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Study of Redesign for Commercial Environmental Building

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Abstract: ***In recent times, sustainable construction is universally considered essential in structure developments, specifically in the commercial fields. Moreover, a nationwide non-profit association, USGBC (United States Green Building Council), was capable of establishing regulations and an assessment system for the sustainable structures known as LEED or the Leadership in Energy and Environmental Design. The fundamental basis for green structures is utilization of sustainable proficiency techniques either in newly constructed developments or renovations of existing estates, so that the operating and maintenance expenditures are reduced. While the rental cost or value of the structure is increased, the energy cost is minimized. Conversely, practical verification affecting the valuing techniques of sustainable structures and properties is restricted. Hence, the objective of the following study is to acknowledge the concerns linked to sustainable commercial developments and the rate-added interval, in which the aspects that influence energy costs are examined. The rate- added interval depicts the variations among the high value of construction value and energy rates, where a green profit is resembled by a positive difference value.***

Keywords: ***Sustainable, Structures, LEED, Rate-Added Interval,*** Green ***Building Council.***

I. INTRODUCTION

Currently, the universe is witnessing a variety of environmental catastrophes, including the inclining threat of climate change, exhaustion of vital natural sources, rising pollution of air and water as well as the expansion levels of solid wastelands. Moreover, these matters are turning into the key factors of worth in real estate and a major influencer in the decision-making procedure. The tactical sustainability method, also known as the "halo effect", is becoming universal and is influenced by the popularity present in the ecological activities' conditions. The majority of studies have concluded that the theory of sustainability must not only focus on methodological or ethical matter, but also should additionally converge on the economic and financial constraints. Much evidence is crucial in order to elucidate the following issues presented in the established environment, where many of it is responsible for the recent development, design, structure and property management in the natural environment and the continued exhaustion of natural supplies. Moreover, a majority of the governments have taken action for environmental obligations by signing international agreements and protocols concerning matters such as carbon emanations and greenhouse gases (Almuhisen and Gokcekus, 2018). The insight on property has been continuously changing over the past decade. Sustainable building is now the main subject in the estate commerce (Robinson, 2007). Therefore, there are many expressions used on the real estate synopsis of "sustainable edifice" which include the United States term "green building", the Australian and UK term "sustainable edifice" "sustainable architecture" and "sustainable structure" (Mansfield, 2009; Sayce, 2010). While the overview on property has reformed, so did the key perception of sustainable property regarding the edifices features and operation which influence property rate and market cost (Lorenz, 2007). There are three vital aspects centered on sustainable protection which include financial affluence, communal progression and ecological safety. Moreover, any commercial estate attempting to fulfill the sustainable program and minimizing any sustained added development values is also referred to as 'green'. The expectancies have increased throughout communities regarding a variety of the ecological demands resulting from urban development's which are to be relieved by enhanced planning ass well as eco-friendly edifice structures. In the process of designing and environmentally friendly structure sustainable builders and engineers observe the various problems. One of the problems facing engineers is the construction resources (Abazid and Harb, 2017), (Abazid, 2017), (Nouban and Abazid, 2017), (Abazid et al., 2019) and (Abazid et al., 2019)

Nowadays in Europe, the building manufacturing utilizes almost forty percent of all raw resources. Also, it should be noted that any minimization of implementing sustainable, recycled resources will largely affect material conservation. Another concern is endurance, in which if eco-friendly resources are required to be substituted often, they become less resourceful. Additionally, a crucial factor for eco structure is a good site. The commercial edifice must be situated in a location near the neighborhood or communal transport in order to decrease the necessity of driving, as well as being located in area that will not threaten the surrounding environment. Furthermore, eco-friendly structures are required to be constructed to promote recycling, control water consumption, as well as reducing energy consumption. The following research will portray a modern design for a commercial structure.

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II. Literature Review

Based on the Commercial Buildings Energy Consumption Survey (CBECS), in the past ten years, building size overtook expansion of the amount of buildings. The CBECS reckons that in 2012 there were 5.6 million mercantile edifices located in the Unites States, encompassing surface area of eighty-seven billion square feet. These statistics portray that as of 2003, which is the last year in which CBECS outcomes exist, there has been an increase of 14% in the amount of structures as well as a 21% incline in surface area. Of the main aspects impacting a buildings energy consumption include capacity, age, topographical area, as well as its main function. The following aspects are the center of the primary table sets. The tables provide a detailed view of the structure supply and the features that initiate mercantile energy consumption. Also, the tables contain valuable data on the edifices, which include their construction, proprietorship, forms of energy consumption, HVAC and additional energy-related gear, office utilities and computers as well as lighting forms; which will be further studied in future EIA papers and reports. It has been implied by Samer (2013) that sustainable structures interdisciplinary premise, in which the concept of green edifices contains a variety of aspects, factors and techniques which deviate into assorted secondary matters that linked to create the green building theory. Commonly, sustainable structures are acknowledged to be environmental aspects. The materials utilized are produced from regional environmental resources (eco-friendly sources), where they are implemented to create an environmental structure exposed to an eco-design that permits a nourishing habitation constructed on the cultural and architectural tradition in construction while guaranteeing preservation of biological reserves. This guarantee's taking apart aspects of the structure elements and materials, after the structures defined lifespan, and allows the eco-friendly resources to be reused or recycled. Throughout the operation of the green structure, consumption of water and energy sources are reduced; which in turn lessens the threatful influence on the environment and allows for better interior atmosphere. Moreover, this type of structure offers excessive stages of ecological, financial and production execution. This contains energy proficiency and preservation, better atmospheric property, material and source proficiency, as well as the inhabitant's well-being and efficiency. The research was aimed at identifying sustainable structures while also particularizing their involvement with the ecosystem, energy, and interior air quality and aeriation. Additionally, the research observed the designs, technologies, roofs and the materials such as bio-cement, eco-cement and green concrete, that are all utilized in green edifices. Moreover, the current research emphasizes the rating system and for green structures, as well as the tasks faced by execution. Ultimately, the inter-dependent relation among the sustainable edifices and cultivation has been debated.

Furthermore, Howe's (2010) research rendered a synopsis on sustainable structures in three phases. The initial phase examines what factors allow a building to be sustainable while providing various descriptions of sustainable buildings. The next phase reviews the ecological influences of conventional edifices as well as clarifying the typical green structure approaches regarding site location, energy and water proficiency, construction resources, inhabitant's welfare and well-being, as well as structure and annihilation excess. The final phase deliberates the responsibility of attorneys in the green structure area. Boschmann and Gabriel (2013), researched and revealed that the utmost extensively acknowledge evaluation system for green structure's in the US is known as the Leadership in Energy and Environmental Design (LEED). The system has been progressively condemned for only recompensing incremental resolutions on approaching the green/sustainable concept. Among the contradicting assessments on how green structures is better attained, the research centered on how topographical environment and reprocessing prevailing structures are compensated. The theoretical context of the analytical study is derived from the contradiction of light green and deep green within sustainability and architectural engineering. A light green perception accomplishes minimized energy use and less pollution by means of technology and green utilities. Conversely, deep green methods are centered on regional environmental situations so that they can operate within natural climate systems by enlightened design through vernacular architecture, including the advantages of adaptive recycle. In the research, a detailed case study examination on the credit ranks given by LEED to six qualified edifices in Colorado. The researches investigation established that the LEED system compensates light green methods more than the other techniques. Additionally, the research depicted that there is restricted motive to pursue sustainability by means of deep green techniques, due to the fact that their recognition among LEED is rare. Boschmann and Gabriel inferred the limitation of compensating deep green methods restricts more altering paradigm-changing innovations among sustainability. The researchers also provided recommendations to LEED for enhancing the rating system and conferred on the emergence of regional supremacy in standardizing green structures. The following research furthered the developing literary works centered on sustainable edifices as an approach towards urban sustainability, as well as representing the topographical views of size, location, and the governmental and financial connections among the inhabitants and the city environment.

III. Problem Statement

Apart from channeling the globe's wealthiest energy resource, sunlight, sustainable designers and engineers' study various features that allow a structure to be environmentally approachable. A major issue includes construction supplies. Presently, the United States consumes about 40% of raw resources. Moreover, utilizing sustainable and recycled sources while reducing the use of other materials, can majorly influence resource conservation. Another issue is endurance, where the constant replacement of sustainable materials results in reduced proficiency of such resources. Also, the geographical region plays an important role in the eco structure, where buildings should be situated near communal or public transport, lowering the use of vehicles, as well as not threating the surrounding neighborhood.

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IV. THE OBJECTIVE OF THE RESEARCH

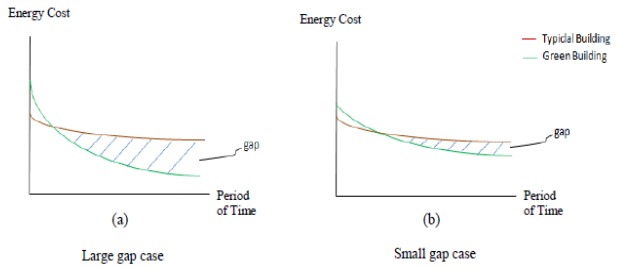
1. Obtaining an adequate location and positioning of the structure in order to diminish the necessity of supplementary heating/cooling systems.
2. Acquiring proper resources needed for a sustainable and more ecological edifice.
3.Providing evaluations and assessment's between utilization of conventional construction material and ecological resources.

V. SCOPE OF THE STUDY

The following study will consist of comparisons among structures with sustainable and eco-friendly characteristics and the traditional structures based on the following aspects; site location, energy proficiency, resource effective supplies and interior ecological value.

VI. RESEARCH QUESTIONS

The essential question of this study revolves around the following topic; Does the added interval value occur between typical mercantile structures and sustainable mercantile buildings as shown in graph (a) or graph (b)?



Secondary questions will be assessed in the theoretical and questionnaire section of this study and include the following;

• Why is the energy value of sustainable buildings after operation not as low as expectations require them to be and what is the influential aspect causing it?

• How is the profit return from sustainable structures, given that sustainable buildings require larger construction budgets, more than that of traditional structures which have been operated for some time?

• Why should the concept of "green" or sustainability be favored?

VII. METHODOLOGY

Typically, the research phase initiates with simplifying the issue at hand, followed by clarifying the research objective. To answer the research question, the following study will be based on a qualitative study to observe the data presented in various literary works along with providing questionnaires to define the research response.

The hypothetical research among the literary works; were primarily aimed at sustainability context and the link between sustainable structures, estate property, sustainability potentials of mercantile structures, and the trends that are followed. Furthermore, the changes occurring towards the perspective of estate property also altered the viewpoint on sustainable property concerning the edifices attributes and operation which effect property rate and market cost. Noteworthy, sustainable structures may cost more to rent or construct in the initial phase, but the operating and maintenance expenditures along with energy and water consumption are significantly reduced resulting in great profits.

The analytical phase of this research is aimed at defining the research outcome by fixating on the program's outcomes. Since the research question is focused on the perspective of mercantile sustainable structures this allows linking the energy analysis to the question. This section is divided into four parts; part A-D as well as consisting of 18 questions that are aimed at the general data of the respondent (ques. 1-4), the valuation of sustainable edifices (ques. 5-7), sustainable mercantile edifice valuation (ques. 8-15), including questions for referencing the respondent's viewpoint on the standard valuation approach (ques. 16-18).

VIII. DATA ANALYSIS AND DISCUSSION

The data needed for this study was gathered from two primary resources; internet websites and individual interviews. The initial phase started with interviews of JGBC Research Committee acquaintances, associations, and JGBC support team for the objective of classifying the establishments that supply ecological structure study. The interviews were constructed by means of one-on-one phone calls, group meeting telephones and e-mails. These conferences along with the personal acquaintance of ecological building study, influenced resources utilized for this study, comprising recommendations to establishments and entities for further data.

The outcomes are subdivided into two primary parts; the first being outcomes and debates on the attributes of constructing using ecological approaches, while the second part contains the results and analysis of designing and construction rate, fixed rate, quantity surveying and operating rate. The following tables below portray the quantity surveying of ecological and non-ecological approaches. Comparisons of the total values showed that ecological approaches inclined by 12.3% at an estimated range of 10-15% of build environment, while the operating cost for ecological structures is 8-9% lesser offering an investment return for about ten years, where 15% covers all the extra budgets added to build environment.

Table 1: Total Initial Cost Before Changes

Value (JD)	Work description	Number
41322	Under the Tiles Level	A
95449	Above the Tiles Level	B
12418	Plastering Works	C
38450	Tiles Works	D
2990	Wooden Works	E
7900	Metal Work	F
15225	Painting Works	G
10875	Insulation Work	H
224629		Total

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Table 2: Total initial cost After changes

Value (JD)	Work description	Number
51910	Under the Tiles Level	A
112659	Above the Tiles Level	B
12418	Plastering Works	C
38450	Tiles Works	D
2990	Wooden Works	E
7900	Metal Work	F
17225	Painting Works	G
12575	Insulation Work	H
256127		Total

Ecological structures have proven to save money by minimizing water and energy consumption along with lesser long-term operation and maintenance rates. It should be noted that energy investments in ecological structures usually surpass expense payments contributed among the design and structure within a practical reimbursement phase. Besides the minimized operating rates, ecological structures provide subsidiary advantages linked to the rates of renovating and reconfiguring voids. Ecological structures that are highly executed have to be funded by vigorous contracting, efficient supervision, management and consultation so that the expected performance is attained.

Along with the previously stated long term operating rate advantages, the lifespan value of ecological structures is less than the lifespan values of conventional structures. Still, the preliminary principal expenses are greater. Some research depicts that ecological structure attributes manage to reduce expense influence compared to other building choices.

IX. CONCLUSION

The inclining rates of energy and construction supplies along with the damaging influences placed on the environment, enhance the financial obstacles which Jordan encounters. Misuse of energy sources resulted in expanding alternate energy resources in addition to establishing techniques to minimize energy utilization. Moreover, modern materials and approaches were created for engineering, execution, management and preservation. The following necessitates delivering a contemporary work method for proficient system throughout the design and observation by means of operating on the system design which are supposed to supply overall energy utilization and the energy consumed in cooling, warming, illuminating, and explicitly water heating. This minimizes the emanation of carbon oxides while improving the attribute of the interior atmosphere and the enveloping air, hence, it promotes in offering a vigorous environment for inhabitants as well as amplifying the structures life cycle and conserving the ecological method, which results in increased efficiency enhance the financial system in several divisions.

Moreover, the expansion and establishment of human communities has greatly affected the natural ecosystem. The production, design, erection, and management of the structures in which we inhabit and work are accountable for the depletion of the majority of our ecological reserves.

Ecological structure, or sustainable design, involves the methodology of expanding the proficiency in which structures and their location consume water, energy, and resources all while minimizing the structures affect on the human welfare and ecosystem throughout the complete lifespan of the structure. Sustainable structure theories expand past the walls of edifices and may encompass site design, neighborhood as well as land designing conflicts. Moreover, there are various areas in which sustainable buildings are considered to be advantageous such as;

There are many benefits of green buildings in various fields:

Ecological Advantages

- Improve and shelter bio-diversity and bionetworks
- Enrich air and water condition
- Decrease waste flows
- Preserve and reestablish biological reserves

Financial Advantages

- Minimize rates of operation
- Expand inhabitant efficiency
- Develop benefit rate and revenues
- Enhance lifespan of financial implementation

Social Advantages

- Improve inhabitant well-being and contentment
- Enhance internal air condition
- Decrease stress on community efficacy substructure
- Develop the entire attribute of existence

Ecological structures denote the succeeding stage of structures, the actuality is that the extensive majority of structure's lack sustainability aspects, and they will keep on being utilized for continuous years. Enhancing the energy proficiency of prevailing structures usually comprises a procedure known as retrofitting, which may be anything from settling additional energy-proficient equipment to expanding the quantity of isolation in a structure. Ecological structures advocate recycling and reusing sources, which eventually results in maintaining environmental supplies, decrease carbon impression and assist in alleviating influences of global warming and greenhouse gas emanations. Ecofriendly structures assist in minimizing energy use by 30-40% and water reserves by 50-60%, which is all exhibited as decreasing in the values of the electric bills as well as the water bills. Granting, the approach of establishing buildings and utilizing procedures that are ecologically accountable and resourcefully proficient among the lifespan of the structure starting from it's location to design, structure, management, conservation, reformation and deconstruction. The following approach enhances and harmonizes the traditional building design issues on financial prudence, efficacy, stability, and wellbeing. The following aspects distinguish "environmental" erection, which are originated from a group of prospects linked to the buildings and their occupation. Ecological structures aspire to exploit proficiency in their consumption of water, energy as well as other sources so that to decrease waste, pollution as well as various ecological deprivation, and to establish natures that promote to wellbeing and efficiency.

The ecological effects of structures are massive. Traditional structures consume great values of energy, location, water and natural materials for construction and management. The advantages of ecological structures encompass expense savings from minimized energy, water and waste; decreases values for operation and maintenance; as well as improved inhabitant efficiency and well-being.

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Ecological edifices place a rather smaller imprint on the ecosystem as opposed to a historically structured building. An ecological structure begins with minimizing the amount of heating and cooling to the most possible extent, and the main element in energy preservation is insulation, which is thought to be a basis of green structures. Appropriate insulations does not only conserve energy, which results in decreasing operating rates, but also provides comfort for the occupants. The purpose of insulation is to conserve energy and reduce expenses, which is all reliant on the climatic conditions. The actual concern, currently, is to develop a method to minimize the loads of cooling and heating systems. Low loads of heating and cooling permit zero energy construction to be profitable in any climatic situation.

Likewise, following the comparisons among traditional mercantile edifices and a sustainable mercantile edifices, it is possible to concur that a rate-added interval does exist, but only happens a small alteration. It seems that the inclining rental costs, advanced residence ratio as well as reduced energy value is not sufficient to expand the added interval. Furthermore, the erection expense tends to remain exceeding expenditures as a result of explicit resources utilized and the incapability of the constructor's to implement the resources. Additionally, structures entail explicit mechanical utilities which require exclusive maintenance, as well as impacting the reparation and conservation expenditures.

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