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Development of Green Trident Measurements to improve environmental performance: Literature Study

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Abstract

Environmental performance is a topic of concern of the increase in carbon emissions due to the greenhouse effect. Therefore, more and more efforts have been devoted to finding sustainable practices to reduce or even reverse degradation, one of which is green accounting. This study aims to develop dimensions and or indicators of environmental performance variables, green information systems, green purchasing, and green strategy. This research uses literature study to get the right dimensions and indicators to form a variable. The results showed that there were several variable indicators that initially did not have

dimensions and were then given dimensions as a novelty. This study also modifies the indicators according to the needs of current research. The green trident that was developed is believed by researchers to be able to develop sustainable environmental performance. Recommendations are expected that the next research can use it in green accounting research. Future research is also expected to add dimensions or indicators so that the green accounting variable is more up-to-date and in accordance with the current state of the scientific revolution and phenomena.

Keywords: Environmental Performance, Green Accounting, Green Information System, Green Purchasing, Green Strategy

JEL Classification: M41, Q56

Introduction

In the current era, the economy must be more advanced and requires investor support ^[1]. The main purpose of establishing a business entity is to earn profits which will then be used to maintain a business or expand a business network ^[2]. For this reason, financial performance is indeed important, but the environment must still be considered. Environmental performance is a topic of concern of the increase in carbon emissions due to the greenhouse effect. The depletion of the ozone layer increases the earth's temperature, which is indicated by the melting of polar ice caps. On the one hand, the growth of the human population, which has reached more than seven billion people, requires a lot of resources, and some of these resources actually cause problems for the environment. The concept of green accounting can be a solution to overcome this phenomenon. One of them is the process of delivering documents using transportation, either by land, sea, or air.

Awareness has grown about the adverse impact on environmental degradation of various business activities. Therefore, more and more efforts have been devoted to finding sustainable practices to reduce or even reverse degradation, one of which is green accounting. Information technology plays an important role in this whole process. The green information system built on information technology has emerged as a very practical tool to facilitate the sustainable activities of enterprises such as, creating green initiatives, improving the communication of different functional units, improving production efficiency and management capabilities, and others.

In sharing information ^[3], during the utilization of green information systems, however, it requires combined knowledge, relevant skills, and achievements to practice individual skills, which have become one of the key enabling reductions in carbon emissions from data transport as well as in the provision of addition and harmonization of databases. Green information systems offer critical information for making results about green design, in object condition and power expenditure, recycling, and equipment revival. But the picture of sharing information is the result of environmental performance that is functionally urbanized from the level to develop ^[4].

Apart from documents (which can be solved by digitalization and virtualization), carbon problems also occur due to the purchase of an item. Imagine buying vegetables from different provinces or buying products or parts from suppliers abroad

(Often happens in the automotive industry). It can also increase carbon emissions from such transportation. Green purchasing can be applied in this case. The purchasing function is the first step in the value chain^[5]. Its success will depend on the integration of environmental efforts, purchasing activities, and environmental objectives of the company. For this reason, the green purchasing function is also an important component of supply chain management. With attention to information systems and purchasing systems, in the end, we also need a green strategy to boost environmental performance. The environmental strategy allows the company to integrate various ecological issues into business operations by implementing environmental incentive programs to promote the sustainable development of new environmentally friendly products and green processes and pay attention to the alignment of resources that have an environmental impact^[6].

Based on this phenomenon, it would be interesting research to discuss the three factors (green information system, green purchasing, and green strategy) that can affect environmental performance as well as the development of dimensions and indicators of each variable. These three factors can be referred to as the green trident that can boost environmental performance because until now they still have various effects. The use of multidisciplinary variables such as environmental accounting, management accounting information systems/technology, marketing management, and strategic management are applied in this study. This study will also explore several measurement indicators for each variable as a novelty, either the formation, addition, subtraction, or modification of dimensions and or indicators.

Literature review

Green Accounting

Green accounting is a means of reporting companies related to the environment. Its purpose is to provide information about the operational performance of companies based on environmental protection. Conventional accounting only provides economic information of a financial nature to shareholders and bondholders for decision making. Performance measures need to be increased to improve existing performance measures. Environmental impacts need to be reported as a form of responsibility to stakeholders^[7].

Environmental Performance

Many organizations are looking for ways to understand, demonstrate, and improve their environmental performance. This can be achieved by effectively managing those elements of their activities, products, and services that can have a significant impact on the environment. Environmental performance is defined as the company's commitment to protect the environment and to demonstrate measurable operational parameters that are within the defined limits of environmental care. Comprehensive environmental performance measures include incident reduction, continuous improvement, recycling performance, stakeholder perceptions, independent audits, waste reduction, resource consumption, and cost savings. Managers play a critical role in achieving environmental performance goals through recruitment, training, appraisal, and incentives for an environmentally conscious workplace^[8].

Environmental performance improvement aims to improve the company's reputation, which indirectly improves its ability to manage its resources. Combining resources and capabilities in all the different parts of a company adds value. The company's environmental performance becomes very important because of the need to realign the company's strategy to address natural environmental problems such as climate change, resource scarcity, and pollution^[9].

Environmental performance can be measured by managing an organization's environment so as not to damage the natural environment. In today's context, effective environmental management can lead companies to achieve a competitive advantage. Therefore, environmental performance can be defined as the result of an organization not harming the natural environment as a result of the organization's activities in using land and other resources and releasing pollutants (air, water, gas, etc.) into nature^[10].

Green Information System

Green Information System (GIS) is a consequence of the uniqueness of the arrangement developed by information sharing which is a skill to synchronously share information directly with others. Furthermore, the ability to explicitly share information with individuals in an appropriate manner. This information is readily available to all supply chain partners. In general, it is recognized that this type of information is fully obtainable during the building of an Enterprise Resource Planning (ERP) system. In addition, a green information system is used to observe procedures to ensure environmental stability. The information system is used to track environmental performance information that reduces power consumption, monitors emissions, and destroys production. In addition, green information systems offer information that supports green options by individuals to improve decision-making by managers regarding sustainability issues^[4].

GIS refers to information systems that address environmental issues and support or enable sustainable initiatives. GIS is seen as able to partially help solve many environmental problems. GIS is very helpful in achieving industrial symbiosis which is an efficient system featuring mutualistic reuse of energy and waste in various industries with very little adverse environmental impact^[11].

The accounting system contains procedures that must be obeyed by company personnel and is able to provide accurate information to parties who need it, especially for management, and can establish communication between existing sections so that the implementation is uniform. Information systems relevant to financial reporting objectives, which include accounting systems, consist of the methods and records established for recording, managing, summarizing and reporting entity transactions (including events and circumstances) and for holding accountability for assets, related liabilities, and equity. The quality of the information generated by the system affects the ability of management to make the right decisions in managing and controlling the activities of the entity to prepare reliable financial reports. Communication involves providing an understanding of the roles and responsibilities of individuals with respect to internal control over financial reporting. Communication includes the extent to which personnel understand how their activities in the financial reporting information system relate to the work of others and how to

report irregularities to an appropriate level of ethnicity. The factors that affect information and communication in internal control are identification of all transactions, timely provision of information, recording of various transactions into correct transaction codes, and communication [12].

Green Purchasing

Green purchasing can be defined as integrating environmental concerns and concerns into the procurement/purchasing process. Selecting the right supplier has a significant impact on realizing the company's environmental goals. However, selecting suitable suppliers is not enough by itself to improve environmental performance. Once a suitable supplier has been selected, the supply process must be managed by adopting a strategic understanding and collaboratively with the supplier. In addition to the selection and management of suppliers, it is also important to assess whether suppliers meet the company's environmental criteria [5].

Green purchasing can be defined as an environmental purchasing initiative that aims to ensure that purchased products and materials meet the environmental objectives set by the purchasing company such as reducing sources of waste, encouraging recycling, reuse, and replacement of materials [13]. Green purchasing focuses on cooperating with suppliers for the purpose of developing environmentally friendly products [14].

Green Strategy

Environmental strategy is defined as a series of initiatives that can reduce the impact of company operations on the natural environment through company processes, products, and policies such as reducing energy consumption and waste, using environmentally friendly resources, and implementing an environmental management system. Environmental strategy can provide managers with the information needed to plan, implement, make decisions about, and control a company's environmental practices [9]. Green management is a management practice that produces

environmentally friendly products and minimizes the impact on the environment through green strategies, green production, green research & development, and green marketing. A green strategy for a company-public or private, government or commercial, is one that complements the business operations and overall business strategy that is already well understood and often well-articulated by the company. Also known as corporate environment, environmental management, or corporate sustainability, a green strategy focuses on making corporate decisions that have a positive impact on the environment. Green strategy is the integration of environmental issues into the company's decision-making process. The main consideration in building a green strategy is for the company to create a culture of awareness and collective action to support environmental responsibility [8].

Methodology

Variable Operational definition

Measurement of environmental performance variables using dimensions and indicators from research [15]. For the green information system variable using measurements from research [11]. The green purchasing variable uses measurements from research [5]. The green strategy variable uses measurements from research [16].

Data Analysis method

This study will analyze the dimensions and indicators of each variable based on previous research found. Then the researcher will add, reduce, or modify the dimensions and indicators from previous research to become even better dimensions and indicators. If the dimensions and indicators are good, no additions, subtractions, or changes are made.

Analysis results and discussion

Development of Dimensions and Indicators of Environmental Performance variable

Research [15] uses the dimensions and indicators of environmental performance variable as follows.

Table 1: Development of Environmental Performance Variable

Old Dimension	Old Indicator	New Dimension	New Indicator	Argument
No	- Air emission reduction - Effluent waste reduction - Solid waste reduction	Waste reduction	- Air emission reduction - Reduction of liquid waste - Solid waste reduction	This dimension is in line with the residual waste factor, and the modification of the effluent becomes liquid because it is easier for the general public to understand
No	- Reducing consumption of hazardous/toxic materials - Decrease in the frequency of environmental accidents - Improvements in the company's environmental situation	Environmental impact	Still	This dimension is in line with its impact on the environment

Sources: [15] and Researchers, 2022

Dimensions and other indicators that have been rigid can be seen in research [11], [10], and [17].

Development of Dimensions and Indicators of Green

Information System Variable

Research [11] uses the dimensions and indicators of green information system variable as follows.

Table 2: Development of Green Information System Variable

Old Dimension	Old Indicator	New Dimension	New Indicator	Argument
No	- Our company has a formal system regarding environmental improvement in operations - We have a formal department that is responsible for environmental affairs	Process	Still	This dimension is related to the process
No	- Practices and measures in the system regarding green practices are widely available - We officially track and report on environmental performance within our company - We regularly track, monitor and share environmental information within the company	System	Still	This dimension is related to information systems
No	- The company has a well-developed database to track and monitor environmental issues	Technology	Still	This dimension is related to technology

Sources: ^[11] and Researchers, 2022

Dimensions and other indicators that have been rigid can be seen in research ^[10] and ^[17].

Development of Dimensions and Indicators of Green

Purchasing Variable

Research ^[5] uses the dimensions and indicators of green purchasing variable as follows.

Table 3: Development of Green Purchasing Variable

Old Dimension	Old Indicator	New Dimension	New Indicator	Argument
Is a dimension of Green Supply Chain Management	- Provide design specifications to suppliers that include environmental requirements for purchased goods - Cooperation with suppliers for environmental purposes - Supplier selection based on environmental criteria - Supplier ISO14000 certification - Environmental audit for supplier internal management	Still	Still	Still

Source: ^[5]

Dimensions and other indicators that have been rigid can be seen in research ^[14] and ^[13].

Development of Dimensions and Indicators of Green

Strategy Variable

Research ^[16] uses the dimensions and indicators of the green strategy variable as follows.

Table 4: Development of Green Strategy Variable

Old Dimension	Old Indicator	New Dimension	New Indicator	Argument
Pollution Prevention	- Prevent or reduce emissions and waste from current manufacturing processes - Reduction of waste during the manufacturing process - Reducing the use of hazardous /toxic materials in current/products	Still	Still	Still
Product Stewardship	- Extend the scope of environmental improvement to include the entire value chain or "lifecycle" of the company's product system - Involve all company stakeholders in the process of environmental improvement - Integrate the requirements of all company stakeholders into the environmental improvement process - Share responsibility for reducing the environmental impact of products across the value chain	Still	Still	Still
Clean Technology	- Considerable focus on future technology - Considerable focus on future markets - Entrepreneurial activities in the domain of renewable energy and other clean technologies - Developing sustainable future competencies	Still	Still	Still

Source: ^[16]

Based on research ^[18], one of the strategies related to environmental sustainability is TRIESKA (Transparent, Reliable, Independent, Evergreen, Sustainable, Knowledgeable, and Adorable). This strategy can be applied in the assessment of companies that have Green Good Corporate Governance (GGCG). Good governance ^[19] is organizational governance that is carried out well, by implementing the principles of openness, fairness, and accountability in order to achieve the goals of the organization. Good governance describes the condition of

the organization's activities by implementing the aspects of transparency, accountability, and community participation. Fulfilling environmental goals by 2030 urgently requires the role of management accountants, especially those related to the environment, in collaboration with other multidisciplinary environmental experts to achieve zero carbon emissions.

Dimensions and other indicators that have been rigid can be seen in research ^[8], ^[20], and ^[21].

Conclusions and recommendations

Based on the results of the analysis and discussion, there are still some studies that do not include dimensions in the variables. Meanwhile, the indicators are quite good in explaining the concept of green accounting. The formation of this dimension is important because a constructed variable requires the right dimensions and appropriate indicators so that the constructed variable can explain the variable correctly. The green trident that was developed is believed by researchers to be able to develop sustainable environmental performance.

With the novelty of developing dimensions and indicators of environmental performance, green information system, green purchasing, and green strategy, the recommendation is that it is hoped that future research can use it in green accounting research. Future research is also expected to be able to add dimensions or indicators so that the green accounting variable is more up-to-date and in accordance with the state of the scientific revolution and current phenomena.

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