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RESEARCH ARTICLE

Assessing Ecological Accounting Information On Managerial Decisions in Enterprises In The North Central Region Of Vietnam

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ABSTRACT

Through ecological accounting, information about natural resources will be made transparent and the company's social responsibility requirements will be implemented, thereby conserving resources from being exhausted. Ecological accounting makes the environmental costs of a company more visible through the accounting and reporting system. The North Central Economic Region is a special economic region with extremely rich natural resources of forests and seas. Businesses in this region are facing a great opportunity - the opportunity for sustainable economic development and growth, with a model of linking to form a synchronous industrial production and goods distribution network, targeting industries with competitive advantages and making exports, services, and tourism spearheads from the region's strengths. To achieve efficiency in sustainable development requirements, businesses themselves must always consider economic efficiency along with social efficiency. With the characteristics of the region, ecological accounting information is important information in business decisions of business administrators in the North Central region.

INTRODUCTION

Gray, Beddington, and Walter (1993) defined ecological accounting as “an approach to accounting discussions to address environmental issues within a given economic system.” It is a rigorous and integrated approach to environmental assessment through measuring ecosystems and measuring the flows of services from ecosystems into economic and other human activities. Schategger (2000) argues that ecological accounting measurements (kilograms, energy consumption, etc.) are limited by physical terms, so they need to be measured in monetary terms. Ecological accounting applies the basic principles of management accounting to environmental information systems through ecological accounting's concern with analyzing and reporting activities, recording activities in a systematic economic manner.

Through ecological accounting, information about natural resources will be made transparent and the company's social responsibility requirements will be implemented to conserve non-exhaustible resources. Ecological accounting makes the environmental costs of a company more visible through its accounting and reporting systems. The benefits and costs to the firm are then captured in the best quantitative assessment, both in monetary and physical terms. Monetary estimates can inform decision makers, such as economic policy making, cost-benefit analysis, and raising awareness of the relative importance of nature to society. Companies must reflect their environmental impacts in their accounting systems based on the requirement of ecologically sustainable development. Ecological accounting begins with the integration of ecological accounting into the company's environmental policy and the development of an accounting framework and the collection of appropriate data. Ecological accounting identifies environmental impacts to determine the responsibility for environmental impacts from products and production processes. Ecological accounting information is used by managers to analyze a company's ecological strengths and weaknesses. This information

system functions as a necessary control basis for the business.

The North Central Economic Region is a special economic region with extremely rich natural resources of forests and seas. Enterprises in this region are facing a great opportunity - the opportunity for sustainable economic development and growth, with a linkage model to form a synchronous industrial production and goods distribution network, focusing on industries with competitive advantages and making exports, services, and tourism become spearheads from the region's strengths. To achieve efficiency in sustainable development requirements, businesses themselves must always consider economic efficiency along with social efficiency. With the characteristics of the region, ecological accounting information is important information in business decisions of business administrators in the North Central region.

The article aims to study the current status of using ecological accounting information, assess the level of influence of ecological accounting information on management decisions of enterprises in the North Central region.

2. THEORETICAL BASIS

Ecological accounting measures how nature and various ecosystems contribute to human and socio-economic well-being and how this evolves over time (Maeset et al., 2020). Ecological accounting is a rapidly growing field, considered an extension of environmental economic accounting, providing a structured approach to assessing the interdependence and impacts of economic and human activities on the environment. According to the United Nations (2021), Environmental Economic Accounting System - Ecosystem Accounting is an integrated, spatially based statistical framework for organizing biophysical information about ecosystems, measuring ecosystem services, monitoring changes in the extent and condition of ecosystems, valuing ecosystem services and assets, and linking this information to economic measures and human activities. Furthermore, ecological accounting includes more benefits to humans than those recorded in standard economic accounts. It provides a structured approach to assessing the interdependence and impacts of economic and human activities on the environment.

Ecological accounting is primarily aimed at preparing asset management plans at the local government level. This type of plan is an important tool in assessing the condition and life cycle of any physical asset (Hamid, 2002). Indeed, the population growth resulting from industrialization, urbanization and ecological issues becoming alarming with global warming are making people increasingly realize the importance of ecosystems. At this point, ecological accounting takes place among the basic drivers of sustainable development.

Companies must reflect the environmental impacts arising from the company into the accounting system based on the concept of ecologically sustainable development, which is an important step in terms of the social impact of companies. When ecological accounting is considered from a broader perspective, it is found that it has surpassed social accounting in importance in application (Schaltegger and Burritt, 2000).

Ecological accounting methods are divided into three systems, namely “Internal ecological accounting system”, “External ecological accounting system” and “Other ecological accounting system” (Compton et al., 1998). “Internal ecological accounting system” is represented as the collection of information related to the ecological system for internal use by management. Subject information is a complementary element of traditional management accounting systems. Methods of measuring the impact of a company's products and production processes on the natural environment are essential and important for good management decisions. Various ways of accounting for ecosystem damage and pollution emissions are being developed. Internal ecological accounting is a necessary prerequisite for any environmental management system (Schaltegger et al., 2000). The internal ecological accounting approach is conceptually similar to traditional accounting. Within this framework, internal ecological accounting (Compton et al., 1998): Is an analytical tool for detecting ecological difficulties and weaknesses, Is a method to support decisions related to relative environmental quality and provide a basis for ecological efficiency for environmental measurement, Is a tool to help control direct or indirect environmental impacts, Is an independent and transparent internal communication tool (and also indirectly for external communication).

“External ecological accounting” is similar to traditional financial accounting. Under the thematic

accounting approach, data is collected and disclosed to external stakeholders related to environmental issues – typically governments, media, shareholders, environmental funds, NGOs, and other relevant entities. The purpose of environmental accounting is to collect, organize, analyze, and communicate environmental information to external stakeholders, just as financial accounting does. Today, most companies provide external environmental reports; thus, they provide an opportunity for public assessment of environmental impacts. Most of these reports are prepared annually and include detailed data on pollution emissions (Schaltegger and Burritt, 2000).

"Other Ecological Accounting Systems" provide tools for regulators to check compliance with regulations, while also measuring data in physical units. A thematic approach is needed to calculate carbon dioxide taxes or Volatile Organic Compound taxes and environmental taxes. Without information on the level of pollution emissions, it is not possible to multiply the environmental tax rate by the amount of pollution emissions to find the total tax liability. In addition, except for tax authorities who are primarily interested in information related to the emissions of certain polluting commodities and environmental protection agencies, more and more other stakeholders such as banks and insurance companies need information related to the ecological impact of the company as part of the risk assessment process in the case of posing risks in the form of guarantees or loans (Schaltegger et al., 2000).

Shulzhenko I., Ostapenko S., Symonenko V. build management decisions as "voluntary intervention of the management subject in the activities of the enterprise to create a coordinated influence on the management object to achieve the goals of the enterprise" (Shulzhenko, Ostapenko & Symonenko, 2018). Oliinychenko O. notes that managerial decision making is "a creative process involving the development and implementation of one or more alternatives from a set of possible alternatives to achieve a given goal" (Oliinychenko, 2007). Zahorodniuk O., Pivtorak M., Maliuha L. define managerial decision as "a series of consecutive actions in a cycle, including separate procedures that naturally influence the organization's management system to achieve a goal or solve a problem" (Zahorodniuk, Pivtorak & Maliuha, 2019). Petrunia Yu. Ye., Litovchenko BV, Pasichny describe a managerial decision as "the result of a creative analysis of a problem situation carried out to achieve a specific goal, including the choice of ways, methods and means of solving it according to the goals of the management system" (Petrunia, Litovchenko & Pasichnyk, 2020).

The decision-making process involves the existence of a decision problem that the decision maker must understand and define accurately in order to find an opportunity to solve. Several obstacles have been identified in the way of properly defining the problem as the subject of the decision: paying attention to the effects rather than the causes, selective perception, defining the problem through solutions (Cornescu, V. et al., 2004).

Simple models of the decision-making process include steps to be followed to guide participants in making a decision. The stages or steps of the decision-making process vary depending on the author's approach. Among the most used approaches are: 7-step decision-making process, 5-step decision-making process, 4-stage decision-making process or creative decision-making process, 3-stage decision-making process and other approaches.

3. RESEARCH MODEL

Data for the study was collected within 6 months, from February 1, 2024 to July 31, 2024. The author sent questionnaires to 250 businesses with 250 questionnaires, and received information from 165 businesses with 165 questionnaires.

The study used the probability sampling method when collecting survey data distributed directly and indirectly through personal relationships. To ensure the reliability of the collected data, the author selected the survey respondents, including senior managers such as General Directors, Directors, Deputy Directors, and Financial Directors; middle managers such as Chief Accountants, Department Heads, and Deputy Department Heads of Finance; and management accounting and general accounting experts of the enterprise. Each individual will represent the enterprise in which they are working. In the scope of the study, the author focused on enterprises in the manufacturing, trade, and service sectors.

4. RESEARCH RESULTS

Characteristics of businesses in the North Central region

North Central is the northern part of Central Vietnam, with an area from Tam Diep mountain range to the north of Hai Van pass, bordering the Northern Midlands and Mountains and the Red River Delta to the north, Laos to the west, the South Central Coast to the south and the Northeast Sea to the east. North Central is one of eight socio-economic regions established by the Government for a master plan on economy and society. The North Central region has an administrative unit of 6 provinces: Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Thua Thien Hue with an area of about 51,552 km2, a population of about 11 million people.

The North Central region is a particularly important area in terms of politics, economy, society, national defense and security, playing a strategic role in implementing the Strategy for sustainable development of Vietnam's marine economy to 2030, with a vision to 2045 according to Resolution No. 36-NQ/TW dated October 22, 2018 of the 12th Party Central Committee. The economic structure of the region has shifted in a positive direction. The Central Sea is a national resource, the sea front of Vietnam, with a coastline of 1,900 km, the region has a particularly important position in the development of the marine economy and economic activities on the coastal strip. The Central region is also the gateway to the sea of the Central Highlands, a support for the Central Highlands provinces, connecting the East-West economic corridor. The potential and demand for opening up and integrating with the international market are very large. The proportion of non-agricultural sectors has increased rapidly, especially the structure within the sectors has also changed significantly towards promoting the comparative advantages of the provinces, which has contributed significantly to promoting and improving the quality of growth. Some marine economic sectors have developed rapidly, such as shipbuilding and repair, oil and gas processing, marine tourism, maritime transport, maritime services, aquaculture and seafood processing, etc.

According to the survey results, joint stock companies responding to the survey accounted for 56.4% of joint stock companies and 43.6% of limited liability companies. This result also shows that the number of limited liability companies and joint stock companies surveyed accounted for an equal proportion of enterprises in the North Central region.

Table 1. Descriptive statistics by company type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Joint Stock Company	93	56.4	56.4	56.4
	Limited Liability Company	72	43.6	43.6	100.0
	Total	165	100.0	100.0	

(Source: Author's analysis)

Regarding business capital results, the number of enterprises with capital under 20 billion accounts for a large proportion (with a rate of 74.6% of enterprises), enterprises with capital scale from 20 billion to 100 billion account for a rate of 24.2%, enterprises with capital over 100 billion account for a rate of 1.2%.

Table 2. Descriptive statistics by total business capital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 20 billion VND	123	74.6	74.6	74.6
	20 – 100 billion VND	40	24.2	24.2	98.8
	> 100 billion VND	2	1.2	1.2	100.0
	Total	165	100.0	100.0	

(Source: Author's analysis)

According to the survey results on the number of employees, 12.1% of companies have less than 10 employees, 61.2% of companies have 10-200 employees, 21.2% of companies have 200-300 employees, and only 5.5% have over 300 employees.

Table 3. Descriptive statistics by number of employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 10	20	12.1	12.1	12.1
	10- 200	101	61.2	61.2	73.3
	200-300	35	21.2	21.2	94.5
	> 300	9	5.5	5.5	100.0
	Total	165	100.0	100.0	

(Source: Author's analysis)

In terms of enterprise size, the author found similarities in the survey results between the two groups of enterprises. The group of enterprises with capital under 20 billion (accounting for 74.6%), similar results to the group of enterprises with less than 200 employees (accounting for 73.3%). Similarly, the group of enterprises with large capital over 20 billion (accounting for 25.4%), similar results to the group of enterprises with more than 200 employees (accounting for 26.7%).

Regarding industry groups, according to Decision No. 27/2018/QD-TTg on the economic sector system of Vietnam, there are 15 main industry groups. However, in this study, the author focused on collecting survey forms from 3 types: manufacturing, services and trade. The survey results showed that the response rate of business sectors was quite even, including 62 manufacturing enterprises (accounting for 38%), 53 trading enterprises (accounting for 32%) and 50 service enterprises (accounting for 30%).

Assessing the importance of ecological accounting information in enterprises in the North Central region

The author uses a 5-level Likert scale: 1 – Not important; 2 – Less important; 3 – Normal; 4 – Important; 5 – Very important.

Assess the importance of ecological accounting information on the following contents; Implement accountability; Increase transparency of information related to the environment; Minimize the negative impact of traditional accounting applications on the environment; Identify the relationship of companies with society and especially with environmental pressure groups and help with compromises related to environmental issues; Create an environmentally friendly image by ethical investment projects; Provide a competitive advantage for companies producing "green" products; Develop reporting, evaluation and new types of performance measurement to achieve internal and external goals.

The results of the assessment of the importance of ecological accounting information are shown in Table 4. The results show that the average values of the aspects have quite different values, ranging from 2.95 to 4.1. In which, ecological accounting information aimed at providing information for corporate accountability is assessed as the most important with a mean value of 4.10. In particular, the purpose of minimizing the negative effects of traditional accounting applications on the environment is assessed as the least important with a mean of 2.95. The remaining purposes have an average level fluctuating around level 3.

Table 4. Results of the assessment of the importance of ecological accounting information

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Accountability	165	3	5	4.10	.631
Information Transparency	165	2	4	3.53	.649
Reducing Negatives	165	2	4	2.95	.642
Social Engagement	165	2	4	3.52	.611
Ethical Investing	165	3	4	3.53	.501
Competitive Advantage	165	3	4	3.23	.422
Report Development	165	2	4	3.19	.422
Valid N (listwise)	165				

(Source: Author's analysis)

Current status of using ecological accounting information sources in enterprises in the North Central region

The current situation of using ecological accounting information sources in enterprises in the North Central region is considered under the following sources: Internal records; Online data sources, internet; Industry data sources and industry reports; Information from meetings with competitors, partners, etc.

Table 5. shows the level of ecological accounting information sources used by enterprises in the North Central region. Enterprises all reached a high level of agreement on using ecological accounting information from industry data sources, internal data and online data with average values of 3.93, 3.76, 3.54 respectively. In particular, data sources from working meetings with partner companies and competitors were used very little, only at an average level of 2.85.

Table 5. Current status of ecological accounting information sources used

	N	Minimum	Maximum	Mean	Std. Deviation
Internal Profiles	165	3	4	3.76	.426
Online Data	165	3	4	3.54	.500
Industry Data	165	3	4	3.93	.260
Partners	165	2	3	2.85	.360
Valid N (listwise)	165				

(Source: Author's analysis)

Reasons for using ecological accounting information in decision making in enterprises in the North Central region

The reasons for using ecological accounting information in the decision-making process in enterprises in the North Central region are reflected in the contents of compliance with voluntary environmental certification requirements, compliance with the law, avoiding or minimizing environmental responsibilities, managing environmental risks, enhancing the company's image, protecting customer investments, meeting business ethics and protecting market advantages. The survey results show that the eight reasons for using ecological accounting information in management decision-making have similar average values. In which, the reason for compliance with the law is the most concerned reason for managers to use ecological accounting information in their decision-making process.

Table 6. Current status of reasons for using ecological accounting information in management decision making

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Voluntary Compliance	165	3	4	3.48	.501
Legal Compliance	165	4	5	4.60	.491
Reducing Liability	165	3	4	3.54	.500
Risk Management	165	3	5	3.86	.764
Improving Image	165	2	4	3.13	.579
Protecting Customers	165	3	4	3.38	.487
Business Ethics	165	3	4	3.23	.422
Protecting Market Advantage	165	2	4	3.28	.513
Valid N (listwise)	165				

(Source: Author's analysis)

Management level uses ecological accounting information sources in decision making in enterprises in the North Central region

The management levels that use ecological accounting information sources in the decision-making process in enterprises in the North Central region are interested in including executive managers, departmental managers, internal auditors and controllers. The survey results on this content are

shown in Table 7. The results show that executive managers are the ones who have the highest need to use ecological accounting information in the decision-making process with an average value of 4.25. The remaining middle and low-level managers have very little need to use ecological accounting information in their operations.

Table 7. Current status of ecological accounting information sources used

	N	Minimum	Maximum	Mean	Std. Deviation
Executive Management	165	1	5	4.25	1.107
Department Level Management	165	1	4	2.81	.874
Internal Auditor	165	2	4	2.66	.800
Controller	165	1	4	2.30	1.031
Valid N (listwise)	165				

(Source: Author's analysis)

5. CONCLUSION

The research results on assessing the importance of ecological accounting as well as the reasons for using ecological accounting information in the decision-making process in enterprises in the North Central region show that the average value of the answers is above 3, thus, business administrators in the North Central region have been and are highly aware of the role of ecological accounting in business decision-making..

In an operating environment where each enterprise can freely and unrestrictedly exploit common resources, it is certain that enterprises will exploit resources thoroughly and gain the highest profits. By placing profits above all, managers make decisions at different levels in production, investment and consumption activities, and only care about the perspective of considering the choice between costs and benefits without paying attention to the social consequences that arise. Many businesses use resources together without taking any responsibility for their use, which will inevitably lead to resource depletion, serious pollution and resource shortages. However, in reality, business operations are always governed by the economic - social - environmental relationship. And when businesses are judged on their environmental impact, it is certain that no manager or shareholder wants a business to develop a poor reputation. To maintain a good public image, businesses may have to classify, collect, record, distribute, analyze and transfer data related to the environment and all environmental impacts of the business when making financial statements. Realizing this, managers of businesses in the North Central region are implementing ecological accounting in their accounting systems to provide relevant ecological information in making business decisions.

Ecosystem accounting information requirements can be classified into three categories: government, economic and environmental stakeholders. Government is the environmental policy implementer, the one who performs all the work that requires various ecological accounting information, therefore, government is the important ecological accounting requester. As environmental impacts have become a factor to be considered when operating a business, traditional economic stakeholders who want to maintain their economic interests will pay more attention to corporate environmental information; employees, consumers and other individuals affected by corporate environmental practices, with stronger environmental awareness, they hope to clarify the impact of their own health benefits with ecological accounting information.

Moreover, if a company wants to maintain its position in the market, it must have a clear competitive advantage. The competitiveness of a company is not only about product price, product quality, product price, market share and service quality, but also about ecological awareness and environmental protection, and the value of ecological efficiency is becoming an important part of gaining competitive advantage. Those who have advantages in protecting the ecological environment, who can receive more support from the government such as tax reduction, capital support policies, etc., can gain some cost advantages. Therefore, the support and respect for ecological information from the government and from the departments will create conditions for businesses to effectively implement ecological accounting.

For consumers, with the increased awareness of people about ecological and environmental protection, consumers supporting green consumption will encourage businesses to implement initiatives in the program and help take a leading position in the market. This is reflected in the image of green businesses, clean production, processing and reusing used products... along with a series of environmentally friendly measures, environmental protection and efficient use of resources, and business activities that minimize environmental impacts.

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