantially on:

Explanation, analyzing, linking, conclusions, attempting to access the nearest views and results and most effective throughout the following stages:

Explanations of building technology concept compatible with natural environment throughout:

1- Environmental Construction System:

Whereas most of environmental construction system participated in traditional environment, in the idea of structure casing is the first value of architectural and space structure, as it represents major organizer and first boarder to face natural and climate conditions.

1-1 Thermal Equilibrium Strategy

Annual climate session phenomenon and daily weather in tropical and dry areas shows variations in heat features, resulting instability of interior environment of the building, so, providing comfort inside buildings depends on the characteristics of extent of control in external casing of the building whereas it depends on:

First: thermal features of walls and roofs, the best building materials that do not access the heat, it is includes porosity natural materials as sandstones and calcareous stones

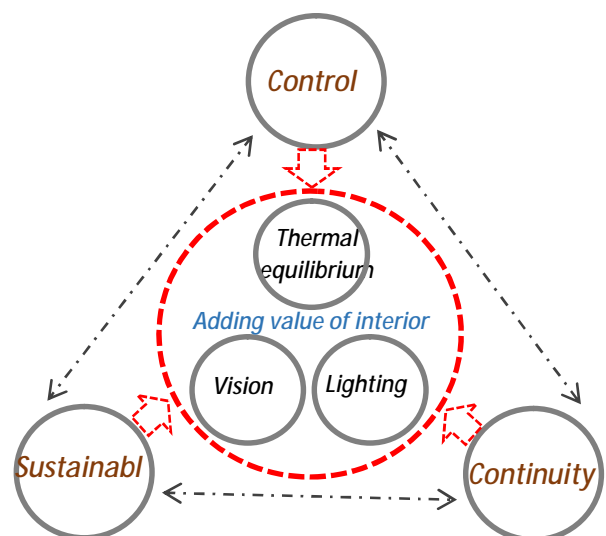
Second: Air movement, dry air, high temperature, openings has a great importance in the major space of the building.

The research finds that the idea of sustainable construction and its maintaining of ecological balance and compatible with climate changes formed in a set of features could be identified in three major characteristics for compatible technology with natural environment as:

Continuity, it represents the fine feature in aims at developing and promoting.

Controlling: Best employment of forming elements, building guide, in which support self-respond for internal and external variables.

Sustainability: To find urban community to achieve principles of maintain, and depends on potential and renewable energy sources.



*Strategy of creating interior space through builders cover
-Researcher Analysis-*

From this point, re-create of the interior spaces through structure casing to face climate conditions and Compatibility with surrounding environment in which depends on the relationship between external and reflective structure on comfort systems inside interior space as equations of thermal equilibrium, lighting, and vision.

2- Analyze dynamic nature for construction casing:

Whereas a builder is fixed facilities, its construction casing could be dynamic to change environmental requirements and conditions, it allows to external environment sources to enter as heat, light, air and sound.

Studying of structure casing is similar to plants cover (breather neighborhood) react with surrounding environment through its thermal behavior, as well as building achieves thermal balancing throughout its design with a flexible type, as its controls of thermal of interior environment of the building .

Structure casing has highly flexible as a reaction of responds for external climate impacts in heat and dry areas.

That means the Construction Casing to access reduction of thermal loads of the building, and achieve the most thermal comfort conditions.

2-1 Vocabulary of construction casing design

2-1-1 Openings

Contact window between interior and exterior environment to achieve three major operations, access to light ratio and required vision, good ventilation and thermal transfer

Light reveals what is present, space gives a tangible shape for the light, whereas the eye attracts to lightening elements, to Contradictions color.

From the functional point of view, light meets the visibility requirements through lighting design in the internal space vocabulary and facilitate performance of human events with a required speed and accuracy.

General impact: Gives uniform and spread illumination, with a few contradictions and faint shadows

Local impact: to light a specific area in the space directly and highly brightness.

Accent impact: it gives an objective lightning with indicated points or rhythms of light and darkness in the space in which limits and Monotonous configuration.



Different lighting effects slots through builders cover to interior space

www.folkculturebh.org

Opening design and used materials is an important side to measure the effectiveness of external casing, air movement depends of the openings in entrance and outlets, this equation may explains , air flow rate through the building by square foot/hour = 30150(square foot) (wind speed mile per hour).

This equation is accurate if the air movement and winds is vertical on the building, in the case of changing the wind angle, the equation must be changed. - *As the following table-*

Proportion	Total area of openings air Exit / Entrance	Air quantity
Equal	Exit / Entrance = 1	3.150
Exit more than Entrance	Exit / Entrance = 2	4.000
	Exit / Entrance = 3	4.250
	Exit / Entrance = 4	4.350
Entrance more than Exit	Exit / Entrance = 1/2	2.700
	Exit / Entrance = 3/4	2.700
	Exit / Entrance = 1/4	1.100

Proportion between entrance & exit openings, and the quantity of air gained
 - المصدر: عمارة الفقراء، حسن فتحي -

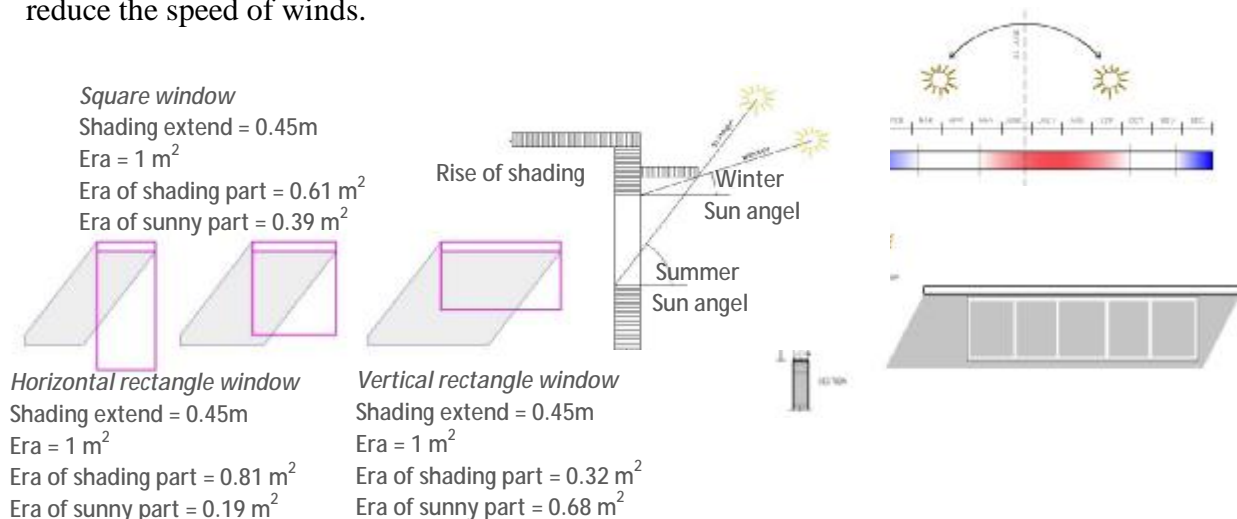
2-1-2 Shading devices

It considers one of the important elements in the formation of the outer cover of the building, it is also a unit complementary and related to the design proportions and forms of the openings to the building cover, it depends on the external means of shading devices shading to protect it from direct solar radiation and prevent its heats to get inside the building., Solar devices divided into three major types:

Horizontal shading devices: Obstacles set horizontally to prevent it from unwanted solar radiation, it differs in its dimensions upon the solar and environmental conditions for horizontal shading devices to protect it from rains and solar radiation.

Vertical shading devices: It is more efficiency of vertical shading devices to be used in eastern and western window in the case of sun angle and low perverted from the direction of the windows

Combined shading devices: Linking elements of horizontal and vertical shading, it is the most comfort for using in hot areas, it could be improves the values of thermal insulation and reduce the speed of winds.



Relationship between extension of shading devices & window space in the summer solstice - warm season

Solstice in summer & winter - "warm and cold season -Arabic Republic of Egypt -"and their effect of extension and height of shading devices

This design to realize environmental and thermal comfort in the interior space, and to set a group of considerations and designed sides:

- 1) To determine heat period in which the shading is required, and cold period during which prefers sunbathing.

- 2) To determine the position of the sun at the stage where shading is required.
- 3) To determine the severity of the effect of solar radiation in different directions.
- 4) To determine the prolonging of Horizontal shading devices per hour.
- 5) To determine the site of horizontal devices to increase the efficiency of its performance in the cold season.
- 6) To determine the effect of the form of openings ratios in determining the preference between the use of vertical and horizontal devices.

3- Conclusion integrative approach to environmental and technological systems:

In which can be reached the best design and most comfort for the user in interior space- according to the research hypothesis, as integration has been done between environmental features and building systems with compromise formula, either it was a traditional environmental formula and technical treatments.

So, it is important to realized what are those systems formed building structures, it represents a great significant of environmental methodology design , in spite of its variations and differences and its degree of variation according to the type of system or element.

It could be summarized in four major systems represent the major specifics of structure system as it called four wheels systems of performance roofs

3-1 Four-wheel system of performing surfaces:

Structure required realizing environmental vacuum system fulfill humanity needs inside and outside architectural space along with physiological side to realize efficiency of work performance in vacuum spaces through:

Structure system: It represents the first entrance of environment to access efficiency in structure energy, in which realizing by efficiency in using martial through structure continuity , geometric continuity and material continuity .

Casing systems: supports fine functional vocabulary of the entity as a whole, cover provides protection by containment, as well as internal and external environment budget.

Interior space System: in which defines spaces to perform various jobs,

Mechanical system: endeavor to rise the required services inside the firm, it forms performance functional compatible with surrounding environment, it consider as a default vacuum depends on the degree of success on the nature of these systems.

3-2 Integration Approach between structural environmental and technology systems

It summarized that the four- system constructed the structure system within the integrated relationship pyramid could by classified engineered and spatially to get mutual impact called Four-Wheels System of performance surfaces in which required five levels to be integrated as follows:

1-Separation: (First level) it occurs the two systems away of each other's, they are physically linked.

2-Toucing: (Second level) it included touching relationship between systems without achieving any continued link.

3-Contract: (Third level) it includes relationship of interdependence, the two system are contracted with each other.

4-Interfering: (Fourth level), it is overlapped between used system in same space.

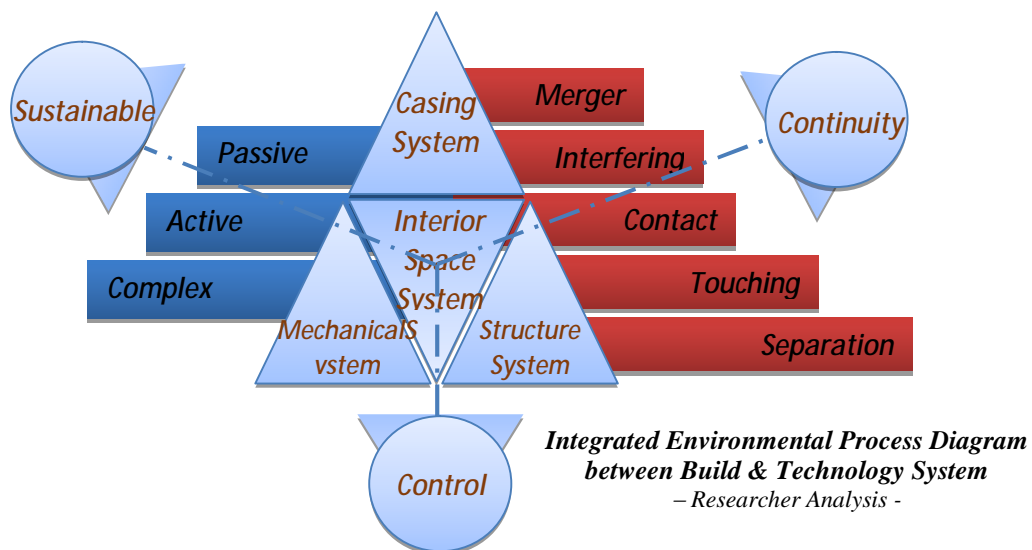
5- Merger: (Fifth level) it is the last level of the relationship between systems in the case of union of two systems or more.

These levels determines the sustainability of the design elements and its continued through a long stages of time, as its nature and flexibility to receive the new, the ability to control and optimal employee in its element in which support self-respond of interior and exterior variables .

A- Passive System: A technological system is used with dynamic features to amend interior environment without using any electro mechanic, it allows a specific amount of thermal Passive heat exchange with external environment and using nature lighting , it is more inclusive, whereas it depends on building design features and materials.

B- Active System:It benefits form succeed environmental solutions of architectural, then developed according modern technological circumstances.

C- Complex system: its more inclusive, merger between passive and active system in which achieve functional efficiency for spaces vacuum, it is not obstacle the surrounding environment or used energy.It supports definite and technological attributes compatible with the natural environment, which is integrated with three important principles of technological systems in modern reformat spreads stereoisomers



4- Access to the nearest results and more efficiency by analyzing studies

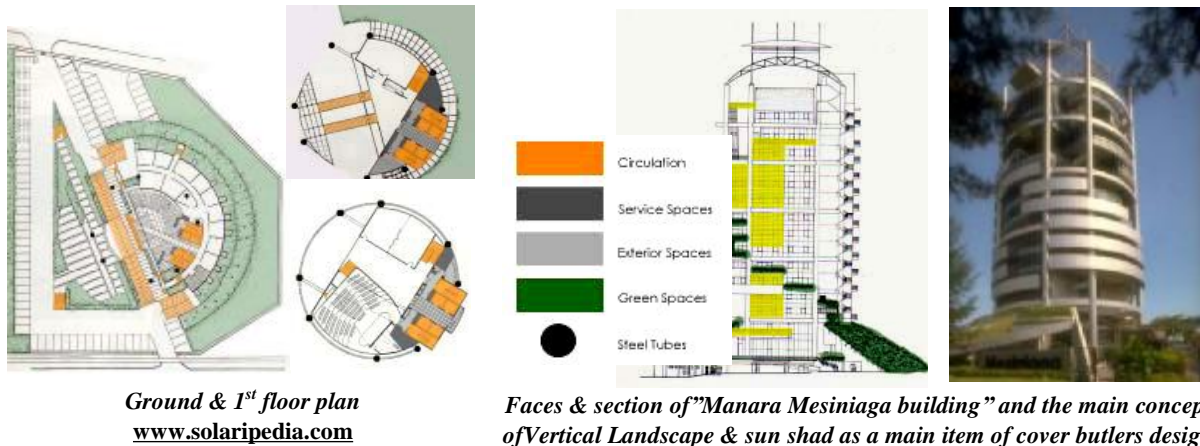
It addressed analyzed study for some models and worldwide examples reached environmental integration between builder structure and technology with various types.

§ First model:

Manara Mesiniaga building, IBM headquarter, Malaysia, designed by: Subang Jaya

The first model concentrates on passive functional systems, the concept of the building, and how to use passive technology system in dealing with external environment and attempted to develop dry and hot climate.

The four-systems of performance services in the design as structure system construction casing, interior and exterior spaces in an integration relationship and directly contract, in which make the building participate positively with environment.



Therefore, the building holds the thought and environmental control rules as an environmental effect using technological systems passive through Garden walls as an outlet for casing the building echoing Pio-climate in curriculum design, as we find that four systems for performing design surfaces of building envelope systems create, spreads inland in the relations of integration and direct connection making the building contribute positively towards the environment through an integrated approach between environmental and technological systems, passive building environment can generate energy instead Of consumption.

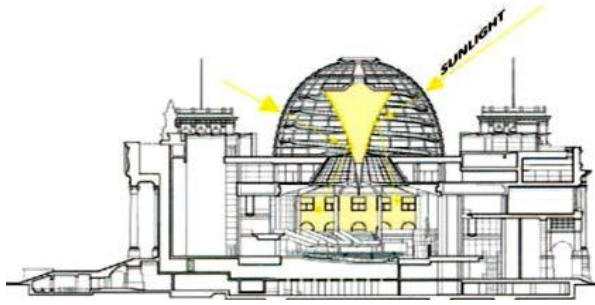
§ Second Mode:

Dome of the German parliament Building, Berlin Germany, designer: Norman Foster & Partner

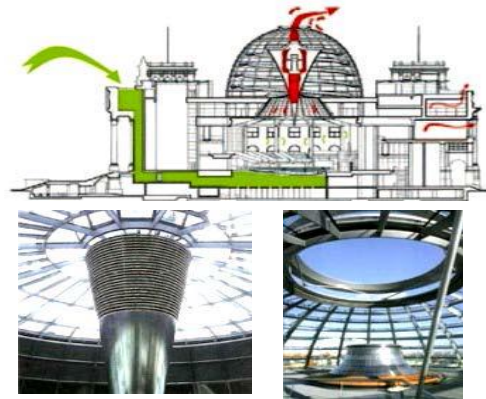
This model represents employment of technology to benefit from renewable energy and re-create the building generally, attempting to employ it cold climate, reduction of natural lights to reach optimal and thermal comfort to reduce using of artificial lights.

Whereas, glass dome represented represents a fundamental purpose to provide natural lights in the building, the dome does not work individually, but there is supportive elements ensure the optimal distribution for lighting and heat inside the building.

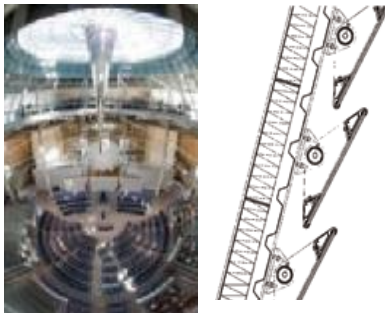
Therefore, reformat the Parliament building carrying sustainable thinking and rules of control where you rely on malty resource in achieving sustainable energy and energy efficiency by reducing fuel consumption and emissions of carbon dioxide and replaced by biofuels, and contributed to environmental solutions of natural ventilation and lighting to achieve this aim. As well as the use of solar energy has provided support and ventilation system are working with systems of shading, and seasonal energy storage through an integrated approach between environmental and technological systems.



Active technology which use natural light in interior space "light sculptor"



Main source of entrance and pass of natural ventilation in the central cone



Movable sun-shield

<http://serendipitylabs.com/architect-design-present>

§ Third Model :

Ger Cer in the framework of 2015 completion, building trust international, designer Jansiz & Partner

This model adapt the casing to be dynamical casing by compatible environmental types, this project comes to enlarge a school in Mongolia, through the participating to help poor peoples and engage of design office to address a new ideas and find design ideas help the peoples in the mentioned area and find a new concept for structure roads and materials.

It imposed a challenge to create development ideas and could be implied in all fields even in tribal society.



Ger Ger School design and depending on Four-wheel system of performing surfaces



The main idea of design in use compatible structure system with environment & minimum cost

<http://www.nbmcw.com/articles/>

The research finds that that the design concept of the Construction Casing depends on integral methodology between environmental and technological system compatible with authorizing of structure types in which depends on rafters to maintain temperature internally.

Whereas, it represents a double frame with 50 cm, fill this vacuum packed bags of sand, dust mixed with straw to form a simple material works on high ability of thermal insulation, and easy access available materials, and re-create internal spaces by define circle paths and reverse the winds, and realizing light openings gradually on different highs to try to calculate as much as possible of natural lights and maintain internal thermal loads using structural insulation system.

Results and recommendations

Research study result the following:

- § Design operation forms an integrated relationship between structure system aims at realizing comfort interior environment thermally and visually forming functional and forming side.
- § To use technology with all its mechanism to adapt the firm and its spaces of environmental and natural impacts after access to major sake, it is environmental compatible as a part inside environmental system.
- § Idea back Sustainable construction and maintains environmental balance and its compatible with climate changings, continuity, it represents features that could be identified in a major three features compatible with natural environment, continuity forming feature aims at develop and promote mentioned environment, Controlling: optimal employment for forming elements and oriented building in which supports self-respond for internal and external variables, Sustainability: to find urban societies able to take its responsibilities and achieving principles of maintains and depends potential energy sources.
- § Structure casing controls thermal impacts between internal and external environment by thermal moving , then it works as a thermal organizer, whereas, the structure casing is dynamically and flexible, it responds to external climate impacts in hot and volatile areas to reduce thermal loads on the building , so, it reaches most degree of thermal comfort in its internal environment.
- § Building requires in tis physical apartment achieving space environmental system achieving humanity needs inside and outside structural space to form space system through structural system, in which support fine vocabularies of the firm.
- § The four systems to the roofs of the performing(structure- construction casing- interior space- services) as a default space depends on natural technology system and compatible with surrounding environment and how long these system are integrated and contacted.
- § Four system constituted structure system within integrated relationship in which classified engineered and spatially to get mutual impact called Four System for Performance Surfaces in which required five levels as graduating from week integration to strong one, depends on used technology system , depending on the degree of correlation between systems, in which presents in: separation, touching, contact ,overlapping and integration.

As the research recommends the following:

- § To set a contemporary structures and friendly to the environment, in the same time, it develops local environment through reaching high integrity between nature environment and contemporary technology, by investing climate vocabularies of natural environment in hot area and warm area as high solar radiation, and wind speed in the atmosphere and changing this negative to as it provides high techniques to realize efficient building.
- § To realize productive style in our contemporary building and create its specific energy by using solar energy (by using PV systems, PV cells, and using wind energy (by using wind turbines and its advanced techniques), so, each building managed to gap its needs and realize self-sufficiency.
- § Reaching to distinguished designs mentally and environmentally, requires a constitution work to reach integration and balance between these three levels, it may be difficult in individual work , so, the research recommends integrated constitution work

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