



ConCERN 2014

Conference for
Civil Engineering
Research Networks 2014

Jointly held with



ACEC

7th ASEAN
Civil Engineering Conference
Under AUN/SEED-Net

Delivering Sustainable Infrastructure
Through Collaborative Research in Civil Engineering

4-5 November 2014,
ITB Campus, Bandung, INDONESIA

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Faculty of Civil and Environmental Engineering
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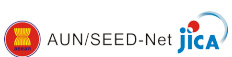


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ConCERN 2014 Introduction

Civil engineering has been considered as one of prominent professions in creating a sustainable world and enhancing the global quality of life. Civil engineers' roles as planners, designers, constructors, and operators of the built environment have been taken for granted by the society, but nowadays, they are also challenged to become the stewards of the natural environment and its resources - sustainable infrastructure is not a jargon, it is a real need for the global society. It is believed that these challenges would only be answered by embracing the roles of civil engineers as innovators and integrators of ideas and technology across the public, private, and academic sectors. Hence, the civil engineering profession can offer the solutions to the society and the environment by taking major part in the infrastructure development process, becoming more aware of social, health, environmental and economic issues.

Innovations in civil engineering and integration among the stakeholders of the infrastructure development could not be possibly done by a party. Global needs and problems faced by the society become comparable, even though some would still be specific for some local conditions, and the specialization as a way of survival in this ever competitive environment called for collaborations in research and development among centers of excellence in the discipline of civil engineering. Despite the fact that collaboration has been an integral part of researching civil engineering for a long time, the nature of collaboration seems to be growing from one of conducting research within a center of excellence to newer areas necessitating partnerships across centers of excellence [e.g. academic, government, private industry].

Having considered the previous established networks of collaboration in civil engineering, the contemporary challenges requires more great deals of collaboration among scholars and practitioners in many centers of excellence. A conference that could cater the dissemination of collaboration results, the establishment of new collaboration, and the augmentation of the established collaborations is one of the immediate agenda to be implemented. Along that line of thought, the Faculty of Civil and Environmental Engineering (FCEE), Institut Teknologi Bandung, Indonesia, initiate an international conference called 'Conference for Civil Engineering Research Networks' or ConCERN in 2014. For the first time, this conference would instigate the thought of collaborations through the research networks in the area of civil engineering that the FCEE have already recognized. Hopefully, the conference would generate more establishments of national, regional, and international collaborations for the FCEE, and for the conference participants as well.

7th ACEC Introduction

The ASEAN Civil Engineering Conference (ACEC) under AUN/SEED-Net is a platform to share the most updated technology and research on common regional issues in order to contribute to the ASEAN community and to draw support from the industrial and the governmental sectors. The regional conference allows opportunities for AUN/SEED-Net members to publicise their research work, exchange ideas and discuss future collaborations and activities related to the civil engineering field. The conference itself is not only to enhance the academic network among the ASEAN universities, but also to strengthen the relationship between ASEAN and Japanese professors of each university.

This year, the 7th ASEAN Civil Engineering Conference (ACEC) will be organised with the theme "Delivering Sustainable Infrastructure through Collaborative Research in Civil Engineering" at ITB Campus, Indonesia on 4 - 5 November 2014, held jointly with ConCERN 2014.

Objectives & Sub-themes

The ConCERN 2014, as reflected from its abbreviation, has the following objectives:

- To provide a platform for educators, scholars, practitioners, governments, and companies in construction industry to meet and exchange ideas;
- To provide an environment to disseminate research findings and innovations in the area of civil engineering as a result of collaboration and networks; and
- To fortify and expand collaborations in the civil engineering research networks.

The selected papers to be discussed in this conference would cover research ideas, findings, and innovations in the following sub-themes:

- **Structural Engineering and Materials**
- **Geotechnical Engineering**
- **Transportation Engineering and Planning**
- **Water Resources Engineering and Management**
- **Construction Engineering and Management**
- **Infrastructure Engineering and Management**

Programs

Day 1: Tuesday, 4 November 2014

Time: Morning

- **Opening Ceremony (Plenary) & Guest Speakers (Plenary)**

Time: Afternoon

- **Technical Paper Presentations (Parallel)**

Time: Evening

- **Cultural Dinner (Plenary)**

Day 2: Wednesday, 5 November 2014

Time: Morning

- **AUN/SEED-Net Field Management Meeting, Technical Paper Presentations (Parallel), & Closing Ceremony (Plenary)**

Time: Afternoon

- **Research Collaboration and Networks Meetings (Parallel)**
- **Side Events**

Keynote Speakers

- **Prof. George Ofori:** Ethics and Personal Responsibility in the Construction Industry, National University of Singapore, Singapore.
- **Prof. Susumu Iai:** Combined Geotechnical Hazards Due to Tsunami and Earthquakes, Kyoto University, Japan.
- **Prof. Akimasa Fujiwara:** Analyzing Air Quality Based on Limited Monitoring Data in Developing City, Hiroshima University, Japan.
- **Prof. Kazuhiko Kasai:** Paper title to be announced, Tokyo Institute of Technology, Japan.
- **Prof. Kusuma., et al.:** Paper title to be announced, Water Resources Research Group, Institut Teknologi Bandung, Indonesia.

Invited Speakers

- **Djayanta Ginting:** Concrete That Contribute to Sustainable Construction, Value Added Solution Manager of Holcim Indonesia
- **Muh. Najib Fauzan:** Paper title to be announced, Director of Human Resources and General Affairs, Indonesian Highways Corp.
- **Nobuo Masaki, Dr.Eng.:** Computing Algorithm of Hysteresis Model of Deformation-History for Isolator, Bridgestone Corporation, Japan.

Place & Date

4- 5 November 2014

ITB Campus
Bandung, INDONESIA

Participants

The participants of the conference are expected to be civil engineering's scholars, government officers, designers, contractors, consultants, lecturers, students, and suppliers. The total attendant is expected to be around 200 people, coming from countries in the Asia Pacific region.

Papers Presented

We have reviewed and accepted 132 abstracts from Hong Kong, Philippines, Thailand, Vietnam, Japan, Bangladesh, Malaysia, Singapore, Taiwan, Korea, Norway, New Zealand, Myanmar, and Indonesia.

Important Dates (in 2014)

- Deadline of full paper submission: **15 Sep**
- Full paper acceptance notification: **29 Sep**
- Deadline of registration: **18 Oct**
- Deadline of revised full paper submission: **20 Oct**
- Conference for Civil Engineering Research Network (ConCERN 2014): **4-5 Nov**

ConCERN 2014 Secretariat

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Registration

Please fill in the registration form at:
<http://concern.itb.ac.id/registration.html>

The registration will be closed on **18 October 2014**.

Category

- International participant: **USD 200**
- International student participant: **USD 150**
- Local participant: **IDR 1.500.000**
- Local student participant: **IDR 1.000.000**

Limited numbers of financial supports are available based on proposal to the Organizing Committee.

Payment method Bank Wire Transfer

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ITB Branch, Indonesia
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Please send your payment evidence (bank transfer receipt) to the Secretariat of ConCERN 2014 and the 7th ACEC AUN/SEED-Net by Fax: **+62-22-2510713** or email: concern@itb.ac.id mentioning your **PaperID** and other relevant registration information.

Getting to Bandung

For International participants, to get to the city of Bandung, you may use the Soekarno-Hatta International Airport (SHIA), at Cengkareng, near Jakarta (capital city of Indonesia, about 150 km from Bandung), or the Husein Sastranegara International Airport (Husein) at Bandung. The SHIA is serving major airlines from all around the world. From Jakarta, you can take a train, shuttle buses or travel mini buses to get to Bandung. However, the Husein airport is serving limited number of airlines, and only from Singapore and Kuala Lumpur, Malaysia.

If you need more information on how to get to Bandung from the SHIA, Jakarta, please visit this site:
http://www.international.itb.ac.id/web/?page_id=67



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JASAMARGA



Welcoming Remarks

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Project Delivery System for Green Building Projects in Indonesia

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Abstract—Green buildings have been flourishing and becoming a new trend for the Indonesian construction industry since almost a decade. New values demanded by the owners, i.e., green building and, moreover, sustainable building, added complexity to the building projects and consequently mandated more robust approaches and methodologies on delivery of the projects. However, the owners and parties involved in delivering the green buildings' projects have been merely adopting the same delivery practices that were implemented to the general buildings with green buildings' specifications in mind. This paper presents a study on the delivery practices of four new green buildings in Indonesia. The study was accomplished by the use of direct interviews to all parties involved in each green building project, i.e., owner, designer, contractor, and supervisor, related to the way they executed the project from the initial stage through the operation stage, and identification of benefit and problems they might have during each stage. The results of the study would portray the green building project delivery systems in Indonesia and whether they would achieve the values demanded by the owner for a green building.

Keywords— *green building, project delivery system, sustainable*

I. INTRODUCTION

Indonesia is still in its early stage towards sustainable construction. The advancement toward sustainable construction has been taking place from year to year. Those in the construction industry have begun to be aware of sustainable development. An example of this awareness can be seen in the action done by a cement manufacturer company giving rewards to those doing green construction projects and the establishment of organizations engaged in the preservation and development of sustainable construction such as the Green Building Council of Indonesia (GBCI).

In the meantime, some Indonesian contractors have been able to meet international standards related to environment concerns, such as the standards of safety and health management systems through Occupational Health & Safety Advisory Services (OHSAS) ISO 1800, the environmental management standard ISO 14001: 2004, and the quality management system standard ISO 9000. Even one of the construction companies of SOE (State Owned Enterprises) has claimed itself as a Green Contractor by doing some environment-friendly construction projects. The central

government initiated the Indonesian National Standard (INS) for green buildings. The local governments have also taken the initiatives in the application of sustainable construction, e.g., the Jakarta Green Building Programs by the local government of Jakarta and the establishment of the Regulations by the Governor of Jakarta No. 38 Year 2012 on Green Building [1]. In Indonesia, green building is also called as sustainable building or high performance building.

The concept of green building is a building that applies the principles of sustainable or environment-friendly principles at every stage of the project from planning and programming, design, construction, operation and maintenance up to the deconstruction phase; all parties integrally involved in very intense communication and collaboration in order to achieve the targeted performance in a very effective and efficient way possible [2]. The level of achievement of the desired sustainable or environment-friendly principles (level of green-high performance) or is also called as green value desired by the owners must be defined (initiated) since the beginning of the project and then forwarded to the next stages. The process of moving the green value (transfer of green value) at each stage should happen smoothly. In other words, the transfer process of the green value must be maintained throughout the stages of the project. After the project is completed, the green building is expected to provide the appropriate performance as designed.

Indonesia has begun to apply the concept of green building in accordance with the Indonesian government's commitment to voluntarily reduce emissions of greenhouse gas (GHG) by 26% by 2020. Since 2009, Indonesia has already had Green Building Council of Indonesia (GBCI) that makes Indonesia become a member of the World Green Building Council (WGBC) altogether with over a hundred countries in the world. Based on GBCI data in May 2014, there are 70 green buildings that have signed up and followed the green building certification; 8 (eight) of them have got the GREENSHIP certificate, and of which 4 (four) are existing buildings (EB) being renovated into green buildings and the rest four (4) buildings are new green buildings (NB). However, the construction of green buildings still follows the existed practices and regulatory guidelines for construction of general buildings.

This paper discusses a research that was conducted to get an overview of the project delivery system (PDS) used in the implementation of green building projects in Indonesia. The complexity of the green building projects was assumed would demand more integrated approach in delivering the buildings compared to non-green buildings. The investigation and assessment of PDS was done to get an idea on how the owners and parties involved in managing and delivering the current green building projects.

II. PROJECT DELIVERY SYSTEM

The decision on how to deliver the project or called the project delivery system (PDS) is very important since it could be used as a framework for all parties involved in a green building construction project. The selected PDS would provide information of the green building projects related to the roles, responsibilities and risks of the project [3]. PDS covers all phases, procedures and components of designs and development to be held and combined on a treaty agreement to complete the projects. PDS is started with the statement of owners on things necessary and required at the time of making the design of the building, progressing to documents of contract, until the building is ready to be operated [4].

In general, there are three commonly used PDS, i.e., Design Bid Build (DBB), Construction Management (CM), and Design Build (DB). PDS is defined by the owners and involving many parties such as designers, contractors and supervisors. However, it is not an easy task for the owners to determine appropriate PDS for a particular project. In fact, the question that always comes to the owners is which PDS is suitable for creating a high quality, cost efficient, and timely project. To answer this question, the first thing the owners should define and prioritize is how to measure the success of a project, and choose the delivery method approach that can lead the project to meet its objectives. It should be noted also that no method that is perfect and no method that can ensure the perfect result of a project.

The selected project delivery approach would determine the expected trade-off between control of the owners to the project delivery process and the anticipation of emerging risks of the selected delivery method. The selected PDS must also consider owners' experiences on project implementation schedule, in which owners must control the delivery schedule to make the project successful since the beginning. Initiatives from owners to include designers and construction professionals and independent consultants to provide assistances in getting information and in making decision for the owners are necessary. In this case, it is important to be able to avoid a conflict of interest between the parties involved [4].

III. RESEARCH ATTRIBUTES

In order to achieve the objective of the research, multiple attributes to portray the delivery of green building projects were used. There are seven attributes that were derived from the literatures and involved with the success of the project delivery (Table I).

TABLE III. LIST OF RESEARCH ATTRIBUTES

No.	Attributes	Definition
A	Owner's Commitment	Owners cling and focus on the decision to implement green building
B	Methods of Project Delivery	System used by owners to manage the design, construction, operation, and maintenance of a building by signing a legal agreement with the parties involved
C	Procurement of Project Team	Procedures for procurement of project team
D	Conditions of Contract	Terms and Conditions related to a written agreement / contract between owners and the project team
E	Delivery Process Integration	Integration of all parties involved in each stage of the project
F	Characteristics of Project Team	Qualities or characteristics owned by parties implementing the project.
G	Construction Process	The execution of the construction process of green building construction.

IV. DATA COLLECTION

The data were collected through direct interviews to the targeted respondents, i.e., owners, designers, contractors, and CM consultants who have experiences in implementing carry out green buildings construction. Some information gathered from the interview processes were:

1. General information of respondents; includes general profile of the respondents, experience related to green building projects, and certification in the areas of green buildings.
2. General information of the projects; includes the profiles of the green building projects that were studied. There were four green buildings studied (Table II).
3. Respondents' answers on the procedures of the implementation project of green building and the research attributes.
4. Obstacles in implementing green building project, and opinions from the respondents on improvements needed for the next implementation of green buildings projects.

Four case-studies were selected for the research based on the list of green buildings in Indonesia from the GBCI. There were 8 green buildings targeted as case-studies, but only four of them responded to participate in the research.

As shown in Table II, there were four green buildings projects that were used as case studies; their names are covered-up. Only one project that was delivered using the Design-Build system. However, the DB system used in that project is not a pure one. It was the design that was redone by the contractor as it came into the project and proposed the green building approach to the owner. The owner agreed and the contractor revised some of the designs to meet the GBCI's criteria.

TABLE IV. GREEN BUILDING PROJECTS AS CASE STUDIES

Buildings	Function	Green Level	Owner(s)	PDS
<i>DC Building</i>	Office	Platinum	SOE	DB
<i>M Building</i>	Office	Platinum	Government	DBB
<i>GR Building</i>	Apartment	Gold	Private	DBB
<i>S Building</i>	Office	Platinum	Government	DBB

Those four case-studies were approached and there were 17 respondents available for the interviews. Educational background of the respondents are: 1 (one) senior high school graduate (6%), 9 (nine) bachelor graduates (53%), and 7 (seven) post graduates (41%). In terms of respondents' experience in the field of construction, the lowest was 6 years and the highest was 25 years, and in average the respondents had worked for 16 years in the field of construction. There were 7 respondents (42%) have had the GreenShip Professional (GP) certification from the GBCI, and 7 respondents (42%) who had the GreenShip Associate (GA) certification from the GBCI. In general, it can be concluded that the respondents interviewed had been long working in the field of construction and had enough knowledge of green buildings.

V. RESEARCH RESULTS

The results of the research are described below, while a matrix of the results is depicted in the Table III.

A. Owner's Commitment

The owners of already built green buildings in Indonesia has been aware of the concept of green building, although their understandings were not complete. Most of the green building project ideas came from the owners' own desires. The rationale to adopt the concept of green building was because it was already became part of the owner's vision, mission, and its contribution to the preservation of the environment and to reduction of global warming.

For the owners that come from the private sector, adopting the green building concept is an important strategy for building their corporates' images. In addition to that, there was a demand from the market to be environment-friendlier. The principles of green for a green building project in Indonesia is still incorporated at the planning and design stages. However, some owners incorporated the green concept at the beginning of construction without any consideration of green design.

B. Method of Project Delivery

Most of the delivery method used in the implementation of green buildings in Indonesia is Design-Bid-Build (DBB). It was also found that DB delivery method was only performed in project development of DC Building. As mentioned before, this DB method was not pure DB, since it was not at the beginning of the project; instead, it was introduced by the contractor as a value engineering process before the construction process

involving redesign process from non-green building into a green building. It can be concluded that the delivery method was not considered yet as an important thing in delivering the green building project. This may happen due to the ignorant of integration need between the life cycle stages and risk associated with a green building project by the owner.

C. Procurement

The procurement method chosen for selecting contractor to build the green building projects in Indonesia is through a tender using a pre-qualification process. However the evaluation was made based on prices in the government green buildings projects. For private sector's projects, the evaluation method used was the best value selection, where the price offered is not the most important aspect to be considered. The technical aspect such as the proposed concept of craftsmanship, construction method, and the understanding of the contractor to the green building concept was the most valuable aspect to consider.

D. Condition of Contract

The type of contract used in the implementation of green buildings projects is a lump sum fixed price with a monthly payment method. There is no initiative or modification found in the contracts of case-studies to incorporate how to achieve green building values. The condition of contracts for green building projects were still the same as for projects of conventional buildings. In the case studies, all the owners emphasized the demand on adopting green building concept verbally at the meetings and notes were then made to be implemented by the parties involved. No provision of incentives and penalties are available related to the achievement of green buildings specification yet either. The need of GreenShip Professional (GP) whose tasks are to assist parties involved in the achievement and assessment of green building specification in the projects was not included in the contract; instead, it was stated in the terms of reference (TOR) separately related to this assistance.

E. Delivery Process Integration

In general, all green building projects in Indonesia have not been well integrated in all stages; especially in the design stage, since at this stage the contractor has not been involved. All parties involved (owners, designers, CM consultants) met for the first time at the beginning of construction stage. The owners also used the green consulting services to help them in giving proper understanding of the green concept, in maximizing green values in the design, in defining the scope of the project, and in controlling the construction phase. In order to level the perception and understanding of all parties involved on the green building concept to be achieved, training and workshop on green concepts were also necessary to be held by the owners.

TABLE III. THE FOUR GREEN BUILDING PROJECT DELIVERY SYSTEMS

No	Attributes	D Building	M Building	GR Building	S Building
A.	<i>Owner Commitment</i>	Strong commitment	Strong commitment	Strong commitment	Strong commitment
B.	<i>Methods of Project Delivery</i>	DB	DBB	DBB	DBB
C.	<i>Procurement of Project Team</i>	Tender	Tender	Tender	Tender
D.	<i>Conditions of Contract</i>	Traditional contract	Traditional contract	Traditional contract	Traditional contract
E.	<i>Delivery Process Integration</i>	<ul style="list-style-type: none"> Integration at the beginning of construction Energy and lighting simulation Contractor hires a green building consultant Bureaucracy is faster than government projects Owner's special team for development GP team acts as personnel of the project team Smooth communication 	<ul style="list-style-type: none"> Integration before contractor selected Owner's special green consultant Frequent meetings GP requirement for all parties 	<ul style="list-style-type: none"> The green concept introduced at design stage Experienced green designer Two Owner's GPs Smooth communication 	<ul style="list-style-type: none"> The green concept introduced at design stage Owner's special green consultant
F.	<i>Characteristics of Project Team</i>	The first experience of constructing green buildings, all GP team members come from the contractor side	The project team did not have experience in green building, but all parties have the same spirit in realizing a green building.	Some of the project team members have experienced green building projects.	Some of the project team members have experienced green building projects.
G.	<i>Construction Process</i>	<ul style="list-style-type: none"> Strict SHE implementation Protection of the environment Limited availability of green materials A workforce that understands the concept of green Remote location 	<ul style="list-style-type: none"> Limited availability of green materials Limited availability of labor Long commissioning processes 	<ul style="list-style-type: none"> Limited availability of green materials Weather constraint 	<ul style="list-style-type: none"> Limited availability of green materials Limited innovative construction method

Integration efforts in the implementation of the project can only be found from the frequent meetings, held each week, to discuss and maintain the same perception among all parties involved. This integration effort could have impacts on the relationship between the parties involved that would create a good climate between the parties during the construction process.

F. Characteristics of Project Team

Solid project team members are important to the success of project implementation. The existence of team members that are knowledgeable in green building concept are essential. Based on the four case studies, they became the first and second experiences for them in implementing green buildings. Even though some of the team members have never had the experience, they had the same awareness and understanding in implementing green buildings. Some of the owners are already

familiar with the green building concept, some are not. However, in order to help them meeting the requirements from the GBCI, most of them hired green consultants.

The selection process of the project team members really depends on the owner's type whether it is a private sector or a government agency. However, there is no specific standard to be followed in selecting the project team member for a private sector, while the government owners must use certain strict regulations, i.e., public procurement regulation. The selection of the project team member was believed to be a way to create a harmony among the parties involved. However, there was no evidence of which selection processes that could be better creating it yet.

G. Construction Process

Compared to the construction processes of the conventional buildings projects, the construction processes of green

buildings projects are expected to be better since the green buildings projects employ more professional service providers, such as sub-contractors and suppliers. The selection of sub-contractors and suppliers by the contractor is stricter considering ISO 14001 certification, experiences in green building projects, and innovative approaches in proposed construction processes. It seems that construction processes of the green buildings projects are expected to deliver better quality of works. This would also affect the project environments surrounding the projects.

VI. PROBLEMS IN DELIVERY

In general, the performance of the already-operating green buildings is good, although there are numbers of problems encountered related to the operation and maintenance issues of green buildings; such as how to maintain the performance of green buildings and how to make the users be familiar with the green building features and participate in the operation and maintenance the buildings. Another important issue related to the need of professional operation and maintenance services since the owner cannot afford to operate and maintain the buildings as supposed to in order to achieve the planned performances.

Other identified problems that have occurred in the delivery of green buildings projects based on the four case studies were:

1. Green buildings projects are relatively costly compared to conventional buildings and the owner found it hard to assure that the cost was worthy.
2. There are not many professionals and experts in the area of green buildings and the supports from the government was not yet adequate in pushing the development of green buildings in Indonesia.
3. There has been no firmed definition on the level of performance of green building to be adopted as standards.
4. The availability of green supply chains of sub-contractors as well as suppliers of green materials are still under development.
5. The number of construction workers that are aware of green building concepts are still very limited.

VII. CONCLUSIONS

From this research discussed in this paper, the delivery of green buildings projects in Indonesia is still the same as of the conventional buildings. However, there are some notable practices that would make the already-built green buildings to be considered successful. They are:

- Strong commitment of the owners to realize a green building.
- The existence of a special green consultant who assisted the owner in defining the value of green building.
- The green building project should be assisted also by a well trained staff in green building assessment, such as Greenship Professionals (GP).

- The contractor takes a major role in applying the green concept during construction processes and deliver the green building values to the owners.
- Good communication and collaboration are essential for all parties involved in the implementation of green buildings to achieve the desired goal.

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