

## **DEVELOPMENT OF SYSTEMATIC SUSTAINABILITY ASSESSMENT (SSA) TOOL FOR ENVIRONMENTAL MANAGEMENT IN MALAYSIA HYDROELECTRIC PROJECT**

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### **ABSTRACT**

Nowadays, there are many significant impacts due to hydropower development such on society or community, environmentally and economically. These impact may go more seriously even across the nation. As one of the latest of hydropower development in Malaysia, the Tekai Project has been paying attention from the commencement stage in this research. To remain competitive to other industries in Malaysia such in manufacturing, automotive and other else, an implementation of sustainability is very important to growth their business performance. In addition, sustainability is vital to Bursa Malaysia Securities Berhad under their listing requirements. Therefore, this study aims to develop a sustainability assessment practice for hydropower sector in Malaysia context by referring to Department of Environment (DOE) requirement, Green Project Management (GPM) P5 concept and State Council guideline. The sustainability practice adopted in hydropower project generally follow GPM P5 concept which cover society (people), environmentally (planet), economically (profit) and also process and product viewpoint. As a result, a satisfactory from the state council or auditor to the project standard will be achieved. In addition, this study, will contribute a number of factors towards sustainability performance of hydropower sector in Malaysia including provide a sustainable integrated reporting toward the project and provide a new sustainability approach to project manager.

**Keywords:** Hydropower, Sustainability reporting

## INTRODUCTION

In recent years, there has been an increasing interest in sustainability at many sector and project all over the world. The first serious discussions and analyses of Sustainability emerged during 1983 at new World Commission on Environment and Development (WCED) (K.Singh,2012) by Norwegian prime minister Gro Harlem Brundland. Then, after four years they release their own report about sustainability in 1987 (J.Kulman et al.,2013). The purpose of that report is to provide long-term environmental strategies, to define shared perceptions of long-term environmental issues and to concern into greater co-operation among developing countries and between countries at different stages of economic and social development that interrelationship between people, resources, environment and development (WCED,1987).

In Malaysia, Bursa Malaysia always encourage a sustainability idea as the key success of their business today. W. Stubbs et al., (2014) was surveyed the performance of sustainability at Malaysia. The majority of the companies in Malaysia which is 77%, only 40% embed a sustainability concept in their overall project or business. S. B. Thai et al. (2014) with their research on Companies that are listed in Bursa Malaysia review that predicting the business can help corporation or investors in prudent decision making either in term of financial, management and others. To remain competitive to other country in the world, Malaysia was prioritizing and limit number of key growth engines behind the support policy. Thus, the Economic Transformation Programme was announced in the Tenth Malaysia Plan (ETP) are focus on 12 National Key Economic Area (NKEAs) such in healthcare, Greater Kuala Lumpur/Klang Valley, Wholesale, Financial Services, Education, Palm oil & Gas, Business Services, Communication contents & Infrastructure, Oil & Gas (energy), Agriculture, Tourism and Electrical and Electronics (J. Perdana Menteri, 2010) . In this paper, hydropower as case study is under energy sector. Energy is an important main player towards Malaysia's economic growth which creating about 20 percent of the nation' Gross Domestic Product (GDP) (F. Kui et al., 2011).

Nowadays, most of company in Malaysia are practicing green at their project management. However, green practicing only covered up in environmental aspect without emphasize other important aspects. Thus, by incorporating a sustainability assessment problem, it is very important to increase the business's profit and to protect people and environment. From Sustainability assessment is a process of evaluation and optimization that aim to establishment the integration of sustainable development in governmental planning and a decision making processes across all parts ('Sustainability assessment Conceptual framework and basic', 2004). In the earlier of sustainability assessment that include in government planning process, the greater the policy design liberty and optimization scope, and it will be more effective. Since the sustainability assessment is very useful for many organization, therefore, many researcher have been develop tools that can claim for assessing sustainability and providing a better application guidelines, data and case study experiences. Since the sustainability assessment become associated with impact assessment tools that consisting of e.g. Environmental Impact Assessment and Strategic Environmental Assessment (Ness, Urbel-Piirsalu, Anderberg, & Olsson, 2007). The development of tool is very important to quantify the performance of the sustainability. From J.Voeten (Voeten, 2013) found that Elkington theory is incorporate a sustainability between three elements which are people, planet and profit and in GPM P5 other two viewpoint such process and product are included. The concept of GPM P5 such in Figure 1 below.

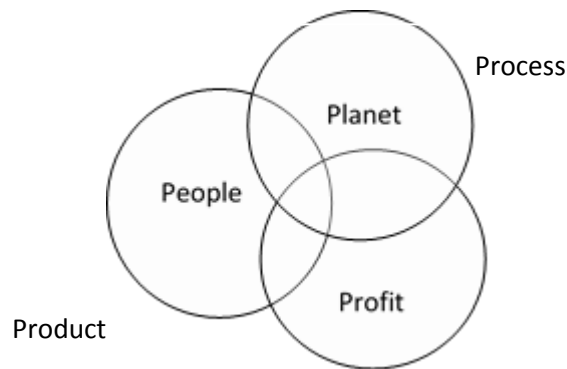


Figure 1: Sustainability concept of Green Project Management (GPM) P5  
Source: Newman, Donald, Myers, & Brun, 2015

Since every company in Malaysia were registered under Bursa Malaysia, it is compulsory them to return the sustainability reporting of their business. Thus, Sustainability Assessment Tool is designed in advancing of sustainability reporting. At the same time to promote sustainable practices. Since, energy is important player in this country, this paper will focus on sustainability of energy sector at hydropower project by integrating the concept of Green Project Management (GPM) P5. Lastly, the study of Sustainability Assessment will provide an indicator to access the level of sustainability compliance in Hydropower sector.

In order to achieve an increasing demand of power energy from hydroelectric power capacity which the current usage is 1,882 MW and to more than 3,000 MW by 2020. But, the construction of hydropower system can lead an imbalances to ecosystems and landscape change. Thus, during the auditing the project or business is given a huge penalty because the qualitative of environment, social and economic effect can not be interpret or measure. Secondly, company under Bursa Malaysia were encourage to apply sustainability practice in their business competitive to others country. The investors in the auspices of Bursa Malaysia are also required to embed the sustainability concept at the forefront of their business especially in profitability. Lastly, the deliverable reporting is very important in every project or company and most of them deliver a sustainability report in separate assessment according to the process approaches or individual report. Therefore, there is a general objective of this study which is to develop a sustainability assessment tool for sustainability reporting while promoting the sustainability practices. The specific objectives of the proposed research are as follows:

- (a) To evaluate an existing environmental monitoring system of hydroelectric project in Malaysia using ANOVA.
- (b) To develop Sustainable Assessment Tool for environmental monitoring management based on GPM P5 approach

The scope for this study is applicable suit to Malaysia context and will implement the concept of Green Project Management (GPM) P5 at Hydropower dam. The data will be taken at Hydropower dam under Environmental monitoring management Project. There are specific parameter to be evaluate. The purpose for this monitoring is to improve an existing reporting and implement a sustainability concept to hydropower project by develop a sustainability assessment tool by generally refer to GPM P5 approach which integrate the people, planet, profit, product and process.

## LITERATURE REVIEW

### Sustainability

Nowadays, one of the biggest society's challenges is sustainability (Dobrovolskiene & Tamošiuniene, 2016). Sustainability is a concept that broadly used based on their mission and strategy by many companies in every sector (Dobrovolskiene & Tamošiuniene, 2016). Sustainability also one of the important challenges that are facing by the society. Since, most of the companies used that concept for their business practices. So it is linked with the project management in every their projects (Silvius & Schipper, 2014). There are three dimensions that are related to sustainability such environmental, economic and social (Martens & Carvalho, 2013). In the development of sustainable, there are some an initiatives on indicators and framework such from Warhurst (2002) viz. the measure of various areas can be improved through SDIs individually and assessing the aggregation of individual areas with respect to the respective dimension can be achieved towards sustainable development. Lancker and Nijkamp (2000) say that the indicator and states value was emphasize by “a given indicator doesn't say anything about sustainability, unless a reference value such as thresholds is given to it”. (Singh et al. 2012). To make a result of sustainability, the carefully integration of environmental, economic and social needs in the policy level. Environmental monitoring is one of the sustainability activity that can improve the quality of that company or project. So that, to characterise and assess environmental change and their potential impact whether positive or negative, the monitoring such measuring and recording environmental parameters were allowed (CEDA, 2015). In detail, Environmental monitoring are process to observe and study the environment by taking a systematic sample of air, water and biota (Weston, 2011). Thus, the preparation of Environmental Impact Assessment can be prepared. There are many monitoring program in many project such a sustainability of metric for waste to energy indicator framework (Tng, Teo, & Tang, 2016), monitoring for building (Wisene, 2013), in second Green power Development Project (Hydropower plant component) (Bank, 2014) and so on.

### Green Project Management (GPM) P5

Other than that, United Nation Global Compact was create their effort to help individual or organization around the world to build their skill towards sustainability concept by introducing Green Project Management (GPM) P5 Standard tool. This GPM P5 is expand from the Triple Bottom Line (TBL) theory. This GPM P5 Tool is an integrating project management and sustainability indicator using matrix index which can provide wide framework for the broad context in every implementation (Newman, Donald, Myers, & Brun, 2015). It was developed in August 2011 (Carboni & Hodgkinson, 2013). The GPM P5 Standard may consider the life cycle of social, environment and economy perspective. During the project phase sustainability a process efficiency and product were considered including planning, product realization, designing and developing production and servicing (Paniagua Tufinio, Mooi, Ravestijn, Bakker, & Boorsma, 2013). To be clear, GPM P5 are integrated from 5P which are Planet, Profit, People, Product and Process. In addition, in 4<sup>th</sup> November 2011, Green Project Management (GPM) was registered and now, for 2016 GPM was receive an award as the world's largest organization of professional development in sustainability (*Page 1 of 35 1*, 2006). The success of this Organization refer to this statement that are using to their organization “The management of a project starts with the initiating process group

and finishes with the closing process group.” – ISO 21500 Guidance on Project Management Pg.11 (Carboni & Hodgkinson, 2013). Last but not least, P5 can be useful as the benchmarking that can help organizations to demonstrate the reality of their commitment to sustainability, thus it will give better understand to sustainable development (Paniagua Tufinio et al., 2013) and it is also practice into a Chinese Environment(Engineering & Thesis, 2014).

## Hydropower

Green Project Management (GPM) P5 approach is using as my research reference to produce a Systematic Sustainable Assessment (SSA) tool. This SSA tool will be implement in hydroelectric project. Firstly, water is one essential elements of life and also utilize as sustainable source energy, worldwide (Fredericks, 2006). There are several research had been done by them that related to hydroelectric project such for Devoll Hydropower Project locate at a narrow gorge in the middle of Devoll Valley, Elbasan (S. Development & Management, 2013). DHP Environment and Social Management Plan was provide the document about this Devoll Hydropower project. It is to give an overview for mitigation measure to be taken and to consolidates and analyse result and surveys that already done during the pre-construction of the project (S. Development & Management, 2013). Next, WCS Canada Conservation Report was reported the “potential impacts and risks of proposed next generation hydroelectric dams on fish and fish habitat in Yukon water”. This report was summarise the major risk on the habitat and provide the guideline and information on the scope of that impacts and risk to Yukon communities and citizens and the article about impact habitat to the infrastructure of hydroelectric dam and how it can be monitor in several state (Reid, 2015)(Highland & Limited, 2015)(Harwood & Ganshorn, 2013). Next, Keyal Khwar Hydropower project also review the feasibility study about this project (Olume, 2007). The parameter characterizing is an important element to evaluate their usefulness while doing river monitoring system, programme and their practice examples (Szozkiewicz, Budka, Pietruczuk, Kayzer, & Gebler, 2016)(“Chapter 3 - Designing A Monitoring Programme,” 1996)(S. H. Development, 2013). From Department of Electricity Development, HMG Nepal, they already come out with manual to prepare Environmental Management Plan (EMP) for Hydropower Project. They used an Environmental Impact Assessment (EIA) tools to achieve their goal in sustainable development (Sector & Development, n.d.)(Bank, 2014). Other than that, in Brazil they Monitor the hydroelectric reservoir by using System for environmental monitoring (SIMA) (Curtarelli, Ogashawara, & Souza, 2013). From book that publish from U.S Department of the Interior Bureau of Reclamation Power Resources Office (July 2005) explain about how hydropower works and so on. Next, the 5<sup>th</sup> Concept symposium on Project Governance at Canada also discuss about a participation of sustainability approach in large hydroelectric project (Environment, 2012). There are many analysis of hydropower and their effect on different state such in Karnataka (India), Canada, Nam Ngum dam Mekong (Laos) (Harwood & Ganshorn, 2013)(Joens, 2012)(“Nam Ngum 5 Hydropower Project,” 2007). In Malaysia context, there are several hydropower project had been monitor such at Bakun Hydroelectric Project, Sarawak (Manager, 2004). This monitoring and developing should be refer to the procedure and requirements in Malaysia based on Environmental Impact Assessment (EIA) guideline (“Environmental Impact Procedure and Requirements in Department of Environment,” 1990.).

## CONCLUSION

The quantitative assessment of changes in project sustainability especially in hydropower sector, regional and global level facilitates the information analysis and decision making process. From this Systematic Sustainability Assessment (SSA) Tool will improve the project and business performance. Thus, will reduce the penalty cost from enforcer and also sustain an integrated report that focus on Profit, people, planet, process and product by facilitate Sustainability reporting (SR) according to International Hydropower Association (IHA) and Department of Environment (DOE) in Malaysia context .

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