

**THE COST OVERRUNS IN GREEN BUILDING  
DEVELOPMENT**

CASE STUDY MINISTRY OF PUBLIC WORKS NEW GREEN BUILDING PROJECT  
REPUBLIC OF INDONESIA

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*To my beloved wife, "Widya" and my two gorgeous knights*

*"Jagad and Dirgantara"*

*Thanks to all of your wonderful love and support*

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## ABSTRACT

Green building technology is a relatively new technology in Indonesia. The spirit of each party to be able to support the development of this technology is a must that was inevitable. With the worst of a world energy availability conditions then of course the green building technology can be a new hope in addressing this energy shortage. The growing of green technology today will certainly stimulate spirit of each party to be able to apply the new technology in the world of construction, especially related to the development of new building. It was a common knowledge that most people's perceptions towards green building was still struggling on expensive technology, technology that was difficult to understand and even technologies that were not suitable to be applied in Indonesia. Green building versus a conventional building was still a polemic in the development of new building in Indonesia. Most of the stakeholders still thought that if this technology was applied to the project to be implemented, then the possibility of cost overruns occurred would be even greater than the conventional one's. Assumption arose because green building technology was still a relatively new technology, which not many people truly understand and could apply this technology in every construction phase. Through this study, the researcher was trying to answer that the cost overruns occurred in green building would not be too diverse than the cost overruns occurred in conventional building, and if it happened then all parties involved would be able to know what the material or component which can cause it happened. At the end of the study, the reader would get a fairly significant result which showing that cost overruns occurred in green building construction was much lower when compared with the cost overruns occurred in conventional building. In the end, because the uncertainties had been answered, then there would be no reason for the stakeholders not to begin the construction of new buildings with green building technology.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the Study

Building is one of the major needs for human beings. In development, humans have many activities that require the development of building such as place for housing, shopping, malls, offices, hotels, terminals, etc. Building is one of the largest energy users to support the human activities in the daily life. With the global warming issue and the current energy crisis, the energy saving efforts is very important. Green building is the concept in how to build the building efficiently and friendly, innovatively and provide solutions to environmental problems around it. Base on literature, the Green building (also known as green construction or sustainable building) referred to a structure and process that was environmentally responsible and efficiently resources throughout a building's life-cycle from design, to construction, operation, maintenance, renovation, and finally demolition. This practiced expands and complements to the classical building design which concerns of economy, utility, durability, and comfort.<sup>1</sup>

Elements which are important points in green building are the manifestation of electrical energy, water consumption and management, and use of building materials.

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<sup>1</sup> U.S. Environmental Protection Agency. (October 28, 2009). Green Building Basic Information. Retrieved December 10, 2009, from <http://www.epa.gov/greenbuilding/pubs/about.htm>

Problem of energy consumption in the building was still the highest and then followed by transportation and industry. Approximately 50% - 70% of energy used in building was spent in the air cooling system and until now the engineers have not noticed radically that energy conservation was still trapped in the casing / shell of the building itself. Based on Indonesian national standards, the allowable sun's heat which came into the building was conditioned with a maximum AC by 45 W per square meter, but since the SNI (Standard Nasional Indonesia) Conservation in the building envelope, issued in 2000, there were no buildings that implement the design. In reality more and more solar heat entering the building, then more energy (electricity) to be paid that make the building is not economically anymore. The groundwater consumption in buildings would also quite large and linear following the reality before..

The use of ground water was linear to a tendency to throw away the used water to the channel, down the river and tipped into the sea. The rain water tends to flow out of the building plots and almost nothing at all was absorbed into the ground. As a result of this trend, one of the important impacts was the shortage of water in the dry season and flooding occurred in the rainy season Thus the fresh water was always in vain flushed into the sea. Types of material in the green building are also important to be considered. The utilization of local materials which can easily obtained and replaced could save production costs and transport, in addition of reducing fossil energy consumption.

When viewed of the construction trend of green building, it continues to increase year by year, accompanied by the requirement of the Jakarta provincial government about construction of Green building in its region. Following that regulation the Ministry of Public Works Republic of Indonesia had planned to build a new building on the same location at this time and considered that the building could serve as an example to other government building with platinum grade of classification in the design, construction and finally maintenance and operation phase Seeing the reality that this building was the first government building to use and



apply the concept of green building then, of course, the problems and obstacles in the implementation would definitely be happened.

**Table 1.1** Grade of Green Building (USGBC. 2009)

<b>LEED Building vs. Conventional Building</b>	
<b>LEED Rating</b>	<b>Anticipated energy/environmental impact (energy. Water. Land improvement, etc)</b>
Certified	30%
Silver	40%
Gold	50&
Platinum	70%+

The construction of the new green building was still using the Presidential Decree No. 80 Year 2003 on Guidelines for Procurement of Government Goods / Services. Unlike what had been prevailing in Presidential Decree No. 54 Year 2010 on Guidelines for Government Procurement of Goods / Services, where the cost variation was still possible to be implemented for the lump sum type of contract with a limited maximum value by 10% of the total contract value. With the high classification to be achieved which was Platinum grade, then certainly the implementation on field would encounter some problems included the design changes, that must be done to meet the requirements grade in accordance with Green Building Council Indonesia standard. The Green Building Council Indonesia was affiliated with the Green Building World as Non Government Organization that provides assessments and checks as well as clarification of new green building construction.

**Table 1.2** Achievement Point on Every Grade in Green Building Construction  
(USGBC. 2009)

<b>LEED Certification Levels</b>	
<b>Rating</b>	<b>Earned Points</b>
Certified	<b>26-32</b>
Silver	<b>33-38</b>
Gold	<b>39-51</b>
Platinum	<b>52-69</b>

## **1.2 Issues**

Based on preliminary discussions with several practitioners (client representative, design consultant, management consultant, contractor, client's technical advisor and green building council Indonesia) who were involved in the development of ministry of public work new green building project, plus some literature studies sourced from several journals and internet website which mainly deals directly to the issue of green building development, the several issue related to the construction of new green building has arise as follow:

- a) Green building construction is often considered expensive and sometimes difficult to be comprehensive understood in its implementation
- b) Considering that green building technology is relatively new compared to other conventional building, then it would be relatively more difficult to be

known exactly related to the problems and constraints within the issue of time and cost overruns

- c) The most significant component in influencing the variation that exists in the development stage of new green building is still difficult to be predicted accurately because of many influencing factors compared to the conventional buildings.
- d) The maximum cost overruns which is allowed to be implemented in the construction of government building is only 10% of the total contract value for lump sum type of contract, so the identification associated with the material or components which is causing the cost variation occurred in the construction of new green building project is really important, and must be carefully done as not to burden the Government budget in the future.

### **1.3 Problem Statement**

As what was mentioned earlier, this building was the first government building using green building concepts with platinum grade then of course there would be problems in the implementation according to every stage of the project phase. With the changed of procurement regulation in Indonesia from Presidential Decree No. 80/2003 on Government Procurement of Goods and Services to the Presidential Regulation No. 54/2010 on Government Procurement of Goods / Services, where the variation could not be done for projects that used lump sum type of contracts. It would certainly raised its own reluctance to the other ministerial that want to build a new building with the green building concept, this could happen because they still

think that if this technology is applied to the project to be implemented, then the possibility of cost overruns that occur will even be greater than the conventional one's. The assumption arose because green building technology is still a relatively new technology, which not many people truly understand and can apply this technology in every construction phase.

To be able to identify what is most important component in the cause of cost variation is not easy. Commonly the experience of planners and contractors in carrying out the project is very important in early identification of such manner. Through this study, the researcher was trying to answer, was the cost overruns occurred in green building would be diverse or not than the cost overruns occurred in conventional building?, and if it happened then could all the parties involved would be able to know what was the material or component which could cause it happened?.

#### **1.4 Research Question**

Based on the issues and problems statement that had been expressed earlier, some of the questions will guide this research to be more depth and detail, the several questions are:

- a) What is the most significant factor in influencing the construction cost overruns on new government buildings that use green building concepts?

- b) How great and significant the factors affecting the cost overruns that will be accumulated at the end of the construction activity phase? And how often these factors occurred mainly in the physical construction phase?

### **1.5 Research Objective**

Base on the research question above, in order to discover the most significant component in cost variation of green building development, this research is undertaken:

- a) To identify the most significant factor and component that caused the cost overruns in development of green building, specially the building which is financed by the government budget.
- b) To measure the degree of significances on the factor and component of green building related to the total cost overruns in government building project

## **1.6 Scope of the research**

This study will focus on:

- a) The Building which is financed by the government budget.
- b) Government building projects that apply the concept of green building construction with a variety of targets grade to be achieved
- c) Government building projects that have been in the construction stages that the design has been approved by the Green Building Council Indonesia
- d) Government building projects with the type of lump sum contracts
- e) Government building projects which accordance with Presidential Decree No. 80 year 2003 on Guidelines for Procurement of Government Goods / Services which limit the additional work or cost variation less than 10% of the total value of the contract

## **1.7 Significant of the Research**

The importance of the research is to provide a wide range of stake holder be it owner, consultant or contractor associated with the additional cost that is the most difficult to predict, associated with the construction of buildings using green building concepts, and especially in this case is the government as the owner, where the

implemented cost overruns is very limited which maximum only 10% of the total contract value.

In addition, this research could also provide the early warning or early representation to the party who will plan the construction of new buildings with green building concepts, related to the obstacles to be faced in the implementation stage of design on construction field.

This thesis will also be able to give an idea related to how great a percentage of cost variation will occur in the construction of government buildings with green building concepts, especially an attempt to achieve a platinum grade which is the highest grade in the assessment of green building in the world.

## **1.8 Thesis Organization**

This study is composed of five chapters as follow:

**Chapter 1** presents the introduction which is including background of the study, issues, problem statement; research question, research objective, scope, significant and methodology.

**Chapter 2** will reviews the literature data relating to green building concept and the requirements to be met in it. In addition in this chapter will also discuss about the assessment criteria in each grade to be achieved in stages of design, construction and operation. This chapter will also discuss the components that are involved in the development of government buildings and the concept of green building including all

the regulations in the Republic of Indonesia that regulate the implementation of cost variation.

**Chapter 3** describes the methodology that adopted to conduct this research, which describe the object of study, finding data method, analysis method.

**Chapter 4** presents the data analysis result associated with the research results that have been implemented including a description of the tools used in analyzing the results of the thesis which the data has been obtained

**Chapter 5** presents the conclusion of this research and recommendations for future research.

## **1.9 Summary**

Green building technology is a relatively new technology in Indonesia. The spirit of each party to be able to support the development of this technology is a must that was inevitable. With the worst of a world energy availability conditions then of course the green building technology can be a new hope in addressing this energy shortage. The growing of green technology today will certainly stimulate spirit of each party to be able to apply the new technology in the world of construction, especially related to the development of new building.

Through this study, the researcher was trying to answer that the cost overruns occurred in green building would not be too diverse than the cost overruns occurred in conventional building, and if it happened then all parties involved would be able to know what the material or component which can cause it happened.



## REFERENCES

- Akinsola, A. and Potts, K.F., 1998. *A methodology for evaluation of the variation clause in the standard forms of contract*, Proceeding of COBRA 98, RICS
- Angelo W. J. & Reina P.(2002). *Megaprojects need more study up front to avoid cost overruns*. Retrieved March 29, 2010
- Ashworth, A. (1994). *Cost studies of buildings*. Essex. Longman Group Limited.
- Asia Pacific Energy Research Institute, 2006, *APEC Energy demand and supply outlook 2006*
- Avots I. (1983). *Cost-relevance analysis for overrun control*. *International Journal of Project Management*, 1, 142-148
- Charles, T.J. and Andrew, M.A. *Predictors of cost-overrun rates*. *Journal of Construction Engineering and Management*, ASCE, (1990), 116, 548–552
- Davis Langdon, (2004), *Costing Green: A Comprehensive Cost Database and Budgeting Methodology*, <http://www.davislangdon.com>.
- Dorter, J. (1991), *Variations*. *Construction Law Journal*, 7(4), pp281-302.
- Duta Pertiwi, (2007) *Energy Efficiency and Conservation: Best Practices of Plaza BII Building*, Jakarta, Indonesia
- Fenn, P., Lowe, D. and Speck, C. (1997). *Conflict and dispute in construction*. *Construction Management and Economics* 15: 513-518.
- Flyvbjerg B, Holm MS, Buhl S. (2002) *Underestimating costs in public works projects. Error or lie?*. *Journal of the American Planning Association*; 68; 279-295
- Franciscus Sutijastoto, (2006), *Energy Efficiency Policy of Indonesia*, Data and Information Center for Energy and Mineral Resources, Ministry of Energy and Mineral Resources (MEMR), the Indonesia government
- Green Building Council Australia, (2006), *The Dollars and Sense of Green Buildings Building the Business Case for Green Commercial Buildings in Australia*”, <http://www.gbcaus.org>
- GSA Report to Congress, [www.usgbc.org](http://www.usgbc.org), March 6, 2007

- Hughes, W.P. and Murdoch, J.R. (2008), *Construction Contract Law and Management*, London: The Cromwell Press, p-212
- Indonesia, (2010) *Draft Regulation of the Minister of Public Works on the Green Building Technical Guidelines*
- Indonesia, *Presidential Regulation No. 54 year 2010 regarding Technical Guidelines on Procurement of Government Goods/Services*
- Jerry Yudelson, Richard Fedrizzi, (2008) *The Green Building Revolution*, Island Press, United States of America, p-13
- McGraw-Hill Construction, (2008) *Global Green Building Trends*, McGraw-Hill Construction
- Peter F. Kaming, Paul O. Olomolaiye, Gary D. Holt & Frank C. Harris, (2010) *Factors influencing construction time and cost overruns on high-rise projects in Indonesia*, 21 Oct 2010
- RCLCO, (2008), *Measuring the Market Demand for Green Residential Development*, RCLCO, [www.rclco.com](http://www.rclco.com)
- The ASEAN Energy Cooperation,  
[http://www.aseanenergy.org/energy\\_organisations/eec\\_ssn/eec\\_ssn.htm](http://www.aseanenergy.org/energy_organisations/eec_ssn/eec_ssn.htm)
- T.H.S. Priyantha, Gayani Karunasena and V.A.K. Rodrigo, (2011), *Nature and Effects of Variations in Construction Industry*, Journal Causes
- UNEP, United Nations Foundation, and the World Bank, (2006), *Local Financing to Slash Energy Waste in China, India, Brazil Said Crucial to Forestalling Global Climate Change*, 3CEE project news release, see: <http://3countryee.org/PressRelease.pdf>
- U.S. Environmental Protection Agency. (2009). *Green Building Basic Information*. December 10, 2009, from [www.epa.gov/greenbuilding/pubs/about.htm](http://www.epa.gov/greenbuilding/pubs/about.htm)
- U.S. Environmental Protection Agency. (2009). *Green Building Basic Information*
- U.S. Green Building Council, (2002), *Making the Business Case for High-Performance Green Buildings*, [www.usgbc.org](http://www.usgbc.org), April 2005
- USGBC, (2007), *Survey of Green Building Plus Green Building in K-12 and Higher Education*, [www.turnerconstruction.com/greensurvey05.pdf](http://www.turnerconstruction.com/greensurvey05.pdf), March 6, 2007.

Wen Hong, Madelaine Steller Chiang, Ruth A. Shapiro, Mark L. Clifford, (2007)  
*Why Green Buildings Are Key to Asia's Future*, Asia Business Council,  
Hongkong.

World Bank, (2007) *Snapshot Assessment of Indonesia's Public Procurement System*.

World Business Council for Sustainable Development (WBCSD), (2007), *Energy Efficiency in Buildings: Business Realities and Opportunities*  
[www.wbcSD.org](http://www.wbcSD.org)

Yogo Pratomo, (2005), *Implementation of Energy Efficiency Policy in Indonesia*,  
PowerPoint Presentation presented at: CTI Industry Joint Seminar on  
Technology Diffusion of Energy Efficiency in Asian Countries, February  
24-25, Beijing, China.

[www.bdcMag.com](http://www.bdcMag.com), White Paper on Sustainability, November 2003

[www.dailyjournal.com](http://www.dailyjournal.com), Jason W. Armstrong, LEED Buildings Come With a Cost,  
Jan. 11, 2010

[www.institutebe.com/Green-Building](http://www.institutebe.com/Green-Building)

[www.worldgbc.org/default.asp?id=67](http://www.worldgbc.org/default.asp?id=67)

[www.businessdictionary.com/definition/construction-phase.html](http://www.businessdictionary.com/definition/construction-phase.html)