



ECO-CONTROL SYSTEM: A LITERATURE REVIEW

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ABSTRACT

An eco-control system is the integration of a management control system and environmental strategy to ensure that organizations can control their environmental strategy, which concerns environmental issues. The importance of an eco-control system has long been recognized by academics as significant for organizations to deal with environmental activities. This paper intends to review the literature of eco-control systems and their aspects, which include a budget system, an intensive system, and a performance measurement system, the role of an eco-control system for influencing environmental strategies, and their procedures. This study uses the content analysis method to review seven selected studies. The results show the critical role of an eco-control system in supporting an organization's implementation of its environmental strategies and increasing their environmental and economic performance.

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INTRODUCTION

Globally, the awareness of environmental problems such as climate change, greenhouse gas production, biodiversity derogation, global warming, toxic waste, and ozone depletion has increased due to the development of organizations in terms of size, products, and the number of employees. These problems require societies and organizations to reduce their impacts on the environment as well as find solutions to these impacts (Aragón-Correa, Hurtado-Torres, Sharma, & García-Morales, 2008; Shrivastava, 1995; Solovida & Latan, 2017). In addressing issues, a range of issues like environmental problems, organizations worldwide have implemented management control systems (MCS) (Langevin & Mendoza, 2013; Merchant & Van der Stede, 2007). MCS includes essential mechanisms that help managers to control their employees and subordinates to ensure that the objectives and goals of the organization have been implemented regarding an organization's strategies and objectives. Such mechanisms include performance measurement (Merchant & Van der Stede, 2007). The development of organizations in terms of size, products, and the number of employees has affected the natural environment, and these impacts have included

increases in global warming, toxic waste, and ozone depletion. Across the globe, awareness about environmental has increased (Shrivastava, 1995). Organizations could decrease these environmental crises by using their resources better so that they do not increase environmental problems (Porter & Van der Linde, 1995). One solution is the integration of MCS and environmental strategy into what is termed an eco-control system (Schaltegger & Burritt, 2000). The concept of eco-control is termed an environmental management control system (Pondeville, Swaen, & De Rongé, 2013), an environmental management accounting (Bouten & Hoozée, 2013), and a sustainability control system (Gond, Grubnic, Herzig, & Moon, 2012). An eco-control system is considered as a part of environmental management accounting, which serves as a system for controlling environmental management in a financial manner and strategic manner. This system has three essential aspects for an organization to use in their activities; these are incentives, budgeting and performance measurement (Henri & Journeault, 2006). In addition, an eco-control system is a specific application of a management control system (Wijethilake, 2017). An eco-control system aims to support environmental strategy inside an organization and translate that strategy into practices that help an organization to disclose information about its environmental

activities and provide an organization with the ways to assist it in measuring its environmental activities and performance (Journeault, Henri, & De Ronge, 2016). This system also controls the environmental activities of an organization and provides the necessary information about the environmental issues to decision-makers to ensure that environmental objectives have been integrated (Henri & Journeault, 2006, 2010; Schaltegger & Burritt, 2000). The objective of this paper is to review the literature on eco-control systems and their aspects. These aspects include a budget system, an intensive system, and a performance measurement system, the role of an eco-control system for influencing environmental strategies, environmental performance, and economic performance. The remainder of this paper is organized as follows: the first four sections present the definition, measurements, benefits, and procedures of the eco-control system. Then, the methodology of this study is discussed in section six. Section seven summarises the characteristics of the chosen studies. In section eight, the analysis of the selected studies is discussed. Finally, the last section provides the conclusion of this study, followed by recommendations for future studies.

Definition of an Eco-Control System

In recent years, growing attention has been focused on an eco-control system as an essential factor for driving the environmental strategy in an organization (Henri & Journeault, 2010). Schaltegger and Burritt (2000) defined an eco-control system as the integration of the management control system and environmental strategy that is designed to ensure that an organization can control its strategy concerning environmental issues. The fundamental concept of eco-control derives from the definition of a management control system of Simons (1987), who defined a management control system as "a system which include formalized procedures for such things as planning, budgeting, environmental scanning, competitor analysis, performance reporting and evaluation, resource allocation and employee rewards". Later, Simons (1990) further defined an eco-control system as "the formalized procedures and systems that use the financial and ecological information to maintain or alter patterns in environmental activities". Eco-control systems were developed to assist organizations in controlling and disclosing their environmental activities and performances (Henri & Journeault, 2010). Lee (2012), explains that an eco-control system aims to integrate both a financial perspective and an environmental perspective to provide relevant and useful information to the decision-makers and managers of organizations. The concept indicates that information about environmental performance and financial performance should be an integral characteristic of the organization systems and their formal procedures (Gunarathne & Lee, 2015).

Eco-Control Systems Measurements: An eco-control system may be categorized into a budget system, an incentive system, and EP measurement (Henri & Journeault, 2010). Organizations may use a budget system for multiple purposes, such as for performance evaluation, motivation, empowerment, resource allocation, strategy formation, operational and strategic planning, communication of goals and implementation and coordination (Ekholm & Wallin, 2000; Fraser & Hope, 1997; Hansen & Van der Stede, 2004). It is vital to have control mechanisms in each organization (Hansen & Van der Stede, 2004) as they provide the necessary information to guide organizational activities (Flamholtz, Das,

& Tsui, 1985) and the management may use them to coordinate and communicate between strategic priorities (Abernethy & Brownell, 1999). Eco-control system budget refers to an environmental budget that is concerned with the writing of specific organizational goals that are related to environmental expenses, environmental investment, incomes from material scraps, and incomes from recycled waste (Henri & Journeault, 2006). Previous studies (Emsley, 2000; Luft & Shields, 2000) have found a positive association between organizational performance and a budget and a positive relationship between the budget system and EP (Henri & Journeault, 2006, 2010).

An incentive system motivates employees to achieve an organization's environmental goals. It is vital for an organization to improve its environmental and economic performance (Marc, 1996). An organization, in this sense, influences the behaviours of its employees to exert additional effort towards the goals and objectives of the organization (Flamholtz, Das, & Tsui, 1985). Incentives in the area of the eco-control system refer to the motivations that an organization provides to its employees to achieve its environmental goals and activities (Gabel & Sinclair-Desgagné, 1993). An incentive system represents the commitment of an organization towards achieving environmental goals, which forces managers to concentrate on profits that related to organizational activities and, simultaneously, on the activities related to EP (Lothe, Myrtveit, & Trapani, 1999).

An organization should reward its employees based on both organizational performance and environmental performance, not merely based on organizational performance such as profit or revenue, which can negatively affect the EP (Marc, 1996). Previous studies empirically have found a positive relationship between an incentive system and organizational performance (Bonner, Hastie, Sprinkle, & Young, 2000; Luft & Shields, 2000; Sung, Choi, & Kang, 2017; Zhang & He, 2017), and a positive relationship between an incentive system and environmental performance (Dahlmann, Branicki, & Brammer, 2017; Henri & Journeault, 2006, 2010; Song, Fisher, Wang, & Cui, 2016). Performance measurement systems are identified as tools that are used to measure organizational activities (Neely, Gregory, & Platts, 1995). In the area of an eco-control system, a performance measurement system is related to the way in which an organization collects information related to the environment and how these organizations disclose their environmental performance. More specifically, a performance measurement system refers to "the collection and disclosure of information regarding environmental performance" (Henri & Journeault, 2006). In literature, a performance measurement system is recognized as an essential element of environmental management in an organization besides the elements of an eco-control system like budget and intensive systems (Figge, Hahn, Schaltegger, & Wagner, 2002; Marc, 1996; Schaltegger & Burritt, 2000).

A performance measurement system includes different measures that provide organizations with key information related to environmental issues (Henri & Journeault, 2008). This system is also used to evaluate the effectiveness and efficiency of the environmental activities of an organization (Neely et al., 1995). According to Journeault (2016), managers use these measures to monitor organizational activities and evaluate their results and progress that support their decisions

making as well as help them to focus on environmental issues. Furthermore, past studies have found a positive association between a performance measurement system and environmental and organizational performance. (Henri & Journeault, 2006, 2010; Journeault et al., 2016; Micheli, Mura, & Agliati, 2011). These studies have recognized a performance measurement system as a tool to enhance organizational capabilities.

Benefits of Eco-Control System: Organizations require a system that provides information to decision-makers to ensure that they can fulfil their environmental objectives and goals. An eco-control system helps an organization in doing so because this system integrates environment issues with a management control system (Schaltegger & Burritt, 2000). Aneco-control system can improve the environmental strategy of an organization providing control for these strategies (Henri & Journeault, 2006). As a particular part of MCS, an eco-control system strengthens the achievement of organizational goals and objectives that are related to environmental issues and supports the development of the achievement congruence between the employees and organization (Schaltegger & Burritt, 2000). This system also improves the allocation of organizational resources, and evaluation of organizational compliance with environmental regulations, policies, and goals (Henri & Journeault, 2010). An eco-control system benefits an organization in several ways; for instance, improving and developing organizational abilities to face environmental needs and capabilities such as environmental innovation, eco-learning, and shared environmental vision increases the organizational performance (Journeault, 2016). On top of that, eco-controls help managers in solving problems related to environmental issues, decreasing the wastage of organizational resources, linking employees with environmental goals, and enhancing the establishment of departments that align with environmental goals (Abdel-Maksoud, Kamel, & Elbanna, 2016). According to Henri and Journeault (2010), an eco-control system provides numerous benefits such as helping an organization to disclose its environmental activities, providing ways that help in measuring environmental activities, controlling environmental activities, and giving the necessary information about the environmental issues to decision-makers to ensure that environmental objectives are achieved. Previous empirical studies on the eco-control system have found positive associations between the eco-control system and economic performance (Baines & Langfield-Smith, 2003; Duréndez, Ruíz-Palomo, García-Pérez-de-Lema, & Diéguez-Soto, 2016; Journeault, 2016) and environmental performance (Henri & Journeault, 2006; Journeault, 2016). An eco-control system is said to support environmental performance and effective resource management because that system provides both financial and environmental information (Henri & Journeault, 2010). Furthermore, an eco-control system provides environmental information to organizations, which may be used as a database in helping them to learn about their environmental issues (Abernethy & Brownell, 1999).

Eco-Control System Procedures

According to Schaltegger and Burritt (2000), the concept of eco-control is divided into five procedures, and these procedures are:

First, Goals and policy formulation and development. The authors identified this as a fundamental procedure for the

managers to formalize and implement aneco-control system. In this stage, the top management defines the purpose of environmental management accounting to ensure organizational commitment towards their environmental strategy. They explained that it is essential that “managers define the purpose of environmental management activities and are involved in the process of goal-setting in order to ensure organizational commitment to the environmental strategy once it is formulated”. At the same time, an organization and its top managers are required to provide a clear justification for why they chose a specific environmental strategy, and improvement of environmental commitment should be developed. Furthermore, after an organization completes the first eco-control procedure and implements it, then the remaining four procedures of eco-control are concerned with the day-to-day operational activities inside an organization.

Second, Information management (EP information). The authors said that this procedure was essential for any environmental management system. This procedure is concerned with the information that an organization uses in its decision making, and this information should be relevant and useful for an organization to improve its eco-control procedures (Lee, 2012).

Third, Decision support. An organization must provide support to its decision-maker. It explained as “a logical and transparent method for taking environmental and economically-sound decisions in accordance with the data collected and analysed during information management procedure” (Schaltegger & Burritt, 2000).

Fourth, Implementation and steering. In this procedure, the managers are required to control, steering, and implement an eco-control system to ensure the alignment between an organization’s environmental policies and goals with the behavior of its employees. In an eco-control system, concerns are at the operational level and strategic environmental management (Schaltegger & Burritt, 2000), in which the information should be required and collected from production managers, then reported to senior managers for integration. At the same time, an eco-control system should align environmental policies and goals with the activities of employees. This is achieved in two ways. The first is by linking rewards packages with environmental measures and second is by enhancing the sharing of organizational values and cultures that are concerned with environmental issues (Schaltegger & Burritt, 2000).

Fifth, Communication between internal and external: An organization’s environmental strategy and policies should be communicated from the top to the bottom of an organization. Internal communication can aid in the process of achieving goals, controlling the organization, and improving the progress and implementation of an eco-control system (Schaltegger & Burritt, 2000). For external communication, an organization must communicate with its stakeholders and provide them with the information to show an organization’s commitment to its responsibilities to the environment (Lee, 2012).

MATERIALS AND METHODS

This study provides a review of eco-control system research that has been published in academic research journals during

the period from April 2019 to July 2019. The following online databases have been used for searching to have a broad literature review of eco-control systems:

- Elsevier
- Emerald journal
- Google Scholar
- JSTOR
- Mendeley
- Science direct

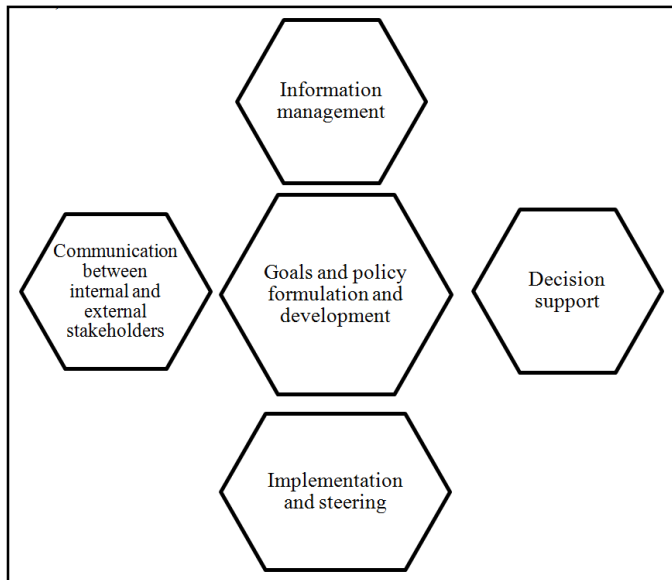


Figure 2. Eco-control procedures. Adapted from Schaltegger & Burritt (2000) and Lee (2012)

In this study, the articles were selected from these online databases using the keywords “eco-control system” to find the literature that had investigated and examined eco-control systems.

author, year, journal or book publisher, sector and country for each study in order to have a big overview about eco-control system and to provide a recommendation for future studies by providing different about these studies. Table 1 provides the details of the selected studies. The table above shows that the selected studies were published in accounting and hospitality management journals, most of them were published in accounting and organizational society journals, and the rest of the journals had one study each. The results also show that the chosen studies were spread over two sectors, which were the service sector (hotels) and the industrial sector (manufacturing organizations). Five of the studies were conducted in manufacturing organizations, and the rest were in the hotels sector. Five of the selected studies used questionnaires for collecting data, one study used a longitudinal questionnaire and one used a case study. In terms of respondents, Table 1 shows that the CEO or another member of the management and managers were the key informants for these studies. Finally, the results show that most studies were conducted in developed countries (Canada) except for two studies, which were conducted in developing countries (Sri Lanka and the United Arab Emirates).

Analysis of the selected studies: This section analyses and discusses the results of the selected studies and investigates the relationship among an eco-control system and environmental strategies, environmental performance, and economic performance. The first study concerns the relationship between eco-control and environmental performance, which was conducted among 303 manufacturing organizations in Canada (Henri & Journeault, 2006). The results of the study revealed a positive relationship between an eco-control system and environmental performance, which, in turn, positively impacted the organizational performance. Four years, Henri and Journeault (2010) investigated to what extent an eco-control system affected environmental performance and economic performance.

Table 1. Details of the Selected Studies

Author(s)	Journal / book publisher	Sector	Data Collection Method	Respondent	Country
Henri & Journeault, 2006	Faculté des sciences de l'administration, Université Laval	Manufacturing Organizations	Questionnaire	CEO or another member of the management	Canada
Henri & Journeault, 2010	<i>Accounting, Organizations and Society</i>	Manufacturing Organizations	Questionnaire	CEO or another member of the management	Canada
Gunarathne & Lee, 2015	<i>Journal of Accounting and Organizational Change</i>	Hotels	Case study	General manager	Sri Lanka
Journeault, Henri, & De Ronge, 2016	<i>The British Accounting Review</i>	Manufacturing Organizations	Questionnaire	CEO or another member of the management	Canada
Abdel-Maksoud, Kamel, & Elbanna, 2016	<i>International Journal of Hospitality Management</i>	Hotels	Questionnaire	Managers	United Arab Emirates
Journeault, 2016	<i>Journal of Management Accounting Research</i>	Manufacturing Organizations	Questionnaire	CEO or another member of the management	Canada
Henri, Journeault, & Brousseau, 2017	<i>Journal of Accounting and Organizational Change</i>	Manufacturing Organizations	Longitudinal questionnaire	CEO or another member of the management	Canada

The search found seven studies that were directly related to the eco-control system and its role in environmental strategies, environmental performance, and economic performance. Content analysis was used to analyse these articles to generate more understanding of eco-control systems.

Characteristics of the Chosen Studies: This section provides the results of the literature review of eco-control systems. The details of the chosen studies and characteristics of each study were provided, the seven chosen studies were categorised by

Using an online survey, the study collected data from a sample of 303 manufacturing organization in Canada. The study found a mediating effect of environmental performance in the relationship between an eco-control system and economic performance. Furthermore, the study concluded that economic performance might be improved through environmental performance. To examine whether the extent of eco-control package supports an organization's capabilities and to investigate the influences of the eco-control package on an organization's environmental performance and economic

performance, Journeault (2016) examined Canadian manufacturing organizations. The study used a neutral based view theory to examine that relationship, and the results revealed that an eco-control package is a mechanism that increases organizational capabilities, which, as a result, improved an organization's environmental performance and economic performance. In a longitudinal study, Henri, Journeault, and Brousseau (2017) examined the relationship between eco-control change and environmental performance among 78 manufacture organizations in Canada at two points in time, namely 2005 and 2010. The study focused on eco-control change in three areas, which were the scope of change, the scale of change and the direction of change. The study concluded that changes leading to increased importance that was given to eco-controls within an organization contributed positively to environmental performance, and concerted changes in all facets of the mixture of eco-controls contributed more to environmental performance than piecemeal changes on specific aspects of the mixture did. The most significant contribution to the environmental performance was not the scale of the change but was the presence of a credible signal reflecting the seriousness that was given to the intentions.

In an online survey of 249 manufacturing organizations in Canada, Journeault et al. (2016) found a positive relationship between the adoption of the levers of an eco-control system in an organization and environmental performance of that organization and the adoption of an eco-control system reflected an organization's environmental strategy for reducing their impacts on environments. Two studies examined the hotel industry. Abdel-Maksoud, Kamel, and Elbanna's (2016) study among 150 three-to-five-star hotels operating in Dubai, United Arab Emirates, found a positive relationship between the effect of stakeholder pressure and the use of eco-control systems. Base on a case study of 12 businesses in Sri Lanka, Gunarathne and Lee (2015) found that organizations at the functional specialization stage, with limited information uses and characteristics, adopt a narrow view of cleaner production strategies by associating them with efficiency. As organizations progress to higher stages of environmental management development, the information uses and characteristics for cleaner production are expanded to encapsulate sufficiency and consistency strategies while strengthening the efficiency uses.

Conclusion

The main aims of this study were to review the literature about eco-control systems and their aspects to review previous studies that investigated the relationship between an eco-control system and environmental strategies, environmental performance, and economic performance to enhance knowledge in this area and provide suggestions and improvements for future studies. This study found that the selected studies mostly used a quantitative research method for examining eco-control systems. The findings of these studies clearly demonstrate the critical role of an eco-control system in supporting organizations in implementing their environmental strategies and improving their environmental and economic performance. Also, the review showed that most of the selected studies focused on manufacturing industrial organizations in developed countries. Therefore, empirical studies on eco-control systems are recommended for developing countries and other organizational sectors.

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