ECO-CONTROLLING JAKO INSTRUMENT SYSTEMU ZARZĄDZANIA ŚRODOWISKOWEGO I OCENY JEGO EFEKTÓW

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Streszczenie: Celem artykułu jest przybliżenie pojęcia eco-controllingu jako narzędzia w zarządzaniu środowiskowym przedsiębiorstw i ocenie jego efektów. Eco-controlling, rozszerzenie tradycyjnego controllingu, koncentruje się na aspektach środowiskowych działalności przedsiębiorstw. Jego głównym celem jest optymalizacja korzystania z zasobów naturalnych oraz minimalizacja negatywnego wpływu na środowisko. Artykuł analizuje, w jaki sposób eco-controlling wspiera organizacje w osiąganiu ich celów środowiskowych, uwzględniając różnorodne systemy zarządzania środowiskowego oraz metody oceny działań środowiskowych. Norma ISO 14001:2015, międzynarodowy standard w zakresie Systemów Zarządzania Środowiskowego (SZŚ), odgrywa kluczową rolę w zarządzaniu środowiskowym. Artykuł podkreśla, jak eco-controlling wspiera procesy zarządzania zgodnie z tą normą, poprzez stosowanie wskaźników jako dowodów realizacji skutecznych działań środowiskowych. Praca rozważa również, jak eco-controlling może być wykorzystany w procesie raportowania zrównoważonego rozwoju.

Słowa kluczowe: eco-controlling, zarządzanie środowiskowe, zrównoważony rozwój, cele środowiskowe

ECO-CONTROLLING AS AN INSTRUMENT OF THE ENVIRONMENTAL MANAGEMENT SYSTEM AND ASSESSMENT OF ITS EFFECTS

Abstract: The aim of the article is to introduce the concept of eco-controlling as a key tool in the environmental management of enterprises and the assessment of its effects. Eco-controlling, an extension of traditional controlling, focuses on the environmental aspects of business operations. Its main goal is to optimize the use of natural resources and minimize the negative impact on the environment. The article examines how eco-controlling supports organizations in achieving their environmental goals, considering a variety of environmental management systems and methods for assessing environmental performances. ISO 14001:2015, the international standard for Environmental Management Systems, plays a key role in environmental management. The article emphasizes how eco-controlling supports management processes in accordance with this standard, by using indicators as evidence of the implementation of effective environmental measures. It also considers how eco-controlling tools can be used in the sustainability reporting process.

Keywords: eco-controlling, environmental management, sustainable development, environmental goals

1. Introduction

Environmental management has evolved to become an intrinsic and key component of the operational strategies of many modern enterprises (Ushkulakova et al., 2020). In the face of growing global environmental challenges such as climate change, air pollution, and the degradation of natural resources, companies around the world are increasingly focused on finding a balance between achieving their business goals and their responsibilities to the planet (Bravi et al., 2020). This approach to sustainability, which integrates both economic and ecological aspects, becomes an essential component of their long-term plans and strategies (Kasych, Rowland, Yakovenko, 2019). These initiatives aim not only to minimize the negative impact on the environment, but also to build positive value and reputation in the eyes of customers, partners and other stakeholders (Morrow & Rondinelli, 2002).

The reasons for the green activities of companies are varied and multidimensional. The increasing number of regulations and laws related to environmental protection forces companies to adapt to new standards (Cai, Ye, 2020). In parallel to legal regulations, the growing environmental awareness of society, social pressures and increasingly demanding consumer expectations have a significant impact (Wierzbiński, et al., 2021). All these factors are driving companies to look for more sustainable and ecological solutions. In this context, eco-controlling appears to be a key tool enabling companies to effectively manage their environmental activities. By using eco-controlling methods and techniques, companies are able not only to meet legal requirements and market expectations, but also to identify and exploit new profit opportunities resulting from green development (Matukova et al., 2021). Eco-controlling also helps to monitor and evaluate the effectiveness of the implemented environmental measures, which translates into better optimization of resources, cost reduction and increased competitiveness on the market (Balicka, 2015).

The aim of this article is to examine and show the importance of eco-controlling as a key element of assessing the effectiveness of environmental management in a company. The article focuses on the analysis of how eco-controlling supports organizations in achieving their environmental goals, considering various environmental management systems and methods of assessing environmental performances. It also explored how eco-controlling can increase the efficiency of enterprises through appropriate definitions, tools, and practices. In addition, the article discusses the issue of integrating eco-controlling with sustainability reporting processes, emphasizing its importance in the context of transparency and environmental responsibility of organizations. The aim is to show how eco-controlling can become a key tool in companies' pursuit of sustainability and improvement of their environmental performance.

This article presents a conceptual and review-based exploration of eco-controlling within environmental management, addressing a gap in existing literature. The methodological approach of this article is primarily conceptual, drawing upon an extensive review of existing literature, standards documentation, and best practices in the field of environmental management and eco-controlling. By doing so, this article aims to contribute original insights and practical guidance to scholars and practitioners alike, enhancing the understanding and application of eco-controlling in achieving environmental management goals.

2. Assessment of environmental activities in the company's environmental

ISO 14001, the international standard for Environmental Management Systems (EMS), plays a key role in global environmental management and sustainability adoption (MacDonald, 2005; Lee et al., 2017). The current version of the standard, ISO 14001:2015, is an amendment to the previous versions – ISO 14001:2004 and ISO 14001:1996. This international standard was first issued in September 1996 and quickly adopted by the European Committee for Standardization (CEN) (Pacana, 2017).

ISO 14001:2015 is now an international standard, the implementation of which can demonstrate effective environmental management (Donnelly et al., 2004; Singh, Brueckner, Padhy, 2015). This standard provides a framework through which organizations can effectively manage their environmental aspects, reduce their environmental impact, and continuously improve their environmental performance.

The International Organization for Standardization (ISO), in developing the updated ISO 14001:2015 standard, set a number of key goals that aimed to modernize and strengthen the role of environmental management in organizations. These objectives include raising the profile of environmental management in the strategic management of the organization and integrating environmental management into business processes. There is also an emphasis on a risk-based approach, internal and external communication as a way to build trust in organizations and systems, and consideration of the entire product life cycle in environmental management (Pacana, 2017).

A particularly important aspect of the amendment is the emphasis on the role of system assessment through the use of indicators as evidence of the implementation of effective environmental measures (Hadini et al. 2019; Pondeville, Swaen, De Rongé, 2013). In this context, eco-controlling is of particular importance as a tool that enables not only accurate monitoring and assessment of the environmental impact of an organization's activities, but also to demonstrate the effectiveness and efficiency of environmental activities. Eco-controlling, thanks to its methods and tools, allows organizations to effectively manage their environmental impacts, identify areas for improvement and demonstrate the progress achieved with reliable, measurable indicators. In this way, the ISO 14001:2015 standard in combination with eco-controlling can create an excellent improvement of efficiency and environmental management in the company, which is not only compliant with international standards, but also contributes to increasing environmental responsibility and sustainable development of the organization.

3. Eco-controlling – definitions, objectives, tools

Eco-controlling is an extension of the traditional controlling concept, focusing on the environmental aspects of the company's operations. It covers the entire management process – from defining environmental goals, through planning, operationalization, to monitoring and verification (Adamczyk, 2021). The main goal is to optimize the use of natural resources and minimize the negative impact on the environment. G. Borys (2001) defines ecological controlling as a systemic and continuous support of environmental management in a company, the content of which is:

1. clear formulation of the company's environmental goals and setting an environmental policy,
2. planning and control of the use of raw materials and energy as well as the environmental burden of waste, sewage, air emissions caused by enterprises,
3. motivating employees to achieve their environmental goals,
4. acquisition and processing of environmental information.

Famielec J. (2008) recognizes that environmental controlling can be considered in particular as an environmental management tool that is part of an overall management system comprising: organizational structure, planning, accountability, rules of conduct, procedures, processes and resources needed to develop, implement, implement, review and maintain environmental policy. Eco-controlling is also considered as a subsystem of the company's management, which systematically co-ordinates the planning, control and information supply of the company's environmental protection. It also supports the adjustment and coordination of the overall system, moderate, formulate, implement, impose, carry out, and control the environmental objectives (Hoitsch, Kals, 1993).

Although the implementation of eco-controlling is not mandatory, many companies decide to implement it, motivated by a number of important factors. The growing environmental awareness of the public and managers plays a significant role here, prompting organizations to take greater care of the environment. Additionally, the tightening of environmental legal requirements presents companies with new challenges that they must address in order to comply with regulations (Matukova et al., 2021). Advances in environmental engineering, offering new methods and tools for environmental management, are also contributing to the uptake of eco-controlling. Environmental controlling supports the implementation of sustainable development by linking environmental goals with business activities. As a result,

companies can not only minimize their negative impact on the environment, but also optimize their environmental performance, which translates into long-term benefits

The objectives of eco-controlling are multidimensional and aim to ensure that the company's operations comply with applicable environmental standards and its own environmental commitments. The first step in this process is to verify whether the company's goals and strategies are in line with environmental requirements. Then, it is checked whether the direction of the company's development is in line with its environmental policy. This includes the development of internal procedures for evaluating the effectiveness of activities in achieving environmental goals (Balicka, 2015).

Eco-controlling also assesses the impact of a company's operations on various aspects of the environment, such as air, soil and water, and seeks to minimize the risk of negative impacts on human health and safety. An important aspect is the identification and assessment of potential sites and areas of risk of failure and the determination of appropriate corrective actions to protect the environment (Matukova et al., 2021).

Before implementing eco-controlling, a company must first precisely define its environmental situation and determine the necessary measures to protect the environment. The key steps are to carry out a detailed environmental analysis (Schaltegger, Sturm, 1996), which considers all aspects of the company's environment, to define legal and normative requirements for environmental protection, to formulate an environmental policy tailored to the company's objectives, to develop an environmental policy and to plan, supervise, control and correct its activities.

Flexibility and the ability to adapt to a changing environment are key to effective environmental management. A clear definition of goals and ways to achieve them is a key element of eco-controlling, which requires coordinated planning, task coordination, process control and control of all the company's activities aimed at environmental protection (Nadolna, 2002).

Eco-controlling functions primarily as an informational system designed for gathering, assessing, and preparing ecological data in a manner that aids decision-making. This system serves effectively not only as a strategic radar for foreseeing future trends and deriving subsequent strategies but also for the operational management of an organization (Păunică, Mocanu, 2017). Hence, eco-controlling can significantly facilitate the fulfillment of the requirements set by the ISO 14001:2015 standard, particularly in the areas of monitoring and measuring environmental performance indicators. According to section 9.1 of the ISO standard organizations are required to monitor, measure, analyze, and evaluate the environmental impacts of their activities. They must define what needs to be monitored and measured, the methods for monitoring, measurement, analysis, and evaluation to ensure the

validity of the results, the criteria against which the environmental performance of the organization will be evaluated, and the relevant indicators. Additionally, it specifies when monitoring and measurements should be performed and when the results should be analyzed and evaluated. Furthermore, in the realm of environmental objectives and their achievement (section 6.2 of the ISO standard), eco-controlling can play a crucial role. The standard mandates that environmental objectives be established at relevant functions and levels within an organization, considering significant environmental aspects and compliance obligations, as well as considering risks and opportunities. These objectives must be coherent with the environmental policy, measurable (where feasible), monitored, communicated, and updated as appropriate. Here, eco-controlling's capability to monitor and evaluate environmental goals aligns perfectly with ISO 14001:2015, providing a mechanism for ensuring that environmental objectives are not only set but also effectively monitored and integrated into the company's overall environmental management system.

Incorporating eco-controlling into this process can greatly assist in defining these critical aspects by providing a structured approach to environmental management. It helps in identifying what specific aspects of the organization's activities need constant monitoring and measurement, and in determining the most effective methods for carrying out these tasks. Eco-controlling's emphasis on flexibility and adaptability is particularly useful in ensuring that the monitoring and measurement methods remain effective over time, even as the organization's environmental impacts and the external regulatory environment change. Furthermore, eco-controlling aids in setting clear criteria and indicators for evaluating environmental performance, which aligns with the standard's requirements for analysis and evaluation of monitoring and measurement results. This alignment not only helps organizations to comply with ISO 14001:2015 but also enhances their overall environmental management practices by making them more targeted, efficient, and adaptable to changes.

Eco-controlling uses a variety of tools that help in effective environmental management of the company, for example (Balicka, 2015)

- **Environmental indicator systems**: these tools rely on selecting, aggregating and presenting ecological facts in quantitative form. They are applied at the operational level and provide quantitative information. Their regular use enables continuous monitoring and assessment of the impact of the company's operations on the environment, which is crucial for decision-making and planning of environmental activities.

- **Environmental cost accounting**: this is a cost transparency tool that allows you to allocate causes and costs to individual projects or products. Also used at the operational level, it provides quantitative information on the costs associated with a company's environmental

performance. Regular use of this tool allows for better control of environmental costs and more efficient management of resources.

4. Eco-controlling and sustainability reporting

The modern world is facing many challenges that force us to think about sustainable development. These challenges, although complex and diverse, have a common denominator: they are a consequence of our activities and affect the quality of life of present and future generations.

The new Corporate Sustainability Reporting Directive (CSRD) aims to introduce new, uniform European Sustainability Reporting Standards (ESRS). The purpose of these standards is to standardize and increase the transparency of sustainability reports to make them easier to compare and evaluate (Próchniak, Płoska, 2022). In 2022, the European Financial Reporting Advisory Group (EFRAG) proposed an initial set of ESRS projects, including general requirements, general disclosures and specific standards focused on climate, pollution, water and marine resources, biodiversity and ecosystems, circular economy, workers, value chain, affected communities, customers and end-users, as well as business ethics (EFRAG, 2022).

Eco-controlling can play a key role in the reporting process in accordance with these standards, especially in terms of environmental standards. Eco-controlling tools and methods allow for effective monitoring, measurement and analysis of environmental data, which is necessary to create precise reports in accordance with the ESRS. For example, in the context of ESRS E1 on climate change, eco-controlling enables the identification, monitoring and assessment of the impact of a company's activities on greenhouse gas emissions, which is crucial for developing emission reduction strategies and reporting on their effectiveness. Similarly, with regard to ESRS E2 for pollution and ESRS E3 related to the use of water resources, eco-controlling helps to track and evaluate a company's activities to reduce pollution and manage water resources more efficiently (for instance: the disclosure required under E3-4 addresses a company's own operations and encompasses the total water consumption; this includes water consumption in areas at risk of water-related issues, particularly in regions experiencing significant water scarcity. It also covers the total volume of water that has been recycled and reused, as well as the total amount of water stored and any changes in water storage).

In practice, eco-controlling provides tools for collecting data, analyzing trends and creating detailed reports that show how a company manages its environmental impact and

what actions it takes to achieve sustainable development. As a result, companies can not only comply with CSRD and ESRS reporting requirements, but also effectively manage their environmental performance, which translates into improved sustainability and image.

5. Conclusions

This article focused on the analysis and explanation of the role of eco-controlling as an important tool in the environmental management of enterprises. A review of the literature shows that ecological controlling in sustainable environmental management can enable companies not only to meet legal requirements and standards, but also to promote innovation and long-term growth in harmony with the natural environment. The objectives of eco-controlling were also presented, including planning, accounting, controlling, analyzing, and auditing the environmental aspects of industrial enterprises' activities. These objectives encompass verifying the company's compliance with ecological requirements, assessing the impact of operations on the environment, minimizing the risk of negative impacts on human health and safety, and identifying and assessing potential risk points (Matukova et al., 2021).

The article highlights how eco-controlling supports companies in adapting to the new European Sustainability Reporting Standards (ESRS) under the Corporate Sustainability Reporting Directive (CSRD). It indicates how eco-controlling tools can be used for effective reporting on climate change, pollution, water resource use and other key environmental areas.

Modern organizations, understanding that environmental responsibility is the key to long-term success, are increasingly using eco-controlling as a tool to achieve environmental policy goals. Proper environmental management supported by eco-controlling can bring benefits not only to the environment, but also to the organization itself, improving its image, increasing customer confidence and opening up new business opportunities in a sustainable world (Păunică, Mocanu, 2017; Zeman, et al, 2018).

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