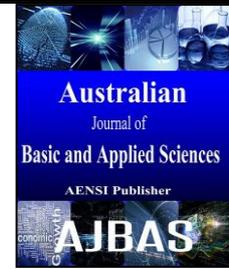




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Establishing Project Performance and Sustainability Principles: A Case Study on Diamond Building Project

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ABSTRACT

In the absence of proven successful sustainable building project in Malaysia, this paper attempts to venture study on the impact of sustainability principles consideration in building towards influencing project success. The preliminary study in this research indicates 22 sustainability principles to be practiced towards achieving successful performance of sustainable building project. The study utilised a case study method with interviews, observations and review of relevant documents to explore the sustainability principles that have been considered in the project and their impact towards project performance. This paper looks at a case study project in Malaysia: Diamond building, which has achieved successful performances through the practices. The finding reveals the benefits of sustainability consideration towards project success.

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INTRODUCTION

Sustainability in building will contribute positively to a better quality of life, work efficiency and healthy work environment (CBRE, 2009; Akadiri, P.O., 2012). A sustainable building project works best when the expanded group of stakeholders work together to concentrate the majority of their creative efforts early in the planning and design process (Prowler, D., 2012; Choi, C., 2009). Based on the literature review, a list of 22 sustainability principles of building are revealed to be considered throughout the whole life of building (Isa, N.K.M., 2004; GRI, 2011). The principles are: 1) optimize materials and resources used, 2) sustainable materials and resources, 3) energy efficient, 4) efficient water consumption, 5) noise control, 6) urban design, visual impact and aesthetic, 7) site planning and management, 8) transport management, 9) concern on quality of land, river and sea, 10) air and emissions quality, 11) efficient environmental management, 12) sustainable method, 13) economic benefit to the stakeholders, 14) improve local market presence, 15) whole life cost efficiency, 16) indirect economic impact, 17) occupational health and safety, 18) training, education and awareness, 19) product responsibility, 20) stakeholders participation, 21) sustainable design, 22) sustainable innovation. There is no specific success criteria model or framework is

currently available for the needs of the sustainability in building projects (Labuschagne, C., 2005). It will be incompetent to judge a sustainable project's success only according to the criteria of cost, time and quality as cited in most published works. The authors suggest, besides of those three criteria of project success, a sustainable building project should also accomplish the other success criteria including of sustainability performance targets. The authors agree that a successful building project can be achieved by accomplishment of the sustainability principles requirements (Hayles, C., 2004).

This paper looks at a project that was planned and designed for sustainability, and achieved the success performance and sustainability target, to identify what the 'secret' is. Diamond building is a successful sustainable building project in Malaysia (Koay, A., 2011). Most interesting is that the project was completed in time, within the budget and achieved high level of sustainability target. Two questions are thus raised. First, do the project stakeholders integrate sustainability principles into the Diamond building project, if yes, what are the principles?. Second, how the sustainability practices influence the project performances? This paper attempts to identify sustainability principles of building and its impact towards project success by means of a case study method. Due to some limitation, sustainability principles consideration

were only measured throughout the planning and design process of the project and their impact was examined limited to three project success criteria – cost, time and sustainability performance.

Research Methodology:

This paper uses a case study research design to identify and understand the sustainability principles that practiced in the case project and its impact towards successful performance of the project. The 22 sustainability principles as mentioned in the literature review were used for the interview. The respondents of this research are the project stakeholders, who have been directly involved in the planning and design process of Diamond project. Inputs from them are useful to understand the sustainability principles that considered throughout the process and its influence towards project success. The stakeholders of construction and operation and

maintenance stage of the project were also interviewed to measure the sustainability and success performance during the stages. Five project stakeholders were interviewed consisting of the owner (O1), energy consultant (E1), local authority (L1), contractor (C1) and energy manager (U1). The data for this study were also obtained through reviews of relevant project documents and site observations, making the research its desired depth.

RESULTS AND DISCUSSION

[i] Sustainability Considerations:

The planning and design stage stakeholders (O1, E1, L1) of Diamond project were asked to assess the sustainability principles that measured and documented during the planning and design process of the project. The results are portrayed in Table 1.

Table 1: Sustainability Principles Consideration during the Project Planning and Design Process.

The Number of Sustainability Principles	Considered? Documented?				
	O1	E1	L1	Σ Documented	Σ Considered
Mentioned in the project documents	19 (High)	19 (High)	11 (Low)	49	57
Considered by the interviewees	22 (Very High)	22 (Very High)	13 (Medium)	Average: 16 (High)	Average: 19 (High)
22-20 Very High	19- 16 High	15-11 Medium	10-7 Low	6-0 Very Low	

The project documents that reviewed together to ensure the validity of the answers are including Development Proposal Report for Layout Plan and Building Development Plan, project development brief, design requirements and project specifications. The results show that, 19 out of 22 principles were mentioned in the project documents and communicated among the owner and designers team and also measured by them during the planning and design process of the project. Other 3 principles which are 'sustainable method', 'improve local market presence' and 'indirect economic impact' were also appraised by them during this process even though the principles were not mentioned in the project documents. However, only 11 out of 22 principles were included in the project documents that had been submitted to the local authority of Putrajaya. The principles were measured and considered by the local authority during project approval process. Two principles, which are 'efficient water consumption' and 'economic benefit to the stakeholders' were not clearly mentioned in the submission documents, but the principles were communicated and considered by the local authority and the entire stakeholders during the process. The rest 9 principles; 'sustainable method', 'sustainable materials and resources', 'optimized materials and resources used', 'whole life cost efficiency', 'improve local market presence', 'indirect economic impact', 'product responsibility', 'training and education' and 'stakeholders participation' were not mentioned

in the approval submission documents and not measured by the local authority during approval process.

Eleven principles were practiced by all project stakeholders and mentioned clearly in the project documents. The principles are 'efficient environmental management', 'concern on quality of land, river and sea', 'site planning', 'energy efficient', 'air and emissions quality', 'transport management', 'urban design, visual impact and esthetic', 'noise control', 'occupational health and safety', 'sustainable design' and 'innovations'. Overall, sustainability principles mentioned in the project documents and the consideration of the principles during the project planning and design process was at a high level.

[ii] Sustainability Performances:

The energy consultant (E1) mentioned that the shape and orientation of Diamond building was an optimum passive design approach to achieve energy efficiency. In general, the expected electricity generated is 102,000 kWh per year which is equivalent to RM40k cost savings annually or an avoidance of 63,000kg annual carbon dioxide emission. The Diamond was designed to obtain 50% of its day lighting needs from natural lighting(E1).The use of rainwater harvesting system has reduced potable water usage by more than 65% (O1). Sustainable materials usage was concerned for this building. The priority is given to the materials

that have no or less impact to the environment. Wastes were minimized during construction stage to reduce disposal to landfill. On-site separation of materials and waste material sorting policy were implemented (E1,C1,O1). Indoor and outdoor environmental quality of the building is at an 'excellent' level. Extensive landscaping and sunken outdoor garden ensure not only connection to greenery but also provide a cool and shaded ambient environment for the occupants. Overall, the stakeholders assessed the sustainability performances of Diamond project during conceptual and design, construction, and operation and maintenance stages to be at an 'excellent' level.

[iii] Cost Performances:

The capital budget of Diamond project was around RM87 million and the project has been completed within the budget. Six percents (RM3.6 million) of the total building costs was expended for energy efficient features of the building. 'Return on Investment' has been undertaken as part of the decision making process on the project where the RM3.6 million will be paid back within the first 3 to 4 years of the building lifespan (O1,E1). It was clearly profitable for the rest of the building life time because the building saves about RM1 million energy cost annually (O1,E1). The project was beneficial to the organization by generating saving throughout the building operation and maintenance period.

[iv] Time Performance:

Diamond building project was started in year 2005. The planning and design process was last about more less in two years time. Construction stage was started in September 2007 and completed in March 2010. It took about two and a half years to finished, without any delay. The building was fully occupied in June 2010 (O1,C1). Overall, the project was completed about 15 days ahead of the given time. The detailed planning and design process with consideration of sustainability has shortened the project duration [O1,E1]. To sum up, this project shows some clear opportunities for integrating sustainability into building projects and achieving project success at once.

Summary:

This paper reveals that sustainability consideration in a building project has a positive impact towards project success, specifically in term of budget, schedule, and sustainable building performance. The fact was revealed by the case study project; Diamond building. Overall performances of Diamond project are at an excellent level. Sustainability practice has sometimes lengthened the time of planning and design but shortened the overall project duration. It was not increase the cost of the project but has obviously improved the project

performance. The findings are very useful to be an exemplary of successful building project in Malaysia through sustainability consideration practices. The results of this study provide an indication that building project in Malaysia should move towards a new paradigm known as 'sustainable project'.

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