Green Renovation and Retrofitting as a Phenomenon

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Abstract: The discourse on climate change has become an issue in the construction industry in Indonesia in decades. Then, it becomes a consideration in the building design process. This paper focuses on renovation and retrofitting, as the action of building post-operation. The term renovation refers to the process of responses to the building operation to make a good state of improvement. In the construction industry, improvement relates to the method of improving or modernizing the current building due to operation. The opposed to a term of retrofitting, which provided something with a component or feature not fitted initially with a part or not fitted during manufacture or adding something that did not have when constructed previously. The professionals from Java island, Indonesia, as respondents. Consists of architects, structural engineers, mechanical & electrical engineer, and construction managers works. It aimed to see the phenomenon that occurs within nine years (2010-2019) for Professionals who do renovation & retrofitting green work. Furthermore, it will have an identification of sustainability initiatives that will mention the green renovation and retrofitting phenomena within nine years backward. The new scheme of phenomena is a finding that involves much thinking and practical consideration of the local institutional and building sector issues to the future as the target of the Green Renovation & Retrofitting on post-operation to the current building. Moreover, this phenomenon related to developing renovation & retrofitting green work in Indonesia that expected to affect the professional profile in anticipation of global warming in the future.

1 INTRODUCTION

They are related to a Building Regulation (Presiden Republik Indonesia, 2002). In article 3, mentioned that regulating aims to the sustainable building. Due to this regulation, green development discourses began in 2002. Moreover, Public Works & Public Housing Ministry issued for Implementation of Sustainable Construction and Green Building assessment.

Also, green evaluation in Indonesia used the Public Works & Public Housing Ministry of Indonesia Republic for Green Building, and Circular Letter. That focused on efficiency and effectivity for building performance of sustainability. Southeast Asian countries issued green development based on the World Green Building Council, such as in Indonesia, Malaysia, Singapore, Thailand, Philippines, and lastly, Vietnam in 2013.

Moreover, Indonesia has two rating tools for green achievement. They are Greenship (from GBCI), and SEDCK no. 86/PRT/M/2016 (from PUPR), both focused on the building sectors.

For green evaluation, Kats (2003) found that the benefits of green buildings are most significant for public entities that have a specific responsibility to concerned about broader societal benefits such as health (G. Kats & E, 2003; G. H. Kats & E, 2003). Programming, design & planning, construction, operation, and demolish (part or energy evaluation) used for only new building evaluation of green assessment in Indonesia, with categories on mandatory, recommended, and voluntary. Towards broader societal benefits of health, based on thermal comfort.

Furthermore, Cappelletti (2015) found the five primary policy targets for reducing greenhouse gas emissions from buildings. There are increasing the energy efficiency of new & current buildings, the energy efficiency of devices, emission-reducing in

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building, changing attitudes & behavior, lastly, renewable energies (Cappelletti, Dalla Mora, Peron, Romagnoni, & Ruggeri, 2015).

It means to increase the energy efficiency on a new and existing building, that focused on building skin, appliances, effort on attitudes & behavior, and lastly, on renewable energies, moreover, based on this research related to the current building, particularly post-operation.

Later, Ma (2012) extended their analysis and revealed that conventional technologies used in the case study office building, such as improving the insulation of the building envelope, retrofitting of the HVAC system. Similarly, operation strategies play an essential rule in capitalizing on the benefits of building energy-efficient retrofitting. After the building energy-efficient retrofitting, the staff can adjust the fresh air rate according to their demands and regulate the temperature of their workplace to a comfortable level via the ceiling fans (Ma, Cooper, Daly, & Ledo, 2012). According to Airaksinen (2011), current office buildings are becoming more and more energy-efficient. Notably, while the importance of heating is decreasing, the share of electricity use is still increasing (Airaksinen & Matilainen, 2011). Thus, Ma (2012) found that a systematic methodology for appropriate retrofits of existing buildings for energy efficiency and sustainability. Then, an overview of previous studies related to the investigation and evaluation of energy performance and economic feasibility vided (Ma, Cooper, Daly, & Ledo, 2012).

Then it is shown that it makes it possible to rank or to rate buildings or retrofit scenarios according to more than one criterion. So, Fowler (2006, 2010) stated that sustainable building rating systems used to examine the performance or expected the performance of a 'whole building' and translate performance assessment into a tool that used to compare the building performance of other buildings or a performance standard (K M Fowler & Rauch, 2006; Kimberly M. Fowler, Rauch, Henderson, & Kora, 2010).

1.1 Renovation

James (Douglas, 2006) found that the consequences of current and future obsolete and redundancy need to bear in mind in any adaptation proposal to responses the obsolescence and redundancy. These divided into three main groups: economic, technical, and functional. Economic obsolete occurs because maintenance has become unreasonably costly or disruptive, and when acceptable (cheaper) alternatives to maintenance are available. Depreciation of a built asset's capital/rental value is the primary economic consequence.
Technical obsolete implies that the performance of the building is deficient or otherwise lacking, leading to dilapidation and, if left unattended, dereliction. Functionally, a building usually becomes underused because of obsolescence. Complete vacancy, however, is the most noticeable effect of building redundancy.

1.2 Retrofitting

According to Craft (2017), the current building retrofits predominantly focused on energy and cost efficiency at an individual building or building component scale. A set of regenerative design principles for building retrofits proposed to emphasize the positive interactions an existing building and improve occupant health and wellbeing, then restore and enhance local ecosystems. A detailed example will then used to demonstrate the principles as a means of shifting the way designers and decision-makers view the building retrofit design process (Craft, W. et al., 2017).

Moreover, Kavani (2014) found that retrofitting of an existing building into a green building taking into account the aspects of energy, water, and materials along with cost considerations such that the occupant wellbeing, environmental performance, and economic returns are improved (Kavani & Pathak, 2014).etrofitting based on repairing a green achievement.

2 RESULT AND DISSCUSSION

2.1 State of the Art

The discourse on climate change has become an issue in the construction industry in Indonesia in decades. Officially, Indonesia has benchmark devices environmentally friendly are rating tools to assess green achievement. Firstly, according to SEDCK 86-2016 rating tools, as shown in Table 1, demolition means a demolish on entirely or apart of a building, component, materials, also infrastructures. It means in renovation works, and this addressed to the buildings that have a similar scope and assessment stage with the neighborhood. Second, as shown in Table 2, renovation works only stated in Greenship

1.2 New Building (Greenship NB 1.2) from six categories of rating tools. In the scope of the assessment, renovation works addressed to mechanical, electrical, plumbing, and structural works percentage on a maximum of 90%. Moreover, renovation works assessed on rating tools with Greenship NB 1.2 as a new building. And not in post-construction as an existing building to be assessed with Greenship EB 1.1.

Table 1. The Rating Tools of SEDCK 86-2016 on Green

SEDCK 86 2016			
FUNCTION	RATING TOOLS	SCOPE OF ASSESSMENT	ASSESSMENT STAGE
BUILDING & NEIGHBORHOOD	PROGRAMMING	APPROPRIATE SITE	PRE - DESIGN
		BUILDING	
		GREEN PERFORMANCE	
		ORGANISATION METHOD	
		FEASIBILITY STUDY	
	PLANNING	SITE DEVELOPMENT	DESIGNING
		ENERGY EFFICIENCY	
		WATER CONSERVATION	
		INDOOR QUALITY	
		MATERIAL MANAGEMENT	
		WASTE MANAGEMENT	
		WATER WASTE MANAGEMENT	
	CONSTRUCTION	CONSTRUCTION	CONSTRUCTION
		ATTITUDE	
		SUPPLY CHAIN	
	OPERATION	BUILDING MANAGEMENT	OPERATION MANAGEMENT & MAINTENANCE
		STANDARD OPERATION PROCEDURE	
		MANUAL BOOK	
	DEMOLITION	PROTOCOL	EXISTING
		RECYCLE	

Source: Surat Edaran Dirjen Cipta Karya no. 86 / 2016
Note: Demolition as an action for post-operation of the buildings towards green.

Table 2. The Rating Tools of Green Building Council Indonesia on Green

GREENSHIP				
FUNCTION	RATING TOOLS	SCOPE OF ASSESSMENT	ASSESSMENT STAGE	CATEGORY
BUILDING	GREENSHIP NEW BUILDING	NEW CONSTRUCTION	DESIGN AND CONSTRUCTION	APPROPRIATE SITE DEVELOPMENT (ASD) ENERGY EFFICIENCY & CONSERVATION (EEC) WATER CONSERVATION (WAC) MATERIAL RESOURCES & CYCLE (MRC) INDOOR AIR HEALTH & COMFORT (IAHC) BUILDING & ENVIRONMENT MANAGEMENT (BEM)
	GREENSHIP EXISTING BUILDING	RENOVATION ON ARCHITECTURAL WORKS		
		EXISTING BUILDING		
		POST OCCUPATION	OPERATION MANAGEMENT & MAINTENANCE	
		POST CONSTRUCTION		
	GREENSHIP INTERIOR SPACE	FULL OR APART OF INTERIOR SPACE	DESIGN REALITY, OUTDOOR VIEW EXISTING	
		INTACT WORKS		
	GREENSHIP HOMES	RENOVATION	SITE ASSESSMENT	
		NEW CONSTRUCTION		
		ADDITION HOME		
		REDEVELOPMENT HOME		
NEIGHBORHOOD	GREENSHIP NEIGHBORHOOD	REAL ESTATE	SUSTAINABILITY BETWEEN BUILDING, ENVIRONMENT & HOME	
		CBD		
		INDUSTRIAL ESTATE		

Source: Greenship Rating Tools of Green Building Council Indonesia
Note: Post-operation as Greenship 1.1 Existing Building action towards green

According to Table 3, the average respondent is a registered professional in 50.6%, and unregistered 49.4% of N. On mean 1.51, professionals are not registered. While the certified professional is 47.2%, uncertified is 52.8%. With mean 0.9, that professional not certified. According to this research, based on green work, the qualifications of respondents who have a green certificate were only 22.5%. With mean, 1.78 professionals do not have green certification.
Furthermore, for what they have done while they are registered and certified, the tools used during work and years of experience are obtained in table 3. The use of rating tools from two provided in Indonesia, SEDCK 86-2016 and Greenship, who did not use both tools amounted to 59.6%, SEDCK 86-2016 amounted to 12.4% and Greenship 28.1%. With mean 0.68, stated that both rating tools not widely used in Indonesia by professionals.

Table 3. The Profiles of Professional on Green Work

Registered Member

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	21	23.6	23.6	23.6
	yess	44	49.4	49.4	73.0
	no	24	27.0	27.0	100.0
	Total	89	100.0	100.0	

Green Certified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	21	23.6	23.6	23.6
	yess	20	22.5	22.5	46.1
	no	48	53.9	53.9	100.0
	Total	89	100.0	100.0	

Rating Tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	53	59.6	59.6	59.6
	SEDCK PUPR 86/PRT/M/2016	11	12.4	12.4	71.9
	Greenship	25	28.1	28.1	100.0
	Total	89	100.0	100.0	

Professional Certified

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	47	52.8	52.8	52.8
	Utama	4	4.5	4.5	57.3
	Madya	38	42.7	42.7	100.0
	Total	89	100.0	100.0	

Project Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	2	2.2	2.2	2.2
	More than two projects	14	15.7	15.7	18.0
	Rare	15	16.9	16.9	34.8
	Never	58	65.2	65.2	100.0
	Total	89	100.0	100.0	

Working Years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	11	12.4	12.4	12.4
	3 Years	37	41.6	41.6	53.9
	6 Years	14	15.7	15.7	69.7
	9 Years	27	30.3	30.3	100.0
	Total	89	100.0	100.0	

However, according to green project experience and green practices experience, both not to show to attention by professionals. Experience on green projects (mean 2.48) that have never done is 66.3%,

which is rarely 16.9%, and those who worked on more than two green projects are 15.7%. Then also shown in working years on the green, which is less than three years at 41.6%, up to six years at 15.7%, up to Nine years at 30.3%, and never worked on green projects at 12.4% as shown in table 3 — for working years, taken since professionals recognized by the certification board.

The emphasis is a paradigm that found on profiles of professional studies for the current nine years as the results of state of the art. Then, this study found the empirical phenomena of green work on post-operation in Indonesia.

2.2 Empirical Phenomena

Roulet (2002) stated that possible to rank or to rate buildings or retrofit scenarios according to more than one criterion. Moreover, Fowler (2006) used to examine the performance or expected the performance of a whole building and translate performance assessment into a tool. It used to compare the building performance of other buildings or a performance standard (K M Fowler & Rauch, 2006).

Both related to the green evaluation studies to obtain a strategy on achieving green with the renovation and retrofitting work through assessing approach. Hence, selected professionals used for respondents, based on three climates and geographics in Java island, Indonesia, to draw the phenomenon of their practices.

2.3 Data Approaches

In this research, a case study is adopted as the data collection approach because this method can help the researcher to demonstrate the relationship between the buildings and the tools that causing achieved the green building assessment. Most importantly, the study on the strategy of green achievement will bring to the organization and also used by stakeholders in managing the green building achievement for public or government buildings can be more conducted and valid on post-operation.

According to Patton (2002), criterion sampling involves selecting cases that meet some predetermined criterion of importance (Patton, 2002). Respondent has taken from three provinces of Java Island in Indonesia. They are architects, mechanical & electrical engineers, structural engineers, & construction managers who are consulting, technical advocating, and supporting to increase capacity and competence of building the organization for the building sector and stakeholders.

According to Rashid (2011), that initiatives on energy efficiency and greening of government buildings aim to improve the quality of life. Moreover, concerted efforts in formulating action plans to further accelerate the energy efficiency and green building agenda (Rashid et al., 2011; Reza Bin Esa et al., 2011).

It is related to the green regulations towards a green achievement to guide the building stakeholder such as architects, engineers, owners, and building management. Green Building defined that a building has criteria and real performance significantly on water and energy saving, and other sources through green rules to function and classified its building management. It addressed to programming, planning & designing, construction, operation, and demolition. Moreover, it divided into three categories: mandatory, recommended, and voluntary for greening achievement.

According to the research, drawn a phenomenon of professional profiles that should be aware of the post-operation stage to works on renovating and retrofit.

3 CONCLUSION

Professional characteristics have an impact on what they do in the area. According to the table, it shows that professional practice (89 professionals) in each region still has minimal potential. They used benchmark devices environmentally friendly are rating tools to assess green achievement SEDCK 86-2016 rating tools and Greenship rating Tools.

Nevertheless, in this study, post-operation work will be the goal of how professionals work according to their competencies, and how professionals recognize the post-operation work scope as well as the readiness to start work. The table shows only a few professionals who have certificates of work for green buildings.

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According to table 3, the average professionals registered in 50.6%, uncertified is 52.8%, green-certified, only 22.5%. The use of rating tools, SEDCK 86-2016 and Greenship, who did not use both tools on 59.6%, SEDCK 86-2016 amounted to 12.4% and Greenship 28.1%. It stated that both rating tools not widely used in Indonesia by professionals.

Actually, according to green project experience and green practices experience, both not show attention by professionals. Experience on green projects that never done on 66.3%, which is rare 16.9%, and those who worked on more than two green projects are 15.7%. Then also shown in working years on the green, which is less than three years at 41.6%, up to six years at 15.7%, up to nine years at 30.3%, and never worked on green projects at 12.4% for working years. This condition took since professionals recognized by the certification board.

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