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Study of Challenges, Impact and Solutions in Sustainable Project Management for Green Construction

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ABSTRACT- In recent years, India has seen an explosion in the environmentally conscious construction industry. Despite the widespread call for greener buildings to reduce their environmental impact, studies evaluating their effectiveness are quite uncommon. Therefore, the purpose of this research is to examine how well green building construction projects stick to their timelines, and to make suggestions that could boost that performance. This study reports the views of construction experts on the incorporation of sustainable construction in project administration in Jammu and Kashmir. In total, data were collected from 122 construction professionals who were randomly selected through the survey. In different categories, land, water, waste, energy, human resources and physical resources are used. The study revealed that the ideas of the success of the project if it works within the three objectives (time, cost and quality) influence construction professionals to underestimate the involvement of sustainability benefits (environmental, economic and social) in terms of the process used to measure the project's project. success. However, most of the buildings in Jammu and Kashmir are very energy dependent, increasing energy wastage and reducing the comfort of residents. The result also showed that recycled construction materials are not fully used in buildings, and this is due to their unavailability in the industry, the unsustainable price of the product and the lack of incentives for the use of such materials. The study concludes that, the challenge facing the construction industry today is not only to complete projects on time, cost and quality, but to combine various constraints such as economic, environmental and social needs in the construction work. Finally, a set of proposals was presented with the aim of improving the effectiveness of the program. The findings of this study will provide a countermeasure which future green building construction initiatives may be evaluated.

KEYWORDS- Green Building, Construction, Schedule, Performance, Sustainability.

I. GREEN BUILDING CONSTRUCTION

Green building, often known as eco-friendly construction or sustainable architecture. It's an approach to environmental improvement. The goal is to improve human well-being, community vitality, and environmental sustainability by decreasing resource usage without sacrificing living standards. The end result is less greenhouse gas emissions, which is good news for lowering the global warming temperature. This paper provides an overview of how modern green infrastructure construction technology can be applied to significantly reduce the overall cost of construction while also mitigating the negative effects of climate change through the conservation and efficient use of resources such as land, water, energy, air, and material as shown in Table 1.

Sustainable buildings, also known as green buildings, are the end result of a design process that prioritizes minimizing the negative effects of a structure over its entire useful life by optimizing its location, design, construction, operation, maintenance, and eventual decommissioning in terms of their impact on human health and the environment. The importance of determining the relative weights of several criteria in a multi-criteria decision-making problem, such as the appraisal of green buildings from different perspectives, is self-evident.

It makes the most of renewable energy sources, uses energy-efficient equipment for its lighting, air conditioning, and other needs, minimizes the amount of energy it consumes overall, and provides a comfortable and sanitary indoor working environment for its occupants.

The construction industry is a major contributor to the worldwide depletion of natural resources and the generation of numerous unintended outcomes, including pollution of air and water, the generation of solid waste, the destruction of forests, the introduction of new health risks, and the acceleration of climate change [1].

To ensure continued economic viability and compliance with forthcoming stringent environmental rules and customer demands, designers must play a pivotal role in developing environmentally friendly plans for public works projects. Due to these and other considerations, the engineer is now designing with greater caution and specificity. We'll talk about how engineers' work is evolving to adapt to climate change.

Table 1: Definition of Green Building

Term	Definition	Quoted source
Sustainable design	A design philosophy that seeks to maximize the quality of the built environment, while minimizing or eliminating negative impacts to the natural environment.	McLennan (2004), The Philosophy of Sustainable Design
Green buildings	Buildings that are designed, constructed, and operated to boost environmental, economic, health, and productivity performance over conventional building.	U.S. Green Building Council (2003), Building momentum
Green building	The careful design, construction, operation, and reuse or removal of the built environment in an environmentally, energy-efficient, and sustainable manner; may be used interchangeably with high performance building, green construction, whole building design, sustainable building, and sustainable design.	McGraw-Hill Construction (2006), Green building smart market report
Green building	The practice of (1) increasing the efficiency with which buildings and their sites use energy, water, and materials and (2) reducing impacts on human health and the environment through better siting, design, construction, operation, maintenance, and removal—the complete building life cycle.	Cassidy (2003), quoting the Office of the Federal Environmental Executive White Paper on Sustainability
Green building	The process of building that incorporates environmental considerations into every phase of the homebuilding process. That means that during the design, construction, and operation of a home, energy and water efficiency, lot development, resource-efficient building design and materials, indoor environmental quality, homeowner maintenance, and the home's overall impact on the environment are all taken into account.	National Association of Homebuilders (2006), Model green homebuilding guidelines
Sustainable construction	The goal of sustainable construction is to create and operate a healthy built environment based on resource efficiency and ecological design with an emphasis on seven core principles across the building's life cycle: reducing resource consumption, reusing resources, using recyclable resources, protecting nature, eliminating toxics, applying life cycle costing, and focusing on quality.	Kibert (2005), quoting the Conseil International du Batiment (CIB), Sustainable Construction: Green Building Delivery and Design

II. LITERATURE REVIEW

A. "Challenges in Green Construction Projects"

1) "Higher Costs for Green Construction Practices and Materials"

In general, the price tag for building a green project is more than that of a traditional project. Capital costs for green initiatives are estimated by Tagaza and Wilson (2004) to be between 1% and 25% higher [2]. Adding green techniques to a project increases costs because of the extra time and effort required in design and modeling [3]. However, the use of green materials and green building technologies does come with a price [4]. It was determined by Zhang et al. (2011) that eco-friendly building supplies are 3% - 4% more expensive than their traditional counterparts [5]. The price of compressed wheat board, an environmentally friendly alternative to plywood, is almost ten times higher than that of its more traditional cousin [6]. The project manager bears the brunt of the increased costs associated with green building because it is their job to keep the project on track and under budget [7].

2) "Technical Difficulty During the Construction Process"

A project manager puts into motion the steps outlined in a project plan so that the desired results can be achieved (Pettersen, 1999; Ling, 2003). In many cases, the methods and processes needed to build green technologies are intricate (Zhang et al., 2011). A project manager's effectiveness may suffer if complexity issues are not properly addressed. Technical issues during construction have been identified by Tagaza and Wilson (2004) as one of the primary obstacles to eco-friendly building. The examination of nonstandard construction materials and systems can also make the design process more involved than with a traditional structure (Hwang and Tan, 2010).

3) "Risk Due to Different Contract Forms of Project Delivery"

Tagaza and Wilson (2004) state that the viability of developing and implementing a green design is significantly affected by the type of contract used for the delivery of the project. Green construction projects need to use a special type of contract that specifies everything about the project's ecologically friendly, fully integrated green design. If the design is frozen before it has been fully developed, this becomes an issue. Incorporating green elements later on increases the likelihood of several, large-scale adjustments, which drives up the overall cost of the project (Hwang and Tan, 2010).

4) "Longauthorizationmethod for New Green Technologies and Recycled Materials"

New green technologies and recycled materials require extensive review and approval, which might add time to the planning process, which is reflected in the current market climate (Tagaza and Wilson, 2004). Zhang et al. (2011) and Eisenberg et al. (2002) found similar results from their polling of the general public, indicating that more time is needed to win over the audience [8].. It is difficult for project managers to create the schedule and authorize progress payments to vendors and suppliers when there is a lengthy approval process. (Pettersen,1999; Ling, 2003).

5) "Unfamiliarity with Green Technologies"

The use of green technologies in business is not without its challenges, as has been proved in numerous reports. Eisenberg et al. (2002) suggest a lack of familiarity with the products, materials, system, or design, and a lack of knowledge or technical aptitude as possible causes. The primary challenge is that green technologies are usually more complicated and unique than traditional technology (Tagaza and Wilson, 2004). It was confirmed by Zhang et al (2011). Project managers face challenges while attempting to deliver projects with the performance stipulated by customers when they lack sufficient knowledge about the performance of green technology.

6) "Top Notch Conversation and Interest is Needed Amongst Mission Group Participants"

The project manager's job is made more difficult by the need to coordinate the efforts of numerous outside parties. For the green project, effective communication is crucial in order to express the sustainable practices that are expected from team members. Tagaza and Wilson (2004) discovered that sub-contractors' early enthusiasm for waste material separation waned as the projects continued and the recycling skips were found to contain a mix of materials, highlighting the importance of sustaining interest among team members.

7) "More Time Required to Implement Green Construction Practices on Site"

In order to guarantee the on-site implementation of sustainable practices, project managers will typically need to conduct random audits and make on-site visits (Tagaza and Wilson, 2004). This is crucial because, when pressed for time, workers may reject time-consuming sustainable activities.

III. METHODOLOGY

A. Study Area

The study was conducted in three cities of the district of Jammu and Kashmir where there are many construction activities. There are many construction industries in the selected cities due to the need for more buildings, houses, and infrastructure due to the increase in population in these cities. As a result, there is an increased use of resources such as water, land, energy and air thus increasing the amount of waste generated by the entire life cycle of the construction project within these selected cities[9].

B. Data Collection Technique

Multiple data collection techniques are adopted to combine the strengths of each technique. This involved a survey method and interviews with a questionnaire as a guide for respondents in the construction industry. These data collection methods have no advantage over others and are highly complementary. This method was chosen to increase the validity and breadth of the data collection techniques, depth and knowledge of the data collected. A pre-test questionnaire was administered to construction professionals in identified construction industries to add, remove, criticize and justify responses for validation purposes. Pre-testing allowed fine-tuning of the draft questionnaire to remove any ambiguities. The process helped the researchers to know if the respondents understand the questions and can give useful answers and determine the feasibility of the data collection activity A written and printed Survey Refined questionnaire consisting of a series of structured questions was administered directly to a number of construction professionals with various backgrounds identified to obtain research data. The purpose of this program was to obtain information about the opinion of construction professionals regarding sustainability issues in construction projects. The questionnaire was divided into 4 sections based on specific objectives. A likert scale was used to present the response from the respondents as follows; strongly disagree = 1, Disagree =2, Medium = 3, Agree =4, Strongly agree = 5. The first step was feedback from experts in the sample industries. Step Two consisted of responses from higher education institutions that were directly involved in this study [10].

C. Sustainable Project Management for Green Construction

From a technical perspective, green building projects are different from their conventional counterparts. To be environmentally friendly, they need to be built with specific tools and techniques.

If environmental verification is the goal of the project, they may also require more paperwork and reporting. Modification of standard project management procedures is necessary due to the specific challenges presented bygreen building in order to save costs and maximize the likelihood of a successful project completion within the budgetary constraints. The majority of these alterations are the result of an increased demand for multidisciplinary cooperation on site selection, construction methods, and building systems and subsystems at an early stage in the project life cycle [11]. Particularly in environmentally conscious building projects, delays caused by conventional project management practices, which are typically described as linear and fragmented processes, can be costly. It is more cost-effective to deal with environmental concerns from the outset of a project than to retrofit them at a later date.

In fact, table 2below shows how the timing of these decisions can have a major bearing on the rates of return for both immediate construction costs and long-term running expenses. Making adjustments early on allows for the formation of an integrated design and construction team that works together throughout the project to attain green building construction goals [12].

Table 2: Green PM Approach to Construction versus Conventional Construction Matrix

Project process	Traditional construction	Green construction
Phase 1: Feasibility		
Project need assessment	Define need based on market conditions, physical needs, or other narrow scopes.	Need definition, in addition to market conditions, physical needs, etc., includes environmental goal, LEED certification level, as well as the amount of capital investment toward green initiatives.
Project manager selection	Select an in-house manager or hire one to serve as the project manager. Selection may or may not happen this early in the project.	Hire an experienced green building consultant/project manager who is familiar with the product type and market and has exposure to all phases of sustainable construction; a LEED accredited professional is optimal and strongly recommended.
Preliminary site analysis and plan	Develop a preliminary budget estimate based on past or benchmarked traditional projects; unit costs are applied to a preliminary scope of work.	Finalize economic and ecological goals based on cost/benefit analysis. Consider site characteristics and weigh building needs against ecological issues. The preliminary budget is aligned with the project's unique goals, and is often accomplished by creating a cost model that aligns resources with program goals to ensure project priorities are not mismatched to resources (Matthiessen and Morris 2004). A LEED checklist and documenting system is developed for the remaining portion of the feasibility stage.
Design charrette	Charrettes may or may not be implemented during a conventional project. They are often perceived as economic waste or schedule inhibitors.	Must include all key external stakeholders, including surrounding property owners and other community representatives. Diverse representation from the project team functions (design, architecture, building contractor, environmental engineer, real estate consultant, etc.) is optimal. The final report serves as one of the guiding documents for the design and construction process (Kibert 2005).
Final site selection	Select site based on traditional proforma with little stakeholder involvement.	Select site based on stakeholder involvement including community input, At this point, the construction team is in place (the owner, the project manager, the architect and the contractor), and all parties have a stake in site selection.
Phase 2: Design		
Initial budget and schedule	Budgets are typically developed by an architect based on a formula or unit costs, which can vary as much as 15% from actual costs. They are often created and expended with little consideration of future operating and maintenance costs (Griffin 2005, unpublished).	Complete preconstruction estimates with input from the builder, project manager, architect, and real estate consultant. Estimating costs associated with specialized areas like green-building products require experience. The budget may also include an emphasis on life cycle costing, shifting focus from short-term return on investment (ROI) to long-term gains from operational savings.
Zoning approval	At this point in the project, this is often the first time regulatory agencies have seen design concepts or site plans. This can sometimes cause rework in the planning and feasibility stages if the concepts do not fit zoning ordinances or local land use goals.	The zoning approval process can often go more smoothly after an inclusive charrette process has been completed because the project will be less likely to face community resistance. The Charette process also encourages feedback from local government planners and other regulatory agencies in the early stages so that zoning considerations are factored into the site plan well in advance.
Design team selection	Select the architect or general contractor depending on the type of contract. All consultants report to the architect or general contractor.	Usually, the core design team has already been selected by this time. Additional experts for technical systems may be interviewed and selected.
Construction document development	Although the design is finalized by this time, often green initiatives are considered, causing rework.	Because the integrated team has participated in the planning and design process, construction documents can be developed more efficiently and with little design modifications.
Government permitting review	Plans are often reviewed for the first time for engineering compliance (grading, erosion control, and storm water standards), building codes, water and sewer systems, etc.	Government stakeholders are involved at earlier stages to ensure compliance with local, state and federal guidelines. The regulation of these important environment systems like wastewater and erosion control are significantly connected to LEED requirements.
Project bidding	"Hard bid" methods are most common, where the lowest bid cost is awarded and subcontracts are negotiated by the contractor on a closed-book basis.	Reed and Gordon (2000) recommend an "overhead/fee bid with an open-book subcontracting process" for green projects. Stipulations for minimum number of bids and cost savings allocations can also be included. "Open book" subcontracting allows the owner to have access to the estimates and pricing submitted by subcontractors.

Project process	Traditional construction	Green construction
Phase 3: Implementation		
Contracting	Traditional contracts like cost-plus-percentage or cost-plus-fixed fee are applied. Sometimes work is further divided into multiple contracts, depending on uncertainty surrounding the project (Bockrath 2000). The less confident the builder feels about the project, the higher the fee or risk premium will be.	Integrated development requires a different kind of client/architect and client/contractor contract (Reed and Gordon 2000). Contracts should include performance agreements, incentives, and bonuses for implementing sustainable practices and exceeding sustainability goals (Pennsylvania State University 2004). Contracts should also include specific provisions for LEED points, Energy Star requirements, the use of recyclable materials, on-site recycling requirements, and agreements to return unused materials to vendors, among others.
Construction	Weekly site inspections are typically reported by architect or builder. There is little cross-communication among the site workforce, including subcontractors.	Launch construction with kickoff meeting that includes a sustainable education component for on-site construction personnel; monthly on-site meetings are required by entire site workforce and include periodic education and training sessions on green building. Sustainability requirements are reviewed with each subcontractor prior to commencing work (Pennsylvania State University 2004).
Inspections	Field changes caused by fragmentation in the owner-architect-builder relationship can require additional government inspections, which create cost and schedule inefficiencies.	At this point, government regulators are working as a partner in the project, as opposed to an outside influence. Less rework and field adjustments decrease the chances of having to request reinspections.
LEED certification	Typically not applicable. If the project is seeking certification, documentation can be difficult to assemble from multiple sources.	The ongoing efforts of the project manager, coupled with the benefits of an integrated team and specialized technology, can make compiling and submitting documentation more efficient for the project's schedule and budget.
Phase 4: Close out		
Occupancy and operations	Minimal testing is performed before the building is turned over for operations.	Building commissioning is an essential step in ensuring the building systems function as intended and set forth in the project criteria. The commissioning authority has been hired from the onset and understands the owner's goals and investments.

D. Integrating the Project Team

After the project's owner has defined the project's scope, objectives, and priorities, the next step is to begin assembling the project team. A single point of contact, such as an architect, real estate broker, or other single-discipline technical professional, is typically hired after the feasibility study is complete and a site is selected as the following stage in conventional building operations. The traditional approach of staffing puts off choosing crucial members of the team, such as the building contractor, until after the project's planning and design phases are complete. Since subcontractors are typically brought on board during the execution phase of a project, they may never even meet the rest of the team [13]. These behaviors are typical, but they hinder the timely and cost-effective completion of a green building project.

The most difficult part of completing a green project is coordinating the efforts of many different specialists. Green building projects, especially those seeking LEED certification, are becoming more and more complex, heightening the importance of inter-team contact and communication. Because of the interconnected nature of green system design, green buildings also require elevated interdisciplinary collaboration. Collaboration between architects, builders, and engineers during the feasibility and programming stage of a project is often necessary to guarantee the delivery of sustainable targets (Bogenstätter, 2000). This is so because, first, each discipline needs a clear understanding of the project's goals, and second, each discipline needs to implement the practices necessary to achieve those goals at all subsequent project phases. If professionals in design and other members of the project team are brought in at the very start, sustainable practices can be maximized at minimal cost.

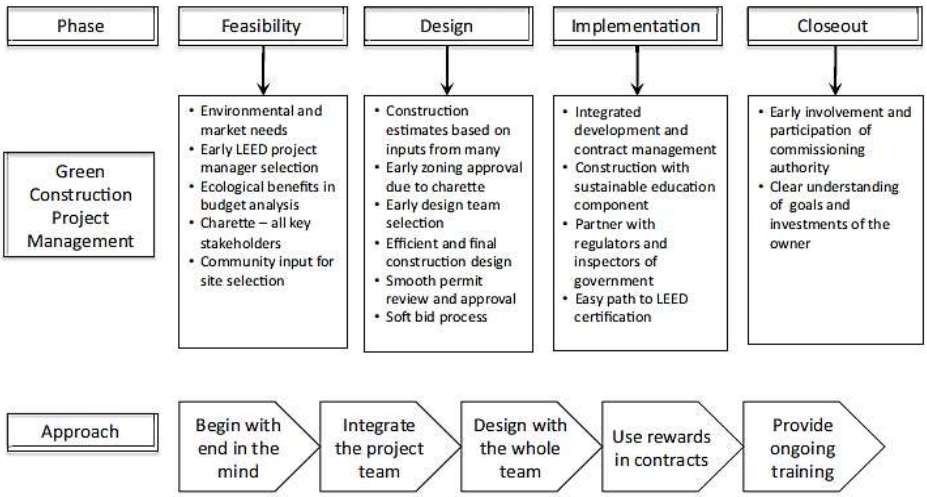

Figure 1: Greening project management

IV. ANALYSIS AND DISCUSSION

Results The result of the questionnaire was analyzed focusing on construction firms in Ghana. A questionnaire was distributed to 122 respondents among key construction professionals.

A. Demographic Characteristics of Respondents

Table 3: Demographic characteristics of respondents

		Frequency	Percentage %
	Title of respondents		
1.	Contractors	16	13
2.	supervisors	72	59
3.	architects	20	16
4.	Consultants	14	12
	Experienced of Respondents		
1	< 2 years	16	13
2	2 - 5 years	40	33
3	6 – 10 years	36	29
4	11 – 20 years	28	23
5	> 20 years	2	2
	Organisation of Respondents		
1	Architectural firm	20	16
2	Consultant firm	14	12
3	Contracting firm	56	46
4	Government bodies	32	26
	Project of Respondents		
1	Private	40	33
2	State	32	26
3	Both	50	
	Organisation Experience		
1.	< 2 years	2	2
2.	2 - 5 years	8	6
3.	6 – 10 years	24	20
4.	11 – 20 years	22	18
5.	> 20 years	66	54

The respondents were divided into four categories; Contractors, managers, architects, and consultants. The demographic characteristics of the respondents showed that most of the respondents (59%) were managers. This was because in every unit of the contracting company there was one or two managers. Most of the respondents had experience between 2-5 years with a small number of respondents having rich experience of more than 20 years (Table 3). In addition, the respondents represent different organizations and most of them work in contract companies (46%). This may be due to the fact that many workers are needed in this sector. In the Ghanaian government, workers are allowed to do some private work during their free time. The table also shows that few respondents (41%) deal with public and private projects. In this study, most of the respondents (54%) belonged to companies that are more than 20 years old. This was followed by companies with 6-10 years of experience and 11-20 years of experience (20%) and (18%) respectively in the construction industry.

B. Basic Information About Construction and Sustainable Development

This section focuses on each respondent's basic knowledge about sustainable construction. Respondents answered a total of 5 questions (figure 2) about their understanding of what sustainable construction means and their needs. The policy to be established to monitor the practice of sustainable construction in the construction industry and to use sustainable construction policies in the construction industry to reduce the waste produced in the area to improve life was considered the most important consideration although all methods were given almost the same level. Importance [14].

C. Pre-Design Stage

The pre-design phase is an important phase in the construction process. There are many things that need to be considered at this stage, as it is a critical stage that shapes the design and development of a stable structure. It is clear that the 7 sustainability strategies related to the pre-design phase

(Figure 3) are all ranked as very important. The most important of these considerations must include community, regional, 'sense of place' and values, equality and human rights and long-term economic health. In addition, respondents agreed that agreement effectiveness and quality of life and accountability, transparency, and participation are different strategies. associated with a sustainable building [15].

D. Design Phase

The design process for all projects follows the same stages of development. In the design phase, it is important to use the issue of sustainability to reduce waste. Figure 4 below shows that equality and human rights accountability, transparency and inclusion are considered the most important criteria to be incorporated into Ghanaian structures. Besides, the respondents agreed that other strategies are also very important criteria that should be considered in order to achieve sustainable construction projects [16].

E. Construction Phase

The construction phase is a critical phase that sustainable issues should be very concerned about, because during this phase there are many activities that can contribute to the production of waste. It is clear that (Figure 2) the efficiency of settlements and the quality of life are measured in a very important way to achieve sustainability. The figure also showed that, accountability, transparency, and negotiation principles, net gains from development, equality and human rights were all at the same level importance.

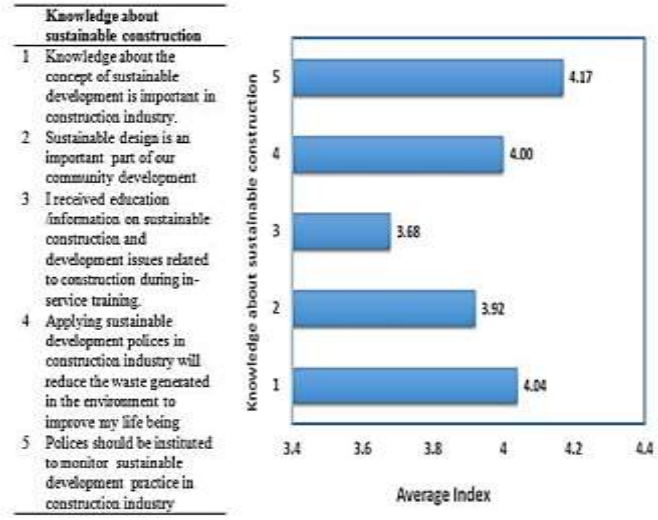

Figure 2: Knowledge of sustainable construction

F. Materials Efficiency

Fig 2 illustrates the appropriate procedures during the selection of sustainable building materials to reduce waste in the design phase. It is clear from the picture that, the building materials were chosen based on their durability. The use of locally or naturally sourced materials over imported long distances and Materials selected based on an analysis of their life cycle impacts on public health were the most important considerations. The experts also agreed that developing a green building product selection system and the use of salvage building products are also placed at the same level of importance in terms of the Ghanaian context. The figure also showed that, the use of recycled building products and materials, the use of quick-use materials from renewable resources and the use of materials that can be reused, recycled or biodegradable were considered as less important [17].

G. Design Analysis for Site Construction Sustainable Construction Begins with Choosing the Right Site

Careful planning, layout, and landscaping can reduce energy consumption levels. Therefore, the responses to the indicators below (Figure 3) do not encourage achieving sustainable construction; with the exception of performing a comprehensive domain assessment that is within the acceptable average index, all other indicators scored below 3.50 in the acceptable average index.

Efficient Use of Water is one of the limited resources that must be used efficiently indoors and outdoors. To achieve sustainable construction, overall water consumption must be reduced. It is evident in the water efficiency.

Energy Efficiency Energy is an area that professionals needed to show the best care to make life in certain areas improved in a sustainable way to reduce waste in construction projects in the design stages. The indicators laid out in Fig. 9, show that the use of an energy source with low environmental effects and the use of efficient materials and appliances are ranked as the most important indicator. Respondents also rate all other energy indicators below the average acceptable indicator and this does not encourage earning money.ainability [18].

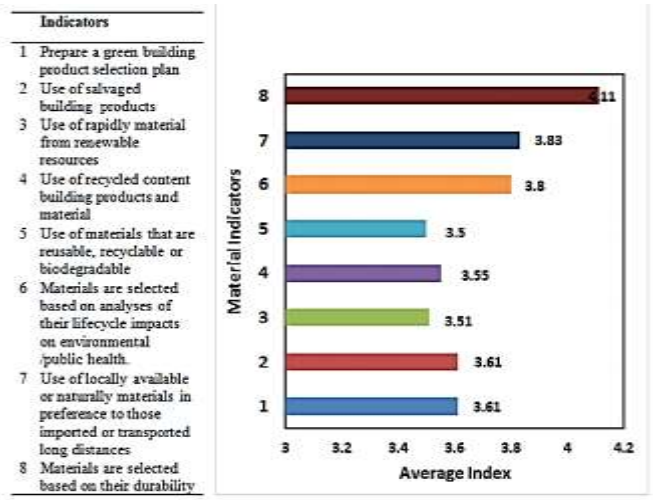

Figure 3: Material efficiency

H. Human Factor

Human features play an important role to provide good design in construction work. All the consumers in the world spend almost all their time in the artificial environment, the operation of this environment with its sustainability is one of the most important concerns for the preservation of the earth.

I. Waste Management

The construction process itself generates large amounts of waste at all stages. Reducing waste, promoting environmentally friendly waste, reuse and recycling are issues of major concern to the construction industry. Construction and demolition activities generate a lot of waste, which increases the amount that is recycled and reused. The waste management indicators indicate that the integration of reduced and recycled construction waste and the renovation of existing renovated buildings in the design phase were rated as the most important indicators. This was followed by the design of buildings for flexibility and dispersal, although the design of minimal use and the preparation and implementation of the construction waste reduction program were placed at about the same level of importance [19].

V. SUGGESTION

- Cost overruns and disagreements can be avoided if the actual construction schedule and resources are closely monitored and assessed to ensure they are performing as expected:
  When constructing a green building, project managers should double-check that the planning and scheduling procedures are ongoing, and that the time allotted for the development of the work and the resources actually matches the period allotted in the schedule [20]. The owners of a project can use schedule control tools and strategies to keep track of time and resources.
  It is possible to implement a schedule control system that specifies what must be done in the event of project schedule modifications, and it is recommended that performance assessments be taken to evaluate the extent to which schedule adjustments were actually necessary(Project Management Institute 2004).
- "Ensure that layout documents are produced on time"
  Construction drawings and specifications may be included in the design documentation. When design documents are complete, they are essential in obtaining a building permit, soliciting competitive bids from experienced professionals, and laying the groundwork for the construction itself. The design documentation is also submitted to the local government building authority for review and approval. Due to this, it is crucial that design documents are finished on time to enable for the necessary actions and activities as defined in the former without delaying the project timetable.
- According to Alaghbariet al. (2007) "ensure that contractor have the functionality and the resources for constructing the undertakingearlier than awarding the gentle [21]. The performance of a project's timetable would be significantly impacted by contractor-related factors, such as problems obtaining funding for a project, insufficient planning and updating of the schedule, and the use of innovative construction techniques. Selecting contractors who can satisfy all the requirements is essential for a green building project, which necessitates the use of novel technology, thorough planning and control, and experienced project team members. Thus, it is required to conduct a more thorough investigation of contractors' capacity before handing out necessary contracts.
  The unique goals of green building projects necessitate the formulation and implementation of rigorous evaluation standards for preliminary screening of potential contractors.
- "test for mistakes and discrepancies in layout files to avoid redoing of designsand drawing earlier than submission for approval to keep away from versions or essential corrections":
  Poor time performance is likely to emerge from the need to redo designs and drawings when flaws and discrepancies are discovered in design documentation, which requires additional time beyond the as-planned timeline to make the necessary adjustments (Assaf et al., 1995). (Chan, Kumaraswamy 1996). When these flaws and anomalies are identified, especially during construction, it can cause variations leading to rework, which in turn can give rise to redundant effort and additional costs to fix it.
- "Alternative procurement method should be analysed to ensure it meets the project requirementsand complexity":
  The project life cycle and interpersonal dynamics are affected differently by various procurement strategies [22]. Since improperly interpreting project features is likely to result in poor project performance and cost escalation, customers should carefully analyze project parameters to determine the suitable procurement technique[23]. Due to the complexity of the technical systems used in green building construction projects, high levels of dependency, communications, and strong collaborations with all project participants are needed for successful projects [24]. Findings suggest that early owner involvement in green building construction projects is essential to achieving green goals at lower cost [25]. In order to ensure that future green building construction projects have optimal results, it is essential to assess a range of procurement options [26].

VI. CONCLUSIONS AND FUTURE WORK

The challenge facing the construction industry today is not only to complete the project on time, cost and quality but to find the best balance between the various constraints in the construction process such as economic, environmental and social needs. There are other things that create waste in our environment. The factors of population growth, the need for more resources and services, and the increase in wealth for certain people are factors that lead to the need to satisfy a higher standard of living. It is also important to take the initiative to make decisions without regret at all times in the life cycle of the construction phase by incorporating sustainable strategies. In each phase, the level of application of this method was different as there was no communication between the parties involved. When designing a sustainable building, the most important factor to consider is the materials used for construction. This determines the stable performance of the structure. Material waste was a major

concern because many of the raw materials used in construction come from non-renewable resources.

Improving the likelihood that sustainable construction work can be completed within budget constraints is one of the main benefits of green project management methods. Based on the phases of the project management life cycle, a matrix was presented that explains how these methods should be modified. The matrix is based on the idea that involving a multidisciplinary team from the get-go increases the chances of a green project's financial success. In addition, when pursuing a green building project, the following rules should be followed:

- Before starting design and construction, decide on your sustainability goals and the structural elements that are most important to you.
- It is important to bring in the project manager and other key players early in the planning stages. The path must begin with a charrette.
- 3.All members of the project team must be included in the formal design process, initial cost estimation, and development of construction documents.
- Contracting projects using a cost and cost system with special measures to increase efficiency is one way to reward those who use sustainable practices and meet or exceed sustainability goals.
- Make sure everyone on the construction site is kept up to date with regular meetings and training at the beginning and end of each month. This should also include a focus on continuing education.

The benefits of integrated design are critical to the timely completion of a green building project at the right cost. Using a comprehensive strategy, we were able to solve a problem that had plagued the building for decades. a group of disparate unemployed professionals who have trouble working together.

In short, there are two main reasons why we think this paper is important. First, we think that the proposed method and our findings can be immediately useful to practitioners. Second, research can confirm the validity of our environmentally friendly building proposals. There are a number of suggested directions for future study. To begin with, there is a lack of literature on project management practices and integrated team strategies used in sustainable projects, despite the abundance of literature on the performance and costs of such projects. Therefore, to check the accuracy of the model presented in Fig. 1 would be a good place to start. Second, there is a lack of data on how to green the construction supply chain. This may be because there is no prominent green product manufacturer that creates and sells a large variety of green building materials. Construction 2006, by McGraw-Hill. Companies that provide green buildings are more likely to be small and independent, which can increase the price of acquiring environmentally friendly materials.

In addition, experts in the development business have the concept of "green washing," or the proliferation of unfounded claims about green products. It is important to learn more about how this supply chain may affect the future of green project management. Finally, more research is needed to see if green project management suggestions will help in general construction projects.

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