

Green Building Development Management: Obstacles in addition to Solutions for Sustainable Growth

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ABSTRACT: Construction of green building is taking place in the building construction sector and it is blooming in many developed countries, especially in the European countries. The construction of the green building is also blooming in Singapore to save the atmosphere and also save the energy and other resource of the country. The increasing cognizance for the climate change leads to more emphasis of the innovation in the field of the green techniques for the construction of the building as well as adoption of the green technology also leads to the fulfillment of the goal of the development by implementing the sustainable technique, that may available for longer period of the time and also save the environment by mitigate the factors for the climate change. The development of the green technology for building construction is still facing many impediments, firstly, this technology is new and requires more innovation, secondly, being a new and under developed technology, the cost associated with it, is very high and not affordable by everyone. The outcome of the present paper represents that an effective and efficient frame work is necessary to implement this technology at its fullest to slow up the speed of the climate change. The outcome of the paper is to work on a wider scale in order to save the environment and energy for upcoming generation.

KEYWORDS: Construction Industry, Green Building, Obstacles, Project Management, Sustainable Development, Singapore.

1. INTRODUCTION

The growth of any country can be judged by its infrastructure development as the infrastructure is counted among most prominent factor to decide the growth and development of the nation. Apart from this, anyone can easily find out the huge difference in the infrastructure of a developed, under developed or developing nation. New invention as well as the innovation has been developed in the developed country and they have transfer the technology to the other nation to promote the technological advancement to uniformly develop the whole world under the guidelines of the United Nations [1]. The United Nations has developed the framework to mitigate the factors responsible for the climate change and one of the major reasons to environment is the conventional type of the buildings also.

The important significance of the green building is to adopt the strategy for the energy saving. The conventional building is more prone to consume the excess of the energy and other resources. Some results data have shown that conventional building designed is not support the energy saving philosophy and also not support the climate saving mechanism. The data have shown that all building together including residential and commercial are consuming the 30 to 40 percentage of the total energy produced of the nation [2]. The construction of the conventional building through the conventional methods are responsible for the release of the carbon based gas and other element, and the process of the construction the infrastructure is very cumbersome in bringing the new technology in such a way that it will not increase the factors responsible for climate change.

Obviously, building industry may be an important conservational problem. Prefabrication can alleviate the conservational burdens associated with conservative construction and thus is being progressively used in construction industry. Additionally, as public understanding of the adverse effects has grown, building construction businesses in different regions have adopted 'green initiatives' to help reduce the environmental damage. Usage of green knowledge such as lighting and planetary energy in residence of electricity, as well as excess minimization, water reprocessing, and use of secondhand materials throughout the building of building projects, only a few examples. The Fig. 1 has been showing the advantage of the green building.



Fig. 1: Advantage of the Green Building

In Singapore, the Local Building Laws were enacted in response to environmentalists' demands. Under this act, all new construction and refurbishing must meet a minimum protecting the environment level. More designers, both public in addition to private, are choosing sustainable and green advance as a result of management laws in addition to social scrutiny [3]. When it comes to sustaining a green building development, a project engineer in building construction can be obsolete. When the popularity of green building increased, so did the need for green construction management. The main principle of the building's architecture is to align with the sustainability guidelines in order to strike a balance between the country's financial, ecological, and commercial growth goals.

These systems are planned and constructed to usage fewer energy besides possessions than conservative structures and have a lower environmental impact. According Building Besides Construction Authority's Green Building Masterplan, the amount of Green Mark accredited constructions in Singapore enhanced from 135 in 2008 to 255 in 2009. These statistics show that, as the value of green construction has become more widely recognized, several developers have joined the green movement and pledged to become BCA Green mark certified. Green architecture is gaining in popularity, and project management methods for green building construction are becoming more relevant.

The aim of the present study's basic objectives is to examine the common challenges that development managers face during development and design of buildings, as well as to suggest plausible strategies for enhancing green building construction management methods, allowing for more intensive green building projects in Singapore. Literature reviews are performed in order to fulfil the stated goals, and 32 project managers besides advisors in Singapore contacted for a survey besides interview. A construction is measured green in Singapore if it has Green Spot Scheme's criteria, which include being energy and water efficient, ecologically friendly, having a minimum indoor air quality standard, and having lime features.

Given the different meanings, a green structure is basically a structure that is energy besides reserve efficient, with negligible environmental effects. Green building is often listed in conjunction with achieving sustainability, and the two terms are sometimes used interchangeably. The environmental, social, in addition to economic problems of construction in context of its atmosphere are subject of achieving sustainability. As a result, building can considered a subsection of maintainable construction as well as a walking stone to sustainable growth, which is characterized as the ability to meet current needs deprived of jeopardizing future generations' needs.

1.1.Green Building Development Management: Obstacles in addition to Solutions for Sustainable Expansion

1.1.1. Legislations and Regulations:

With a growing recognition of the importance of sustainable expansion, many industrialized republics have enacted legislation regulating environmental subjects arising from construction sector. The Energy Efficiency of Building Directive (EPBD) is an example of such legislation, as it requires building in every Schengen Agreement (EU) state to encounter the minimum liveliness presentation requirement and have environmental quality guarantee by 2006. Furthermore, Green Building legislation has been adopted in the United States to encourage use of green building development by making it mandatory to meet the LEED (Leadership in Energy and Environmental Design) requirements in infrastructure design. In Singapore, new Building Control Regulations went into effect on April 15, 2008.

Both new buildings including retrofitting must meet a minimum environmental protection requirement under this set of regulations. As a result of such regulations, a growing number of developers would be forced to undertake green construction. Economic Advantages Traditional buildings do not have many economic benefits that green buildings do. Acquisition, integration, and transformation are three indicators of green business advantage that companies should concentrate on to increase their business efficiency (audits, environmental declarations). Energy and water savings, decreased waste, improved occupant efficiency, and lower maintenance and operating costs are only a few examples.

Furthermore, with natural gas and oil prices rising steadily in current years, making annual energy reserves in green buildings increases the construction value, as occupants can protect their costs of the property in time. Green building construction also enables developers to a variety of incentives. In United States, for example, positions like Oregon in addition to New York provide tax incentives for existing architecture, based on the scale and degree of LEED certification. Both new and existing sustainable walls in Singapore are eligible for incentives of up to \$3 million under Green Mark Incentive Scheme (GMIS), which is dependent on amount of Green Mark Award the building has earned besides its gross ground area. There are several risk management benefits of implementing proper green building practices. Fig. 2. has been showing some approaches to attain the growth as sustainable.

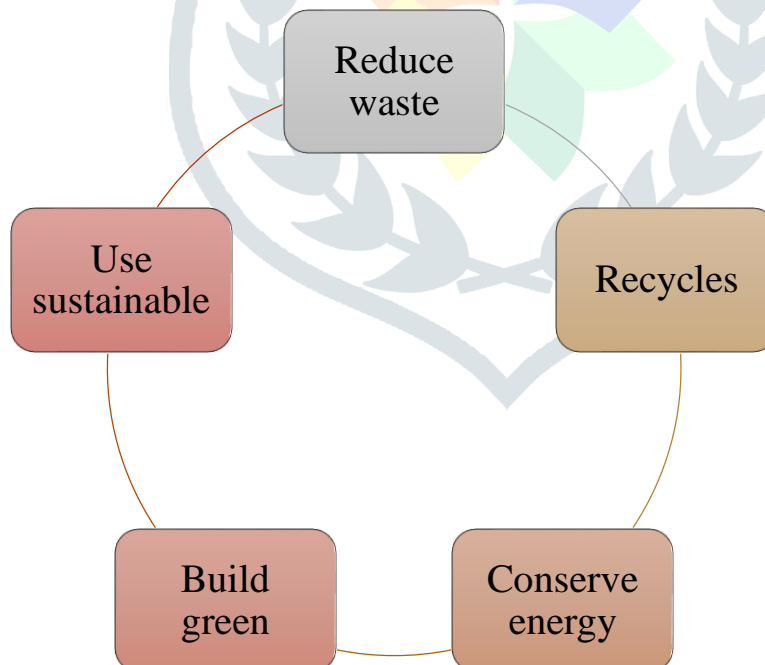


Fig. 2: Some of the Approaches to Attain Sustainable Growth

Adoption of sustainable design practices, such as repurposing construction methods, will, for example, help mitigate the risk of financial degradation related to the construction waste disposal, protecting the contractor from potential litigation stemming from non-compliance with sustainable development legislation. Another example of these benefits is the decrease in new construction work needed when structural components are reused, which decreases occupational hazards for construction workers [4]. Additionally, green assets are now producing quicker sales besides leasing than traditional building units, as the general public is becoming more aware of their various benefits in terms of conservational concerns as international warming.

Faster sales volume and leasing will help developers reduce financial risk by allowing them to recompense off loans and several other economic commitments faster. As a consequence, the amount of interest accrued is reduced, allowing for greater income.

1.1.2. Conventional Against Green Building:

The mainstream's building schemes are still approved out using conventional methods and standards, favoring short-term explanations over long ones, and using materials, technological solutions, and management techniques that are seldom confidential as groundbreaking green technology besides practice. Since communication skills between project team is needed for green building projects, the architecture delivery framework is the most suitable. Furthermore, when architect and even contractor collaborate, contractor will deliver useful insight into the viability of sustainable building features.

Contractor expertise can help prevent design adjustments and reworks later in the project, which can trigger a significant delay in the timeline and additional costs. Additionally, this distribution mechanism safeguards that final creation is compatible with design, which is particularly essential for building, which must meet a number of requirements before being certified as green [4]. A building scheme also necessitates the creation of a team at the outset, which will include all key staff involved in the project. Energy efficiency specialists, such as those who specialize in energy efficiency and green building qualification, should also be consulted. This is since these individuals have a better understanding of idea of green building in addition to are acquainted with the green building certification criteria and specifications.

1.1.3. Constricting for Green Construction Construction:

The production of green development, careful consideration must be given to green standards, which are usually found in contract specifications. Typically, such standards define the types of materials and facilities being used in addition that they meet a minimum normal in terms of ecological sustainability. Aside from that, another form of green specification discussed in construction schedule is environmentally sustainable practices and steps. The LEED Green Building Certification System for new buildings includes initiatives like construction activity emissions reduction and protection of existing natural environments, and it contains these construction and procedures. In a typical construction contract, such detailed requirements will not be required.

Before employing people and additional experts such as development leaders and advisors, developer seeks out others with expertise in green building construction and sustainable design. A Green Prospectus may also be issued to hire an architect and a main contractor. The Green application form ensures the contractor that the experts have a thorough understanding of green building principles and will respect the project's goals and priorities in order to complete it efficiently. In conservative construction agreement, contractors are frequently nominated grounded on bottommost cost presented, but may not consume ideal potentials obligatory for specific development.

1.2.Green Construction Design

Since evaluation of alternate materials by the development team is often needed in traditional construction developments, schematic drawings that contain of condensed besides general ideas of pardon buildings would look comparable are used at start of project phase. Though, because sustainable walls have many specific enterprise landscapes not frequently found in outdated buildings besides deep integration, a comprehensive and inclusive design approach is used correct from beginning of the development in building construction.

The three key categories of sustainable building features include indoor lighting, construction materials and layout. The artificial lighting in a green building combines low-energy light fittings with good daylight through careful window placement and the use of energy-efficient fluorescent lighting. To guarantee that sustainable walls are safe, ecologically approachable construction materials, recyclable cane flooring, dangerous substances, such as chlorine cabinets in addition to non-toxic painting, are used. Building arrangement plays an important role in perfecting dynamism competence of the construction. Green constructions also take benefit of normal aeration finished construction's alignment.

1.3. Building of Green Schemes

Green building projects must use sustainable construction techniques in addition to traditional construction approaches, which frequently classified in building index such as LEED. A waste management strategy to decrease generation of waste on the building site is one example of such activities. Sustainable performs such as by means of reprocessed materials for concrete work besides using wood from renewable sources are also required in green building construction. Furthermore, the main project manager must monitor watercourse sedimentation, in addition to airborne dust production to safeguard that contamination from building is aloof to a minimum. Besides that, the natural landscape should be preserved by carefully sited buildings that cause minimal disruption to the current natural environment. In conventional architecture, these aspects are often overlooked.

1.4. Obstacles in Green Building Development Management

Premium with a High Price Building owner are more expensive to construct than traditional buildings since green resources are considerably additional expensive than standard resources. Compacted wheat board, for instance, which is alternative to plywood, costs around ten periods as much as regular plywood. Other costs associated with the search for natural materials and the qualification of buildings contribute to high cost finest of green constructions. As a result, staying within the capital budget is challenging when handling green building projects. Benefits are distributed unequally [5]. Developers must pay a high quality for buildings, while occupants reap the majority of benefits, such as improved enclosed air quality and water and energy investments. Furthermore, the additional costs borne by the sustainable construction cannot be easily passed on to the tenants.

1.5.1. Lack of Green Produce Statistics

There is a lack of knowledge about green goods and sustainable construction technologies that can be used in green structures. As a result, developers are being forced to pay for the services of counsellors who specialize in goods and construction organizations. The designer can risk trailing green documentation or supplementary costs to accurate harvests or arrangements that meet quantified green morals if they do not have enough details. Deficiency of Information Outdated ideas of in what way a construction should built still hold sway, and developers are wary of going green because of the potential risks [6]. Another study demonstrates Singapore's lack of green construction knowledge by demonstrating that local independents handle and use resources without regard for conservation or the ecosystem. Due to a lack of study, the public is unaware of welfares of green buildings, particularly on subjects such as impact of various building indoor conservational on productivity and health.

1.5. Green Building Project Management Framework

All of interviewees said they don't consume a clear management system in place for green construction projects. As a result, in Singapore, a traditional project organization system was recycled as a recommendation for maintainable building [7]. However, laws and regulations relating to green building standards are being given special attention. Prior to the start of construction, requirements from BCA's Green Mark Rewards were examined to see if achieving a specific equal of reward was possible and indoors the development team's capacities of expertise, properties, and, more significantly, expense.

1.5.1. Recommended Solutions for Obstacles:

The top five challenges in survey surveys were (1) high-cost best of a green construction project, (2) nonexistence of coordination besides interest among development team associates, (3) absence of articulated curiosity from patrons and marketplace request, (4) lack of reliable studies on the benefits of green building, as previously established by review. Possible solutions to each of the aforementioned obstacles are planned in section, as well as the findings of the study's survey questionnaire and interviews. The following challenges are needed to resolve to implement the green technology application at a large scales.

1.5.2. High-Cost Premium and Market Request:

Green building interest could be ignited raising awareness about the value of sustainable development in the face of depleting natural capital and a worsening worldwide environment. This could be accomplished by government agencies conducting green edifice excursions for property managers and possible consumers in order to inform the public about the advantages of green design & construction performs. The building

walkthrough would be exposed to public when organizations are built, so that tourists can escalate how building strategies and technology help brand constructions more liveliness efficient besides sustainable.

1.5.3. Project Team's Communiqué and Interest:

In comparison to traditional building projects, a green construction building project necessitates a developed level of coordination among project team members. This is since it was important for each member of the team to consume a thorough sympathetic of building concepts as well as their responsibilities to contribute creativity and vigor to the creation of an outstanding structure. Customers should promote green organization goalmouths from the top down to inspire entire scheme team in the direction of the target, in addition to traditional methods as daily tool-box conferences. The communication is the main trait of the project management to cover all aspect of the process in such a way that the message should convey from the top to bottom of the flow.

1.6. Green Building Project Management: Obstacles and Solutions for Justifiable Expansion

Green building project executives may use a high-performance building distribution system rather than conventional transport systems. This delivery method is based on construction-at-risk delivery, which necessitates extensive announcement among development participants. As a result, the initial team building should include a diverse range of stakeholders to ensure that everyone is aware of the project's goals and green requirements. The delivery system also necessitates that all employees have a working knowledge of green construction [8].

1.6.1. Measures Taken to Overcome Obstacles:

The applicants had occupied a number of measures to address the top challenges acknowledged in questionnaire survey. If client wants to go for sophisticated level documentation such as Platinum, the project team designs the building to satisfy furthestmost basic Green Scratch criteria in addition to follow Building Regulations just a building design project contained by budget considering from top to bottom cost complicated. In order to keep the material costs down, cheaper material alternatives were also sought. Different sub - contractors' prices were measured, and the one with the lowest price was selected, as long as the goods or systems met certain quality standards. The energy efficiency of a green building is measured by the materials, services, and systems used throughout the structure, which decide however much energy is expended.

In-house advisors also reduce expense of hiring third-party consultants, which is particularly beneficial for larger projects. In reality, several people working on green building projects have many responsibilities. Some engineers, for example, are qualified as energy managers through the Energy Sustainability and Enterprise Advancement Program and are capable of conducting an energy audit for a construction. As a result, costs are lowered because the need for additional energy auditing services is eliminated.

2. DISCUSSION

Professionals and executives with involvement in building as well as familiarity with indigenous environmental laws are also favored and designated to join development team. multidisciplinary workers who are acquainted with built environment besides its regulations in the project team, the connection between parties could be strengthened. The local construction sector, on the other hand, takes a cautious approach to sustainable projects. In order to save money, many construction owners just want to obey with simple guidelines and therefore have no meaning of achieving a LEED Certification prize. As a result, while consultants often advise clients to pursue an award for Green Mark rewards, project teams seldom make an effort to pique clients' knowledge about green building.

The biggest impact of the challenges, according the interviewees, would have been on the project budget. The cost of green building technology, goods, and materials, as well as consulting services, takes a toll on creation budget. At project planning period, the local projects and guarantee that costs remain within inexpensive by creating estimated costs that are as similar to actual amount as possible. To remain within budget, some contractors had no choice but to cut crooks besides use substandard goods and resources that were neither affordable nor environmentally friendly.

As a consequence, consistency suffers as a result of process. Penetrating for substitutions takes a lot of time, which isn't always available in construction schedules. To guarantee that cheap options are found while staying on budget, a balance must be struck. Any delays in the project timeline, like any other development project, will result in significant losses.

3. CONCLUSION

The aim of this study was to look at the common roadblocks that project managers face and, in the end, propose viable solutions to resolve these roadblocks. The key alterations between traditional as well as green infrastructure developments, according to related literature, are level of detail in addition to communication needed. That is particularly evident in distribution organizations used. Often traditional developments use cost delivery methods, in which coordination amongst design and structure players is not a priority. Furthermore, at arrangement phase of traditional developments, a simple schematic design is typically sufficient. Green ventures, on the other hand, necessitate exceptional coordination, which can only be accomplished by delivery mechanisms such as architecture, which combines building design and construction into a single entity. The future application of the study is to plan the new technology for the infrastructure that are comply with the environment norms.

Furthermore, since green design elements are special and involve seamless addition with any characteristic of building, a comprehensive combined design development is recycled at beginning of project. The findings from survey and interviews showed major problems in building construction project administration. These roadblocks were discovered to be interconnected, but they all boil depressed to sustainable building's high cost premium. The lack of competition for buildings that go beyond regulatory criteria is due to a nonexistence of R&D on the advantages of green technologies. As a result, these green systems and technologies are uncommon, resulting in exorbitant installation as well as implementation costs.

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