

# Study Economic Profitability of Sustainable Buildings Industry

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## الربحية الاقتصادية لصناعة المباني المستدامة

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## **Abstract**

The increasing global awareness of the Earth's deteriorating condition and the unpredictable effects of climate change has given rise to worldwide phenomena that impact several elements like the economy, agricultural security, water availability, and energy supplies. Buildings contribute significantly to the generation of greenhouse gases, as well as the disposal of pollutants and energy consumption. Therefore, they play a crucial role in addressing environmental issues.

Although sustainable buildings are widely acknowledged as a potential advancement, professionals in the property market still believe that the upfront costs of creating sustainable buildings are significantly higher than those of conventional buildings. This view serves as a hindrance, obstructing the widespread use of sustainable building principles. The objective of this research is to investigate the possible economic benefits and obstacles that come with the construction of ecologically friendly buildings. The aim is to determine whether these advantages can play a crucial role in the decision-making process when it comes to participating in sustainable buildings. This statement affirms the idea that in order to fully assess the total costs of constructing sustainable buildings compared to conventional ones, it is necessary to take into account the entire lifespan of the project.

**Keywords: Building Industry, Sustainable Buildings, Economic Benefit, Building Principles, Sustainable Construction, Project Management.**

## المستخلص

لقد أدى الوعي العالمي المتزايد بحالة الأرض المتدهورة والآثار غير المتوقعة لتغير المناخ إلى ظهور ظواهر عالمية تؤثر على العديد من العناصر مثل الاقتصاد والأمن الزراعي وتوافر المياه وإمدادات الطاقة. تساهم المباني بشكل كبير في توليد الغازات المسببة للاحتراس الحراري العالمي، فضلاً عن التخلص من الملوثات واستهلاك الطاقة. لذلك، تلعب دوراً حاسماً في معالجة القضايا البيئية.

على الرغم من الاعتراف على نطاق واسع بالمباني المستدامة باعتبارها تقدماً محتملاً، إلا أن المتخصصين في سوق العقارات ما زالوا يعتقدون أن التكاليف الأولية لإنشاء المباني المستدامة أعلى بكثير من تكاليف المباني التقليدية. تعمل هذه النظرة كعائق يعيق الاستخدام الواسع النطاق لمبادئ البناء المستدام. الهدف من هذا البحث هو التحقيق في الفوائد والعقبات الاقتصادية المحتملة التي تأتي مع بناء المباني الصديقة للبيئة. والهدف هو تحديد ما إذا كانت هذه المزايا يمكن أن تلعب دوراً حاسماً في عملية صنع القرار عندما يتعلق الأمر بالمشاركة في المباني المستدامة. يؤكد هذا البيان على فكرة أنه من أجل تقييم التكاليف الإجمالية لبناء المباني المستدامة مقارنة بالمباني التقليدية، من الضروري مراعاة العمر الافتراضي للمشروع بالكامل.

**الكلمات المفتاحية:** صناعة البناء، المباني المستدامة، الفائدة الاقتصادية، مبادئ

البناء، البناء المستدام، إدارة المشاريع.



## 1 - Introduction

In the past decade, there has been a growing focus from environmental economists and policymakers on sustainable building. While there is no universally agreed-upon definition of "sustainable buildings" or the corresponding policy, scholars, and organizations typically prioritize resource efficiency in construction and aim to minimize the adverse impacts of buildings on people and the environment.

Consequently, there has been a growing implementation of regulations in Iraq and other nations regarding the construction business. These policies aim to enhance energy efficiency and mitigate the environmental impact of the construction or site.

This article presents a concise overview of the economic and policy aspects of sustainable buildings by analyzing empirical and scientific data. Our focus is on making investments in entire buildings in order to narrow down the scope of our evaluation and emphasize the importance of considering the life cycle and energy efficiency aspects of environmentally friendly constructions (Ries *et al.*, 2006).

Sustainable buildings are promoted through a range of policies, some of which are optional while others are mandatory, that impact the whole lifespan of the building, starting from its design and construction and extending to its operation and final dismantling. Therefore, we distinguish sustainable building regulations from initiatives at the component level that aim to enhance energy efficiency, such as appliance standards, building codes, and other regulations unique to technology.

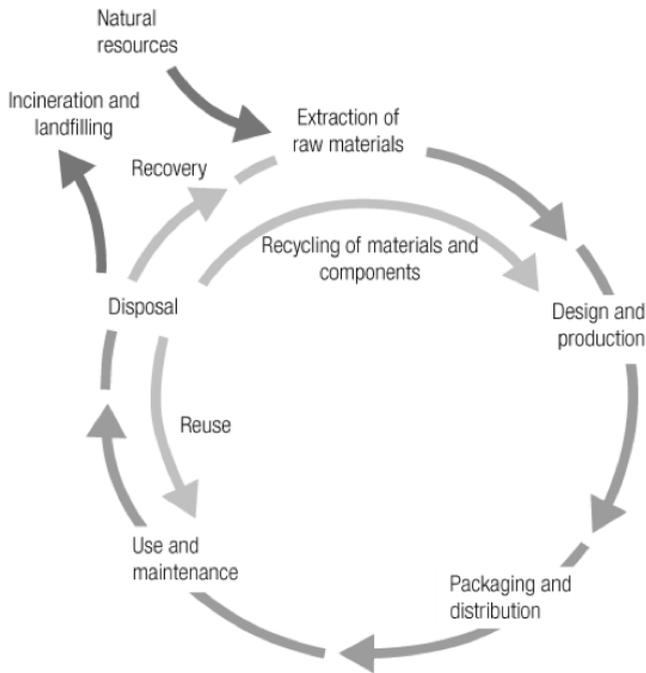


A comprehensive literature analysis was conducted to analyse the increasing momentum of the sustainable building industry worldwide. To commence, the concepts of sustainability and green construction are deconstructed into their constituent elements, which encompass an integrated design process, evaluation criteria, and strategies for implementing sustainable practices. Following that, a concise account of the sustainable architecture movement in Iraq is provided to the reader.

The thesis examined the concept of sustainable development in the context of constructing eco-friendly structures. A structure will undergo four essential stages throughout its lifetime: the design phase, the construction phase, the operating and service period, and ultimately the destruction phase.

As depicted in Figure (1), sustainable building involves moving away from practices that cause pollution and use up non-renewable resources. Instead, it focuses on using resource-efficient materials and processes that benefit the environment and society in the pre-building, building, and post-building phases of construction.

This holds true throughout the entire construction process. Sustainable building involves transitioning away from practices that lead to pollution and the depletion of non-renewable resources.



**Figure (1): The Life Cycle of Sustainable Construction**  
(Source: Waidyasekara and Fernando ,2012)

According to Waidyasekara and Fernando (2012), it is recommended to evaluate the construction processes at each of the three phases. This will help gain a better understanding of how the design, construction, operation, and disposal of a structure can impact the environment as a whole.

Each sustainable idea is tailored to its unique set of requirements, including climatic conditions, geographic factors, environmental and social needs, and the utilization of diverse construction materials. As a result, every project yields distinctive environmentally friendly solutions. Before delving into the description of "sustainable building," it is imperative to establish a



clear definition of the "integrated design process."

In order to achieve a sustainable building in terms of the environment, economy, and society, it is crucial to use all of the sustainable construction strategies listed in the table above (Kats, 2003).

These techniques should be handled in a synchronized and cohesive manner. The Integrated Development Process is a methodology employed throughout the design phase to identify and resolve any significant concerns that could greatly impact the long-term sustainability and effectiveness of the project (Feng and Hewage, 2018).

This approach is employed to detect and resolve any concerns that could significantly impact the project's long-term viability.

## **2 - The Efficacy of Sustainable Building**

Implementing an integrated design approach that fosters synergy across many academic disciplines and technology is a method to attain significant levels of building efficiency. This method is commonly observed in numerous contemporary construction processes. By implementing a high efficiency building envelope, which includes reinforced windows and improved insulation, one possible strategy to save costs in the mechanical construction of a building is to minimize its size (Hwang and Ng, 2013).

Throughout every phase of the design process, it is imperative for mechanical engineers, construction engineers, architects, and other pertinent specialists to collaborate in order to create synergies and explore alternative possibilities.

Kubba (2010) asserts that every design decision should be made after a meticulous evaluation of the costs and benefits connected with it.



Integrated design, however, encompasses more than simply gathering all members of the design team in one location at the beginning of a project to establish consensus on performance objectives.

Kubba (2010) emphasised the need of establishing a shared vision for the tasks at hand and improving the quality of connectivity and data used for communication. Integrated design encompasses more than simply gathering all members of the design team together in one location at the beginning of a project.

Hawang and Tan (2012) identified the following as the most prominent characteristics of the integrated design methodology:

1. Recruiting design team members who are eager to participate in the development and construction of structures utilizing an innovative approach.
2. Establishing ambitious objectives for the entire group and assessing their advancement in relation to those goals.
3. Achieving a state when the team has completely eliminated all expenses.

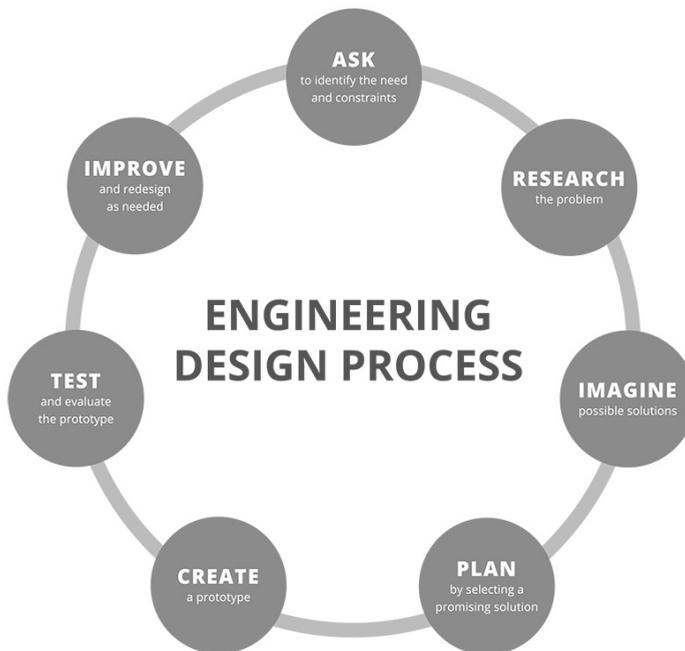
Before commencing the design process, allocate time for cognitive tasks such as charrettes, research, and other comparable endeavors.

4. Ensuring sufficient time for input and revisions prior to finalizing the design concept.

Maximize the involvement of as many individuals as possible in various elements of the project.

In order to fully comprehend the integrated design process, it is important to possess prior knowledge of the conventional design process. As

per the findings of Zhao *et al.* in 2020, the conventional method provides limited opportunities for optimization, often resulting in issues during the latter stages of the process. In contrast, integrative design offers a diverse range of optimization possibilities right from the start of the design process, as depicted in Figure (2).



**Figure (2): Integrative Design for Optimization of the Design Process**  
(Source: Zhao *et al.* 2020)

The reason for this is because integrative design employs an iterative method instead of a top-down approach in the design process.

Certification programmers or grading tools are crucial elements of green buildings as they assess the performance of the building and encourage the adoption of sustainable building practices and technology. These



instruments are utilized to assess the quality of the building on a numerical scale ranging from one to ten, with ten representing the highest rating.

The grading methods are consistently improved over time in response to advancements in technology, professional knowledge, and market trends.

The acronym "BREEAM," derived from the "Building Research Establishment's Environmental Assessment Method," was initially used in the United Kingdom in 1990. Another instance of grading systems is "CASBEE," an acronym for "Comprehensive Assessment System for Building Environmental Efficiency," which originated in Japan in 2001. The acronym "LEED," which stands for Leadership in Energy and Environmental Design, originated in the United States in 1998. Both of these rating systems are examples of rating systems. The utilization of these individual grading techniques enables the exchange and acquisition of knowledge from different industry experiences, hence expediting the progress towards environmentally conscious construction practices.

### **3 - Benefits of Sustainable Buildings**

Hwang and Ng (2013) argue that the construction industry is seeing a significant change due to the "sustainable building revolution," resulting in a growth in the market share of this specific sector.

Tam *et al.*, (2004) highlighted that while the tactics and ideas are already present, the challenge is in moving beyond the familiar and conventional approach of "business as usual" and taking the risk to be innovative. This is in spite of the existence of preexisting techniques and ideas. To examine the present status of research on the challenges and potential advantages of projects involving environmentally friendly building, a thorough search of the pertinent published literature was conducted.



### 3.1 - Economic Benefits

Environmentally efficient structures offer substantial financial advantages. The advantages encompass reduced initial investment costs, decreased ongoing expenses, and diminished overall expenditures during the building's lifespan. Furthermore, building participants see an enhancement in labor productivity and an increase in property values. The subsequent text provides a concise overview of select published research that pertains to the current topic and has endeavored to measure the monetary advantages of utilizing eco-friendly construction materials.

Luo *et al.*, (2022) conducted the first extensive study on the costs and financial advantages of green buildings. The research found that allocating an extra two percent of the budget for estimating results in life cycle returns that are ten times higher than the initial outlay.

The reduced use of electricity, water, and garbage, along with the decreased costs associated with management and maintenance, and the improved tenant productivity and health, all contribute to financial benefits for the business.

For example, if \$100,000 is invested initially to incorporate environmentally friendly construction technologies into a \$5 million project, it would result in savings of \$1 million over the estimated 20-year lifespan of the structure (Luo *et al.*, 2022).

In 2004, the General Services Administration (GSA) conducted a study comparing and contrasting 12 buildings that were certified under the Leadership in Energy and Environmental Design (LEED) programmer. These buildings were situated in various regions around the United States. Based on the statistics, environmentally friendly buildings have considerably



reduced operational costs along with enhanced energy efficiency (Hwang *et al.*, 2019).

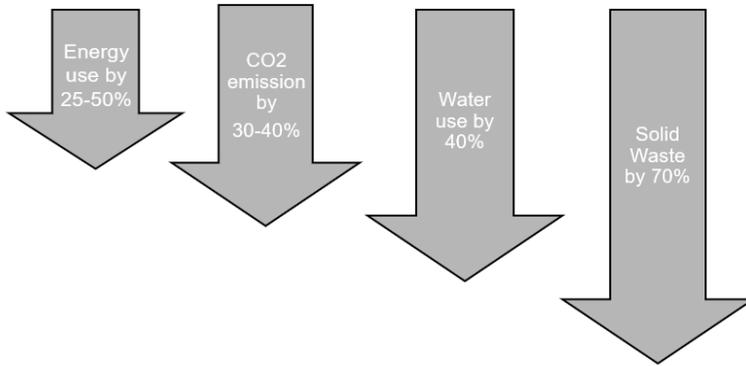
In October 2004, the cost assessment firm "Davis Langdon" conducted a study comparing the construction expenses of 138 facilities, including libraries and laboratories, across the United States. Out of the total of 138 buildings, 93 were not constructed according to LEED standards, while 45 were in the process of seeking LEED certification. The study's findings indicate that there was no substantial difference in the total expenses between sustainable and conventional structures from an economic standpoint.

A reassessment of the research conducted in 2006 confirms the consistent findings on the process of making inferences. A separate study aimed to measure the advantages of sustainable buildings discovered that the new facility, which was designed with environmentally friendly principles, experienced a 25% boost in manufacturing efficiency and a nearly 30% reduction in electricity consumption per square foot (Rawai *et al.*, 2013).

The aforementioned findings were discovered within the recently established facility, designed in an environmentally sustainable manner.

Environmentally friendly buildings have a beneficial impact on the capital value of the building due to an enhanced working environment, lower building running expenses, and reduced infrastructure maintenance costs. One advantage of this is an augmentation in the overall value of the building (Sang *et al.*, 2018).

Figure (3) provides a visual depiction of these advantages. The subsequent paragraphs will provide an elucidation of several studies that have substantiated the augmented value of eco-friendly structures.



**Figure (3): Visual Representation of Green Building Benefits**  
(Source: Sang *et al.*, 2018)

In a recent study, Luo *et al.*, (2022) have presented findings that demonstrate a positive impact of sustainable features in buildings on rental and sales prices per net square meter. Specifically, the research indicates an increase of around 21 percent and 26 percent in rental and sales transaction prices, respectively. This was discovered in their research area.

Another study examining the correlation between energy-efficient design and the leasing and revenue markets for commercial property revealed that rents for such properties are approximately 7% to 17% percent higher. Additionally, the selling subscription for Energy-Star labelled properties is found to be thirty dollars per square foot, while for LEED certified properties it is 130\$ per square foot.

The study conducted by Luo *et al.* (2022) examined the correlation between energy-efficient building practices and the rental and revenue

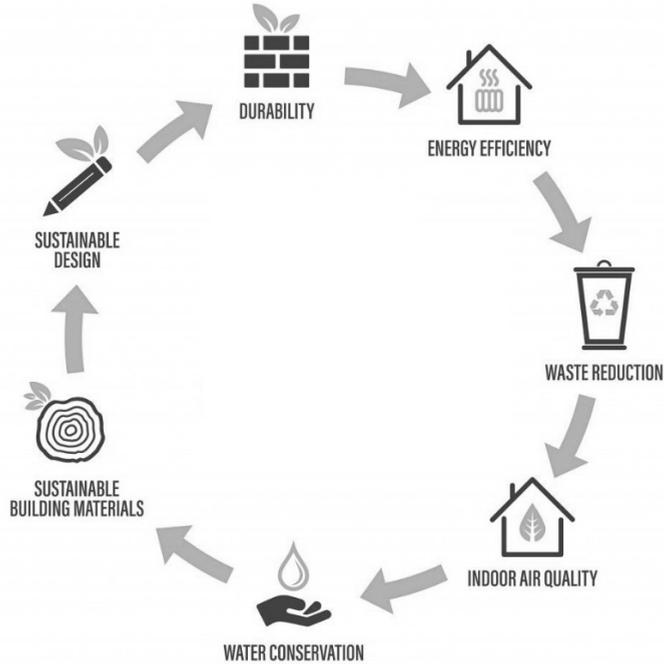


markets in the residential real estate sector. This study examined the residential real estate sector.

Arif *et al.* (2009) conducted a separate study to examine the influence of environmental certification on the pricing of commercial real estate buildings. A study revealed that Energy Star-Certified buildings and "LEED" Certified structures in the same metropolitan location have price premiums of 10% and 31% respectively, compared to non-certified buildings. It was also shown that this price premium is applicable to both LEED and Energy Star certifications. Unlike the other buildings in the region, which lack the necessary environmental accreditation, this skyscraper stands out.

### **3.2 - The Economic Justification for Policies Concerning Sustainable Construction**

This section will explore the theoretical rationale for designing eco-friendly buildings and implementing environmentally conscious building policies. The reasons for constructing buildings sustainably include improved building efficiency and greater opportunities for marketing. Market shortcomings such as asymmetric information and negative externalities can be addressed by establishing green building policies and methods, where Figure (4) showing the main principle to achieve success marking of sustainable construction.



**Figure (4): Economic Advantages of Sustainable Construction**  
(Source: Erdogan *et al.*, 2019)

### 3.3 - Market Advantages of Sustainable Construction

The decrease in operational costs and the rise in productivity can both contribute to an augmentation in the asset valuation of the structure, which is advantageous whether it is being sold or rented. If the operator of a sustainable structure can exploit sustainable marketing opportunities or appeal to environmentally conscious participants, they may gain economic benefits from the provision of beneficial externalities. This, in turn, can provide additional direct advantages to the operator of sustainable construction.



Improved efficiency may arise from more effective use of energy and water, as well as from more productive employees (thanks to retention and advancement efforts) (Sekerin *et al.*, 2018).

Additional benefits may accrue to building owners from sustainable design, such as protection from the effects of climate change, new regulations, and other environmental threats. Furthermore, as per Gunduz and Almuajebh (2020), one way for a business to reduce its risk exposure is to use fewer inputs like water and energy, whose prices might fluctuate wildly.

As an illustration, Erdogan *et al.*, (2019) demonstrate that climate-related disturbances increase the premium that is paid for green-certified dwellings in the state of California, where modern and higher-quality industrial structures may have a higher overall energy consumption compared to old buildings; however, these buildings are fewer susceptible to damage caused by extreme climate.

According to Shi *et al.*, (2014), expenditures made in “Singapore's Green Mark” designation for environmentally friendly buildings paid off when stricter environmental rules were implemented. Beyond-compliance activity can also be employed to curry popularity with authorities, in addition to connecting with green customers or other interested parties of positive externalities. This can be accomplished by taking advantage of sustainable marketing advantages or by appealing to other participants who are environmentally conscious.

Pham *et al.* (2014) found that contemporary and higher-quality commercial structures may consume more energy overall compared to older buildings. However, these buildings are also more resistant to the impacts of weather disturbances.



In this study, Shi *et al.* (2014) provide evidence that investments in Singapore's Green Mark accreditation for ecologically responsible buildings yielded positive results when more stringent environmental regulations were introduced. Engaging in beyond-compliance activities can be utilized to cultivate favor with authorities, as well as with environmentally aware consumers or other stakeholders.

### **3.3.1 - Lack of Economic Capability**

Notwithstanding the various potential benefits that may be obtained from building in a sustainable manner, the market is continually under producing sustainable constructions due to a number of significant market faults. These flaws are the reason why the market consistently under produces sustainable constructions. Inequalities in information and the existence of externalities are two examples of the issues that are associated with the market. According to Pham *et al.* (2014), the present trend toward "Sustainable Building" might be seen as an attempt to bring the "private expenses" of structures more in line with the "Social Expenses" that are hidden beneath the surface.

### **3.3.2 - Asymmetry of Information**

Regarding sustainable buildings, there are sometimes variations in the information provided, which can lead to a poor representation of architectural features that are difficult to assess. Builders possess a greater understanding of the construction business compared to building owners, whereas building owners or inhabitants have a superior awareness of the design and performance characteristics of the structure compared to potential buyers or tenants.



Building qualities, such as efficacy and interior air quality, pose challenges in terms of pre-purchase or pre-lease detection and confirmation. This resemblance to a consequential encounter, wherein the discernment of the worth of a product is only possible post-consumption, implies that the value of a structure remains unknown until it is acquired or rented.

In addition, Oke *et al.* (2023) propose that the presence of professional investors, who possess a stronger conviction in the profitability of energy efficiency enhancements, may result in planners allocating greater financial resources to energy performance initiatives. This can be due to the increased trust of institutional investors in the profitability of energy performance improvements.

The difficulty in ascertaining information about building quality may result in the construction of unsustainable buildings. This scenario involves the displacement of high-quality structures (sustainable buildings) by low-quality buildings (conventional buildings), which in turn hinders the encouragement of more investments in sustainable development. The major policy tool used to promote green buildings is certification systems such as LEED (Wardhana and Sari, 2023), this challenge serves as the driving force behind the implementation of these systems.

### **3.3.3 - External Factors**

Buildings provide a substantial contribution to air pollution, and regulations for sustainable construction should encompass a broader spectrum of concerns beyond only information-related ones. Building construction, operation, and demolition throughout the life cycle of a structure are accompanied by a multitude of externalities that have not been assigned a monetary value. The construction process, including the proper disposal of construction waste, can impact the quality of both water and air (Dang *et al.*, 2021).



Constructing buildings incurs intangible social costs that are difficult to measure or value due to the utilization of energy, which subsequently impacts the quality of air and water, as well as the discharge of rainwater, which affects the quality of water. The progression of municipal growth is impacted by the selection of a location and the restoration of the site, which in turn indirectly influences issues such as congestion, air pollution, and other challenges faced by the municipality.

Wang *et al.*, (2014) found that sustainable certified buildings in the UK had a positive impact on neighboring property values, even for houses that are not certified, a phenomenon known as the "gentrification effect." This discovery implies that certification is linked to beneficial outcomes.

The presence of these externalities indicates a state of balance in which economies construct fewer environmentally friendly structures than is optimal. This is likely to occur even if the imbalances in knowledge are totally resolved. Despite the potential for profit organizations to aggressively respond to a signaling approach that addresses hidden information about the environmental quality of buildings, these corporations currently lack the motivation to solve their own inefficiencies internally.

### **3.3.4 - Cost of Obtaining Sustainable Certification**

Shi *et al.*, (2014) discovered that Green Mark–certified residences in Singapore command a 9.9 percent higher price in the selling market, despite the fact that initial transactions only require a 4.4 percent premium. This implies that green certification could reduce information imbalances in the economy when it comes to reselling.



Mohd-Rahim *et al.* (2017) found that buildings in the UK that undergo assessment using the BRE Environmental Evaluation Method have longer operating durations and require an annual premium that is 28 percent higher than the usual rate. Additionally, they find that rental residences with green certification command a greater price compared to those that are being sold.

This emphasizes the importance of certification in reducing disparities in information and creating an inexpensive method for potential renters to evaluate the overall quality of an investment. It is important to mention that the financial value of green buildings extends beyond the savings gained on operational expenses.

Goel *et al.*, (2020) discovered that consumers are not only interested in energy consumption certificates, but they are also prepared to pay extra for sustainability certifications.

Similarly, Oke *et al.*, (2023) finds that the price of LEED buildings exceeds the value of their reduced running costs. This indicates that there is an additional value placed on "sustainability" or commercial advantages that go beyond simply reducing operating expenses.

It is crucial to note that Mohd-Rahim *et al.*, (2017) found that the economic worth of green building certification diminishes as the number of certified buildings in the vicinity increases. This implies that consumers who make their purchase later will receive a lower premium for certification.

### **3.3.5 - Expenses and Efficiency of Investments**

There is a lack of strong scientific evidence about the expenses and advantages of expenditures needed to acquire green building accreditation. The limited generalizability of cost projections is attributed to two factors:



the adaptability of green building certification schemes and the highly building-specific nature of individual investments.

Zhang *et al.*, (2014) argue that the cost of constructing green buildings is not always higher than that of traditional constructions. Despite the apparent clarity, it is evident that engaging in activities necessary for certification or attaining higher levels of certification will result in higher building costs.

Manzoor *et al.* (2021) found that acquiring a certification for a green building involves extra expenses, along with different "soft costs" related to the design of the construction and the assessment of its environmental impact. These costs may encompass both explicit and implicit expenditures.

Nevertheless, when considering the overall expenses of a certified green building, which encompass the costs of research and design in addition to the basic planning and construction costs, lower-tier green structures may only incur a slightly higher expenditure compared to conventional construction (Zhang *et al.*, 2014).

#### **4 - Sustainable Buildings Projects in Iraq**

It is indisputable that the sustainable construction movement is rapidly gaining momentum worldwide. Indeed, the concepts of "sustainable building" or "sustainable methods" have a lengthy lineage, emerging as a response to both environmental conservation efforts and an energy crisis. Consequently, Iraq is experiencing a swift transformation in its built environment, with a significant surge in the desire to construct eco-friendly buildings.

The term "sustainable building" encompasses various concepts that have been previously explored and implemented in construction projects.



These concepts have been examined in the context of comparing and contrasting conventional and modern houses, to create energy-efficient structures in a hot and arid region of Iraq (Abbas and Razaij, 2021).

The design criteria encompass various aspects such as the selection of location, distance between buildings, arrangement, building enclosure, and shape. Based on the study's findings, historic dwellings had a significantly lower average temperature than modern homes throughout the hot summer months.

#### **4.1 - Impediments to Sustainable Construction Project Management**

The conceptual framework that has been developed has the potential to guide facilities managers in designing sustainable buildings. However, there are various factors related to sustainable buildings that may hinder the implementation of the facilities manager's role in achieving sustainability. Insufficient expertise and comprehension of smart buildings, which can drive technological innovation by facilities managers, along with a lack of awareness, education, and tools, can all be classified as obstacles to project management in the attainment of sustainable facility structures (Aslam *et al.*, 2021).

Tokbolat *et al.*, (2020) concur that the absence of specialized and scientific training for facilities managers limits our current understanding of project management issues and will inevitably affect sustainable management as buildings adjust to new technology.

Tabassi *et al.* (2016) contend that the absence of training hampers our current understanding of project management challenges and will undoubtedly impact sustainable management. According to them, the absence of training is problematic as it hinders our ability to comprehend the most efficient methods for managing tasks.



Gunduz and Almuajebh (2020) discovered that multiple variables hinder the adoption of ecologically sustainable construction practices. Several factors contribute to this predicament, including inconsistent financial incentives, inadequate government legislation that fails to promote the development of sustainable structures, and an approach to construction operations that regards sustainability as a secondary concern.

While the construction sector has been progressively advancing towards the development of more ecologically conscious buildings, other businesses have also been integrating sustainable practices into their daily operations and educational curricula for more than ten years (Kang *et al.*, 2016).

Fields such as architecture have been using sustainable building methods for a somewhat longer duration compared to the construction industry. The building sector lacks sufficient knowledge on ecologically sustainable techniques, falling short of the level of advancement it should have reached.

Ogunde *et al.* (2017) identified a major hindrance to the use of sustainable construction technologies: a dearth of appropriate knowledge, they argue that the dearth of knowledge and the absence of consensus among professionals in the construction industry are hindering the implementation of environmentally sustainable plans.

Zhang *et al.*, (2014) found that building specialists, who are typically confident in their ability to gain and utilize knowledge, saw a decrease in optimism when faced with problems related to sustainable construction. This remains true even though building specialists have exhibited confidence in their ability to provide understanding.



Wardhana and Sari, (2023) further validate the notion that a deficiency in suitable training for construction professionals is a significant barrier to the development of sustainable buildings. In recent years, professional organizations have been striving to incorporate sustainable alternatives into their professional qualification frameworks.

#### **4.2 - Project Management Practice Implications for Sustainable Construction**

To tackle the aforementioned difficulties, it is necessary to have a facilities manager who can actively promote and support sustainable methods. Increasing their utilization of green solutions is believed to enable facility managers to make a more substantial contribution to sustainable buildings.

Kang *et al.*, (2016) reported an increase in the recognition among facility managers of the importance of their role in promoting sustainability. This insight stems from the heightened emphasis on the significance of sustainability. They contend that the development of the facility management sector has been influenced by climate change and the drive to reduce carbon emissions, despite the perception that FM is typically associated with conservatism. The reason for this is that climate change is leading to an increase in the frequency and intensity of extreme weather phenomena.

Gunduz and Almuajebh (2020) identified several factors that drive sustainable project management, these include legislation, corporate image, organizational ethos, leadership from senior management or directors, customer pressure, cost reduction throughout the project's life cycle, and pressure from employees and shareholders to adopt sustainable practices. Constructing environmentally friendly buildings can be much simplified by considering these variables during the building process.



Something can transition from being perceived as a hindrance to being a catalyst if the factors that classify it as a hindrance are reinterpreted as factors that provide answers to a problem. Thus, obstacles to implementing sustainable construction practices, such as limited access to education and information, perceived higher initial expenses, conflicting incentives, absence of government regulations, and neglecting building operations, have the potential to become catalysts for promoting sustainable building practices if they are reversed.

The government must take steps to fulfill the objectives mentioned above, which include designing and implementing appropriate policies. Internationally, sustainable construction is commonly understood to be primarily influenced by government policy.

Manzoor *et al.*, (2021), states that the government of the United Kingdom has implemented numerous legislative efforts and legislation to promote environmentally friendly practices in the real estate industry.

Tabassi *et al.*, (2016) assert that policies serve as how the government guides the construction sector toward sustainability. They argue that policies are instrumental in steering the construction sector towards sustainable practices. This is supported in the UK as the government provides and promotes initiatives that incentivize the construction industry to use sustainable techniques.

Furthermore, Erdogan *et al.*, (2019) highlight the importance of government engagement in environmentally sustainable construction methods and the establishment of legislation to effectively govern and regulate these procedures. They assert that undertaking this action is imperative to safeguard the ecology in its entirety. Government rules impose



tight restrictions on the use of construction materials that do not meet basic sustainability criteria. They also advocate for the importance of transparency and accountability. Furthermore, these policies explicitly acknowledge the significance of sustainability. Another advantage of these laws is that they effectively discourage the utilization of construction materials that fail to meet the necessary criteria. Every building expert must adhere to these criteria, which encompass comprehensive procedures and meticulous overviews of those procedures.

Manzoor *et al.*, (2021) state that a key driver behind the construction of sustainable buildings is to promote the acquisition of knowledge in emerging building technologies among building experts. This factor was identified as a significant catalyst for the development of sustainable structures. One of the primary driving forces behind the creation of eco-friendly buildings is the desire to protect the environment. The government's policies may facilitate a larger number of folks to enhance their proficiency in contemporary technologies.

## 5 - Conclusion

The tangibly beneficial outcomes that result from the economic investment in green buildings, the availability of relevant resources, and an awareness of sustainable building practices, such as cost reductions brought about by increases in energy performance as well as decreased water consumption, material consumption, and waste.

Conceptual benefits encompass several advantages such as enhanced workplace productivity, improved health and satisfaction in residential environments, and alleviated strains on infrastructure, among others.



The concrete advantages are contingent upon both the proven performance enhancements identified in the assessment and the long-term sustainability of the implemented solutions. While this research offers a quantification of certain financial advantages, such as annual energy consumption, it is important to acknowledge that the actual benefits are contingent upon the accuracy of predictions, verification of installed devices and systems meeting design specifications, and the sustained performance during procedure.

The expense disparities between environmentally-friendly designs and conventional projects are predominantly dependent on the precise assessment criteria (credits) that are achieved. The impact on this particular component is anticipated to arise from both client preferences and existing cost constraints. The constraints mentioned are dependent on various aspects, including the scale of the project, the characteristics of the location, and the design approaches utilized.

The potential cost escalation could be significant in the event that a customer indicates a preference for particular ecologically sustainable features, and/or if the circumstances surrounding their integration lead to a substantial supplementary expenditure.



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