

Green Management System for Optimization Sustainable Performance Strategy at Center for Quality Assurance Development of Vocational Education in Mechanical and Industrial Engineering In Indonesia: Literature Review

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Abstract:- This study aims to test and analyze the Green Management System (GMS) in optimizing sustainable performance strategies at the Center for Quality Assurance Development of Vocational Education in Mechanical and Industrial Engineering (CQADVE MIE) in Indonesia in the fields of ecology, economy, social capital, and institutions. The research method used in this research is descriptive analysis method. The Data Envelopment Analysis (DEA) method is used to calculate efficiency and measure performance using the Analytic Network Process (ANP) method based on the Benefit, Opportunities, Cost, and Risk (BOCR) aspects. The results of this study can be used by agency leaders or company managers to implement GMS to optimize sustainable performance.

Keywords:- Green management system, optimization, sustainable performance strategy.

I. INTRODUCTION

Based on the explanation of the Law of the Republic of Indonesia Number 16 in 2016 concerning Ratification of the Paris Agreement to The United Nations Framework Convention on Climate Change, the impact of global climate change has become a concern of the world community and nations, including Indonesia. As an archipelagic country that has various natural resources and high diversity, Indonesia has great potential to be negatively affected by climate change, and at the same time has great potential to contribute mitigating and adapting to the negative impacts of climate change.

Furthermore, it is explained that the close relationship between the impacts of climate change and human life, both humans as actors in activities that emit greenhouse gases and as those affected, has made the issue of climate change increasingly a concern for countries in the world, which are united under the umbrella of the United Nations Framework for Climate Change, and negotiate to find best ways and compromises in sharing roles and responsibilities in controlling climate change and managing its impacts.

Based on Indonesian Government Regulation Number 70 in 2009 concerning Energy Conservation, the Indonesian Government has launched an Energy Saving Program. However, the Indonesian people are still not maximal in implementing it as a habit and are still limited to assuming that there is an electricity bill reduction program. In fact, energy sources can run out and an energy crisis occurs due to waste and inefficient use.

Therefore, a sustainable commitment is needed to use energy wisely, including at the level of government agencies in Indonesia, such as the CQADVE MIE.

CQADVE MIE occupies an area of 130,976 m² with building area 34,632 m², road area of 16,640 m², and a yard area of 92,368 m². The electricity usage bills for the last five years are as follows: in 2017 it was Rp. 795,128,263/year, in 2018 Rp. 813,029,370/year, in 2019 Rp. 872,101,972/year, in 2020 Rp. 740,559,856/year, and in 2021 Rp. 709,870,505/year.

With a yard area of 79,704 m² in the form of plants that function as urban forests, CQADVE MIE also produces organic matter with a volume of approximately 9 m³/day. In addition to organic waste from plants, the activities of the institution, especially in organizing training for employees, also produce organic and inorganic waste from these activities. Organic waste is in the form of leftover food from catering, while inorganic waste is mainly in the form of plastic from drink bottles and other packaging.

CQADVE MIE has a Renewable Energy Engineering expertise program, and is a Center of Excellence in this field, and has collaborated with GIZ Germany, Asean Center for energy, Energy and Environment Partnership (EEP) Finland, CASINDO Netherlands, Schneider Electric France, and Swisscontact Switzerland.

The Renewable Energy Engineering Expertise Program at the CQADVE MIE also has the potential to utilize idle practice equipment such as: Solar Power Plant with a total power of 13,500 WP, Wind Power Plant with a total capacity of 2500 W, Biogas with a total capacity of 15 M³, Biobriquettes with a capacity of 100 kg, Bioethanol with a capacity of 30 Liters, Biodiesel with a capacity of 300 Liters, and a waste processing site.

Based on the conditions mentioned above to reduce the negative impacts of climate change, the CQADVE MIE has implemented a green management system through the implementation of energy conservation in the form of energy conversion and energy efficiency, waste management and energy management. GMS is a set of standard processes and practices that help Institution to improve their sustainability by planning, executing, evaluating, and administering environmental policies. Three levels in the implementation of GMS, namely the development of environmental rules that contain the commitment of work units to focus on the environment, system planning for implementing rules, and implementing them in practice [1].

Stakeholder demand, resources, knowledge, and product uniqueness have a significant effect on the implementation of green management, and green management has a significant effect on sustainability performance [2].

Based on the phenomenon of globalization, it is important for every company to have a strategic way of thinking, by creating sustainable competitive advantages, to maintain the viability of the company in global competition. Based on this description, it is necessary to study green management strategies with the scope of greening business management in relation to sustainable competitive advantage [3]. Environmental management positively affects economic performance [4].

GMS is planned by the company to manage the environment to prevent or reduce the company's negative impact on the environment, plan the use of resources from the surrounding environment both physically and socially which can have a positive impact on the company and calculate ways to process and maintain resources so that they can continue to be used in the future future [5]. The concept of green companies and the needs of modern companies according to the principles of sustainability are constantly evolving as a result to the rapid technical, technological, and industrial development, besides various advantages, it also brings questions about environmental safety and the survival of future generations [6].

The description above describes the factors that drive the implementation of Green Management in a work unit. In addition to the driving factors, there are inhibiting factors, both external and internal obstacles. External inhibiting factors are obstacles faced by organizations from outside the entity, such as the small number of green practice experts, the small number of suppliers who adopt green practices, inflexible deadlines for stakeholders, and the existence of poor relations between stakeholders [7]. Internal inhibiting factors are obstacles that arise from within the organization, such as high implementation costs and a mismatch between knowledge and awareness [8].

The existence of environmental costs must be allocated by the company because several types of industry, (for example: mining and health) are very vulnerable to the risk of environmental damage, so these costs must be borne

by the company. This is where the role of GMS and environmental accounting for processing environmental costs [9].

Most of the obstacles to green implementation are weak regulations and enforcement of rules and a lack of knowledge about green, especially for small and medium industries [10]. The biggest obstacle to green building practices is the lack of socialization and government support, as well as minimal experience in planning environmentally friendly buildings [11].

With the availability of human resources, availability of facilities and infrastructure, as well as the implementation of the GMS in the CQADVE MIE, it is necessary to apply the right GMS to optimize sustainable performance in the fields of ecology, economy, social capital, and institutions.

II. THEORETICAL BASIS

A. Sustainable Performance

Sustainability performance can be defined as company performance in all dimensions and for all drivers of corporate sustainability [12]. Sustainability performance reflects one final target of the company's movement in the unity of corporate responsibility. Sustainability performance indicators have a role in helping companies and stakeholders, especially financial institutions, to assess/assess how their production activities contribute without reducing/ disrupting sustainable development goals [13].

Sustainability performance refers to the application of the concept of sustainable development at the corporate level [14]. The concept of corporate sustainability emerges as economic growth, compliance with environmental regulations, as well as pressures to create justice and social equity [15].

B. Sustainable Performance Strategy

The strategic management system consists of two main stages: the planning stage and the plan implementation stage. The convergence of the circular economy and Industry 4.0, which aims to increase the efficiency of resource use, has emphasized environmental sustainability [16]. In an increasingly interconnected global world, stakeholder relationships are being redefined as a sharing economy based on sustainability [17]. Environmental sustainability is one of the important principles of sustainability, which ensures that the search for meeting our needs must not sacrifice environmental quality, and ecosystems must be maintained for the sake of future generations [18].

C. Green Management System

Green activity or environmentally friendly activities to preserve the environment and natural resources is the essence of GMS. A company cannot rule out the existence of the environment around it. Therefore, we need a system that can efficiently manage the company's sustainability, while still paying attention to environmental aspects. This can be done by implementing GMS. GMS is a tool for managing the impact of business activities on the

environment. GMS integrates environmental management into daily company operations, long-term planning, and the adoption of other quality management systems [19].

D. Triple Bottom Line (TBL)

TBL is the essence of sustainability by measuring the impact of an organization's activities on the world, including profitability and shareholder, social, society, and the environment [20]. From the economic aspect, companies must focus on profits for the survival of the company, from a social aspect, companies must have a commitment to society to provide maximum benefits, and from an environmental aspect, all company activities are closely related to the environment [21].

E. Green Management System on Sustainable Performance in Ecology

GMS is an effort to protect the environment. With the depletion of natural resources environmental protection is not only limited to a small part of corporate social responsibility but must become a model in the organization's business. Various studies use the concept of ecological sustainability as a framework for studying management practices in operational and strategic contexts [22].

By using proactive strategies, companies can carry out toxic reduction processes, can generate organizational efficiencies, and can reduce many costs by reducing waste, energy, and redundant materials.

F. Green Management System on Sustainable Performance in the Economic Sector

Green management activities can increase the competitiveness of MSMEs [23]. It is very important to understand how sustainable development becomes a part of company business model [24]. A green economy seeks not only to produce goods in a more resource efficient way, but

also to produce goods and services that support greener outcomes such as recycled paper and solar water heating [25].

G. Green Management System on Sustainable Performance in the Field of Social Capital

Implementing green management, will expected that the company can lead to sustainability (strategic), social responsibility (ethical and strategic) and at the same time environmental sensitivity (ethical). A completely sustainable company is of course the hope. The concept of green management is rooted in the concept of sustainable development, especially on the environmental and social pillars [26].

H. Green Management System on Sustainable Performance in the Institutional Sector

Implementing green management has indirectly prevented environmental pollution not only at the end of the production process, namely by managing waste, but also preventing waste from occurring in every link in the process chain. This action will indirectly foster proactive behavior in preventing environmental pollution [27]. Companies need to maintain stakeholder legitimacy and place it in a policy and decision-making framework so that it can support the achievement of corporate goals, namely business and business continuity assurance [28].

The frame of mind is the ability to analyze and evaluate information. The frame of mind asks important questions and problems, formulates them clearly, collects and evaluates relevant information, uses abstract ideas, thinks openly, and communicates effectively with others [29]. The framework for thinking in this study is presented in the following figure:

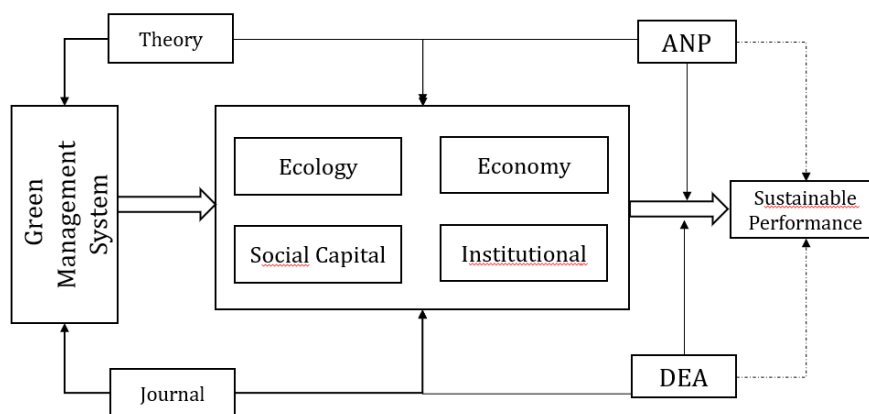


Fig. 1: Research Framework Flowchart

III. RESEARCH METHODOLOGY

This research was conducted to apply the right GMS to optimize sustainable performance strategies at the CQADVE MIE in Indonesia.

The research method used in this research is descriptive analysis method. The DEA method is used for calculating efficiency and measuring performance using the

ANP method based on the BOCR aspect for decision making.

Descriptive analysis methods are statistics that are used to analyze data by describing or describing the data that has been collected as it is without intending to make general conclusions or generalizations. Descriptive research is research to explain current problem solving based on data

by presenting, analyzing, and interpreting it [30]. Descriptive research is a type of research that aims to describe or describe existing phenomena, both natural phenomena and man-made phenomena which can include activities, characteristics, changes, relationships, similarities, and differences between one phenomenon and another [31].

A. Population and Sample

The population in this study were all civil servants at the CQADVE MIE. The current total population of civil servants is 161 people. The sampling technique used in this research is saturated sampling technique. In calculating efficiency using the DEA method, the number of samples is 51 people from all work units with Masters degrees and 9 people with Doctoral educational backgrounds, while for performance measurement using the ANP method based on BOCR aspects, the number of samples is 9, namely the heads of work units in institutional internals.

- **Instrument Arrangement:** The research instrument in this study is a tool to obtain data that will become a measuring tool so that conditions are needed so that the data obtained is valid. In this study, the data collection technique used a questionnaire with DEA to calculate efficiency and ANP-BOCR for performance measurement, with the number of respondents as mentioned above.

B. Data Envelopment Analysis

DEA can overcome the limitations that ratio analysis and multiple regression have. DEA is a procedure specifically designed to measure the relative efficiency of a Decision Making Unit (DMU) that uses many inputs and many outputs, where combining these inputs and outputs is not possible. The relative efficiency of a DMU is the efficiency of a DMU compared to other DMUs in a sample (a group of DMUs being compared against each other) that use the same types of inputs and outputs. Solving problems with the DEA through principles including Input, Output, Efficiency, DMU.

C. Analytic Network Process (ANP) - Benefit, Opportunities, Cost, and Risk (BOCR)

GMS consists of three indicators, namely energy conservation, waste management, and energy management. The three indicators are then measured for their performance in the fields of ecology, economy, social capital, and institutions. Then all the existing dimensions of ecology, economy, social capital, and institutions are measured through the BOCR aspect. The final result is the selection of alternative strategies that best support sustainable performance at the institution.

In choosing an alternative there are many criteria that must be considered from the BOCR aspect. Therefore, in selecting alternative GMS strategies, ANP and BOCR analysis tools were used. The goal is to get a priority ranking of alternatives as a reference in decision making. The initial stage is conducting interviews through questionnaires with the head of the work unit. The alternatives will be selected based on the main problems that arise as reference for criteria, sub-criteria, and their

interrelationships. To obtain the weight of each ANP element, a pairwise comparison questionnaire was used which was taken from the preferences of the head of the work unit and then processed with the Super Decision Software. BOCR analysis presents three conditions in selecting priority alternatives, namely Standard (B/C), Pessimistic B/ (CxR), Realistic (BxO)/(CxR).

IV. RESULT AND DISCUSSION

The results of previous research between GMS and sustainable performance with measurements through ecological, economic, social capital and institutional dimensions can be described as follows:

Knowledge of green business management is also an important factor in determining the successful implementation of green business management; green innovation influences sustainable performance; Knowledge management has been analyzed in different studies in relation to sustainability, innovation, and together this has allowed the identification of how knowledge management impacts the construction of innovation and sustainability.

An emerging managerial challenge for all organizations is to protect natural resources by reducing their negative impact on the environment and promoting sustainable performance; awareness that the interaction between environmental variables and organizational design has varying effects on sustainable organizational performance; Industrial sustainability will be achieved through the effective application of industrial ecology concepts; and sustainable goals based on climate change with passive design principles to achieve a healthy built environment regarding the performance of residential buildings. Based on the relevant healthy building standards, the requirements for the thermal, light, and acoustic environment are determined.

Economic quality, technological innovation and human well-being within the limits of resources and environment are global sustainable development goals; sustainable manufacturing is considered as resource-efficient production, environmental friendliness and customer satisfaction, and is a major driving force for sustainable development; the use of renewable energy will improve environmental and economic performance to reduce emissions, while environmental performance is negatively correlated with public health spending, indicating that greater environmental sustainability can improve human health and economic growth.

Social capital enhances social value creation to benefit society and the company simultaneously, external social capital influences board effectiveness and sustainable company performance more than internal social capital, external social capital influences board effectiveness and sustainable company performance more than internal social capital, the positive impact of collaborative practices is more pronounced when relational and cognitive capital is established in relationships, and social capital is considered a central principle in enhancing the dimensions of sustainable development.

Institutional sustainability is positively related to environmental performance, institutional pressures have effect on environmental performance, companies can strengthen governance activities, and proactive intentions are sometimes stronger than drives towards sustainable performance.

V. CONCLUSIONS AND SUGGESTIONS

A. CONCLUSION

GMS can optimize sustainable performance in the fields of ecology, economy, social capital, and institutions. The concept of a green company and the needs of a modern company are in accordance with the principles of sustainability, sustainable competitive advantage, and GMS implementation.

B. SUGGESTION

Based on business phenomena, research gaps from previous studies, theoretical studies, and previous research literature reviews, the researchers propose several updates in this study, namely: GMS is developed to encourage institutional sustainability performance in the future; GMS implementation through energy conservation, waste management, and energy management; and performance measurement sustainability is carried out through ecological, economic, social capital, and institutional aspects.

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