

Role of Building Services Quantity Surveyors in Managing Cost of Green Buildings

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Abstract. This study reviews the importance of green building and identified some popular rating tools available. The importance of green building requirements was also discussed. Significant cost factors in green buildings were described and methods of capturing and controlling the costs of building services by quantity surveyors discussed. The major barrier to effective cost control of green building have been identified as lack of a clear green design goal; midstream attempts to incorporate green; decentralized management of the green building process; lack of experience with green building; and insufficient time and funding. The study concluded that, it is essential for quantity surveyors to develop a cost management framework responsive to both client values and user requirements within the framework of sustainable development.

Introduction

Greenhouse gasses and ozone depletion are currently a household word following the Earth Summit in Rio, 1992 [1]. Therefore, a green building is designed to use less energy and water and consider the Lifecycle of the materials used which is achieved through better site development practices, design, construction, operation, maintenance, removal and possible reuse of materials [2, 1]. Green rating tools are available in different countries to measure greenhouse gas emission and the acronyms for the tools differ from country to country. Some of the popular green rating tools include UK's BREEAM, USA's LEED, Japan's CASBEE, Australia's GREENSTAR, Singapore GREENMARK and Malaysia' Green Building Index (GBI) [3]. GBI Malaysia is developed by Pertubuhan Akitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia (ACEM).

Green Building Requirements: The International Organisation Standard (ISO 14001) published in 1996 specified the actual requirements of an environmental management system which an organisation has control of and which it can be expected to have an influence on. This requirement is applicable to any organization that wishes to implement, maintain and improve an environmental management system; assure itself of its conformance with its own stated environmental policy; demonstrate conformance; ensure compliance with environmental laws and regulations; seek certification of its environmental management system by an external third party organization and; make a self –determination of conformance. Moreover, contractors are required to develop environmental management plans that include items such as: energy and greenhouse gas adjustment; energy use reduction; review of energy sources; efficiency of water design; procurement and material types; sourcing; and waste reduction management.

Similarly, Green Building Index (GBI) Malaysia is intended to promote sustainability in the built environment and raise awareness among Developers, Architects, Engineers, Planners, Designers, Contractors and the Public about environmental issues [3]. The rating system will provide an opportunity for developers to design and construct green, sustainable buildings that can provide energy savings, water savings, a healthier indoor environment, better connected to public transport and the adoption of recycling and greenery for their projects. According to [3] buildings will be

awarded the GBI Malaysia rating based on 6 key criteria which include energy efficiency; indoor environmental quality; sustainable site planning and management; material and resources; water efficiency; and innovation.

It is obvious that sustainable debate is becoming increasingly prominent and building services play a major part in determining the viability of both the business case and functions of modern buildings. As many of the green building measures that give a building its greatest long – term value are: on-site energy production; on-site storm water management and water recycling; green roofs; day lighting and natural ventilation; these often require a high capital cost [2]. The energy efficiency, the proper installations, operation and maintenance of the building services are critical in achieving the green target as well as determining the success or failure of projects [4]

Cost of Green Buildings Technologies: Environmentally sensitive design (ESD) solutions are not beyond the budgetary expectations of most building owners and investors. Many of the ESD options identified involve extra initial capital expenditure, but achieved reduced short to long-term operating cost benefits [5]. Therefore, regardless of the procurement strategy adopted, there is a need for one party to quantify the extent of additional cost required for green features in buildings for the purpose of obtaining a price for completing a building project, valuing the extent of work completed for purposes of payment, valuing variations in the content or extent of building works, or to support applications for tax or other financial incentives resulting from green features in the building [6]. The overall costs associated with green design and construction may exceed one percent of construction costs for large buildings and five percent of costs for small buildings, depending on the measures employed [2].

The Role of Building Services Quantity Surveyor (QS): [7] surmised that building services are key to developing new green technologies for buildings and some of this includes combined heat and power, district cooling and heating, ground source heat pumps and wind turbines. Therefore, the role of building services quantity surveyor on green building is to demonstrate the cost/benefit of installing such systems using techniques such as whole life cycle costing to show the payback periods for new technologies. It is therefore essential for building services quantity surveyors understand the cost of green buildings because the single most important factor in the development and construction world is cost [2].

The main aim of the study reported in this paper was to identify methodologies to enable the QS to deliver value-for- money on green buildings and identify the barriers that could prevent effective cost control of building services components in green buildings. It is therefore essential for building services quantity surveyors to be accustomed to clients' value criteria for green building projects so as to provide the client with a critical analysis of sustainable systems from cost perspectives. The cost factors associated with a green project to cover an array of issues from decision maker, buying, to contracting and project management and some of the strategies to manage these cost factors are presented in Table 1 as suggested by [8]

Table.1. Green Project Design & Cost Factors

Cost Factors	Mitigation Strategies
Design Load	Work with the design team to create a realistic maximum anticipated load to avoid oversizing power, ventilation, and cooling systems.
Degree of standardization	Consider standardizing equipment locations and types to save on construction costs by keeping the design simplest to build.
Flexibility of building users	Determine early on if the users support potential innovative changes that may affect the way they use the building
Plan for growth	Carefully consider the costs and benefits of planning for expansion capability. Expansion can be a very useful and environmentally sound way to meet future needs without having to construct an entire new building; but it also can mean building expensive features now that may never be used.
Materials and systems	Consider opportunities to transfer funds from operation and maintenance budgets into capital construction funds to help pay for more durable and efficient products, which often incur additional upfront costs.

Integrating the additional cost of green building into the total cost of buildings with the selection of required building services systems requires a meticulous measurement and cost control of overall budget which can only be done by experienced quantity surveyor [9, 7]. Cost management of sustainability enhancement in buildings is not part of traditional quantity surveying practice, it is essential therefore for quantity surveyors to develop a structured approach to capture and justify such cost in line with conventional practice from the inception of building projects.

This approach will also provide a communication tool for the project team, allowing a clear understanding of any budget limitations. Thereby, ensuring that sustainable elements are not eliminated on the projects. Achieving this will require that the building services QS understand the initial budget; generate a cost model for the project to determine cost centers; allocate funds; address possible constraints on the budget; and ensure effective implementation of the budget.

According to [10] implementing a successful cost management methodology requires establishing and using the appropriate standard framework from which to classify and manage information. If there is no standard framework, inconsistency will occur between projects and between stages of each project leading to confusion and loss of control. The use of standard framework for construction information will serve the following basic purposes: (a) Ensure consistency of work products over time and from project to project; Provide a frame of reference for collecting and managing information and eventually for delivering feedback based on experience; (b) Provide a checklist to aid in both management and technical decision making; (c) Facilitates clear communication among all disciplines; (d) Establish a basis for ongoing training of personnel; and (e) Lay an efficient base for automation.

Barriers to Controlling Cost of Green Buildings

The major challenges that could be identified in the cost of managing cost of green building is somewhat related to the traditional cost management of building services. It has been observed that, few traditional practitioners possess detailed knowledge of the complex engineering and operational requirements that need to be considered during any business case development [11, 12, 4]. Meanwhile, with the exception of plumbing installations, quantity surveyors only provide prime cost sums for building services while the detail breakdown is done by consulting engineers. In addition, [8] consider that the top five barriers to controlling costs of green buildings are: lack of a clear green design goal; midstream attempts to incorporate green; decentralized management of the green building process; lack of experience/knowledge with green building; and insufficient time/funding.

Conclusions

The cost of green buildings is real, occurs first and must be justified to various stakeholders. Benefits are generally long-term, and costs are immediate, so many people tend to shy away from anything that will add costs, no matter what the potential benefits. The QS is often the guardian of the project cost of a construction project and should play a major part in directing green projects towards value-based solutions. The most distinctive features of green buildings as identified are economy, efficiency and effectiveness, of the system component which should be achieved through a well defined cost management framework to achieve a better value for clients' money. These features are essential ingredients in each of the tools discussed in this paper. Inherent within the cost management framework is a need to reconcile both client values and user requirements within the framework of sustainable development. These are significant factors that will influence the degree of client satisfaction in the project outcomes. Because it is the choices made during design which will ultimately determine whether a building can be sustainable and not the budget.

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