

doi: 10.52370/TISC2441AM

IMPLEMENTATION CHALLENGES OF ENVIRONMENTAL ACCOUNTING IN MANAGEMENT INFORMATION SYSTEM

Aleksandra Mitrović¹; Snežana Knežević²; Stefan Milojević³

Abstract

Environmental Accounting and Management Information Systems are gaining popularity among academics and practitioners. This research investigates the implementation of Environmental Accounting in the context of its performance in Management Information System. A survey analysis was carried out among directors and heads of accounting employees of hotel companies operating in Serbia, which served as a basis for the discussion about integrating „green“ information and providing guidelines for effective implementation. According to the findings, there is a statistically significant difference in respondents' attitudes toward the argument that environmental information should be released outside of the annual report of different groups according to the respondents' level of education.

Key Words: „green“ information, effective implementation, Environmental Accounting

JEL classification: M41, Q56

Introduction

Businesses operate in accordance with legal and industrial practices, requiring resources to produce products and/or provide services; they

¹ Aleksandra Mitrović, Ph.D., Associate Professor, University of Kragujevac, Faculty of Hotel Management and Tourism, Vojvodanska 5a, Vrnjačka Banja, Serbia, +381 36 515 0024; aleksandra.stankovic@kg.ac.rs

² Snežana Knežević, Ph.D., Full Professor, University of Belgrade, Faculty of Organizational Sciences, Jove Ilića 154, 11000 Belgrade, Serbia, +381 11 395 0875; snezana.knezevic@fon.bg.ac.rs

³ Stefan Milojević, Ph.D., Associate Professor, Educons University, Faculty of Business Economics, Vojvode Putnika 85-87, 21208 Sremska Kamenica, Serbia, +381 21 4893 610; stefan.milojevic@educons.edu.rs

operate in the environment from which they draw resources and which their activities can affect (Godschalk, 2008). According to Dyball & Thomson, (2013), „Accounting for Sustainability is inching its way of political discourses, accounting institutions, professional accounting practices, and research activities into the mainstream“. Since the 1990s, many distinct approaches to Environmental Accounting and management have evolved, frequently as discrete techniques with diverse conceptualizations (Liu et al., 2018). Environmental Accounting, at its heart, focuses on systems that govern the impact of enterprises in order to mitigate or minimize various harmful consequences. In the 1990s, scholars and the general public were concerned about the lack of environmental considerations in accounting programs. Although there have been many innovations, changes, and examples of the increasing inclusion of environmental issues in the accounting framework, the reality is that most accounting programs around the world have not changed much (Bebbington et al., 2021).

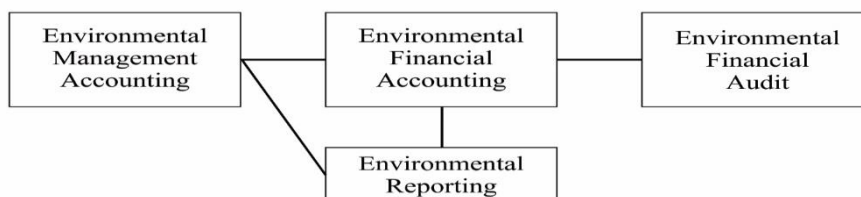
As stated by Mylonakis & Tahinakis (2006), „Accounting Information Systems (AIS) are a subsystem of Management Information System (MIS)“. AIS are expected to collect non-traditional and/or non-financial data (Gray & Bebbington, 2001). In addition to these initiatives, Alewine et al. (2016) conducted research on Environmental Accounting data from the perspective of how information systems can indirectly affect the environment. According to the literature, many AIS do not give enough environmental information for decision-making (Jasch & Savage, 2008).

Environmental accounting information is well known to include unknown, non-financial, and non-traditional qualities, and this information is increasingly influencing decision-making, particularly in regard to environmental preservation. To address these challenges, an effective environmental AIS must be developed so that entities can better capture, measure, and report environmental accounting information for various initiatives such as communications with interested users and assessments to help make environmentally conscious decisions (Marelli, 2015). The development trend of the aforementioned difficulties may be recognized through a conceptual accounting model that represents the environmental impact and talks about the necessity to establish a model for the integration of environmental impact in accounting (Stanescu et al., 2021).

Environmental Accounting and Management Information System

Corporate Environmental Accounting is one of the tools that businesses can utilize to address the aforementioned issues associated with various regulatory and industry standards. According to Godschalk (2008), there are four elements of Corporate Environmental Accounting, which are presented in Figure 1.

Figure 1: *The elements of Corporate Environmental Accounting*



Source: *Godschalk, S. (2008: 250).*

Environmental Management Accounting refers to the process of identifying, gathering, analysing, and utilizing two specific categories of information to aid in decision-making. The first category involves data pertaining to the consumption and movement of energy, water, materials (inclusive of waste), while the second category encompasses financial information related to costs, profits, and savings linked to environmentally sustainable practices. Environmental Financial Accounting seeks to guarantee that environmental revenues and costs, as well as assets and liabilities, are clearly portrayed in a company's financial statements in line with applicable legislation and international accounting standards. Environmental Reporting refers to reporting on environmental issues in addition to the required financial disclosures. Environmental Financial Audits focus specifically on evaluating and addressing the environmental elements within financial statements (Godschalk, 2008).

Table 1: *Accounting types and Environmental Accounting*

Accounting types	Accounting for the environment at the organizational level
Financial Accounting	<i>Environmental issues in Financial Accounting:</i> The inclusion of environmental information in financial statements involves incorporating details concerning earnings, expenses associated with environmental factors, investments in environmental initiatives, costs attributed to

	environmental protection responsibilities, and other significant expenses directly linked to an organization's environmental performance.
Management Accounting	<i>Environmental issues in Management Accounting:</i> The utilization of MIS for environmental and economic performance management involves a concentrated emphasis on gathering and analysing data related to energy, water, material usage, waste management, and financial information concerning associated costs, profits, and savings.

Source: *Adapted by Jasch & Savage (2008: 326).*

The traditional divide of accounting into financial and managerial accounting, in the first place, necessitates an examination of environmental accounting challenges within the organization (Table 1).

Environmental information is increasingly being included in financial statements. Some nations require such information in financial statements, whereas others include it voluntarily (Jasch & Savage, 2008). According to Thomson et al. (2021), „the transparency of environment-related disclosure is considered essential for the sound provision of financial information“ (p. 101). There are no external reporting requirements specific to Management Accounting or Environmental Management Accounting, though some organizations use environmental management accounting information for statutory environmental reporting, national reporting, or voluntary corporate environmental and sustainability reporting (Jasch & Savage, 2008: 326).

Sample and methods

An electronic questionnaire was used to collect data for research purposes. The survey was conducted in December 2023 and January 2024. A total of 63 directors and/or heads of accounting from hotel enterprises operating on Serbian territory were polled. Wilmshurst & Frost's (2001) research reviewed the function of accounting and accountants in the Environmental Management System, based on the responses of CEOs and CFOs on the list of the 500 greatest Australian companies, and their analysis was used to define the questionnaire. In addition to generic questions about the respondents, questions concerning their perspectives on Environmental Accounting and implementation in the MIS were posed. Cronbach's Alpha is 0.851, indicating that the scale has extremely strong reliability and internal consistency for this sample.

Analysis of research results

Table 2 shows that the majority of the respondents among directors and/or heads of accounting are female (61.9%) and between the ages of 31 and 40 (38.1%). The ratio (38.1% for male and 61.9% for female) in groups of gender can still give reliable results (Pallant, 2007; Tabachnick & Fidell, 2007). The majority of them have completed undergraduate studies in Faculty - bachelor degree (28.6%) in the fields of economics, management, and business (73%). When it comes to work experience, the majority of the respondents (60.3%) have at least ten years of experience.

Table 2: *Demographic data on respondents*

	N	%
The gender:		
Male	24	38.1
Female	39	61.9
The age:		
18-30	10	15.9
31-40	24	38.1
41-50	12	19.0
51-60	14	22.2
above 61	3	4.8
Level of education:		
High School	4	6.3
College	13	20.6
Faculty - bachelor degree	18	28.6
Faculty - master degree	14	22.2
Faculty - magister degree	6	9.5
Doctoral studies	8	12.7
Education in the field:		
Economics, management and business	46	73.0
Other areas	17	27.0
Years of work experience:		
Less than 5 years	12	19.0
5-10 years	13	20.6
Over 10 years	38	60.3

Source: *The authors*

A descriptive examination of the respondents' attitudes is shown in Table 3. For the questions presented in Table 3, a Likert scale was used with possible answers from 1-5 (category). The respondents showed the

highest level of sending with the argument that environmental data should be published in quantitative form wherever possible (Mean=3.65; Std. Deviation=1.19; Median =4.00). They, on the other hand, agreed the least with the statement that environmental issues are beyond the purview of accountants (Mean=2.73; Std. Deviation=1.53; Median =3.00).

Table 3: *Descriptive analysis of the respondents' attitudes*

	Mean	Std. Deviation	Median
Environmental issues are beyond the domain of accountants;	2.73	1.53	3.00
The accountant should contribute to the company's environmental management;	3.38	1.41	3.00
An accountant has a professional responsibility to represent environmental issues in the financial elements of firm administration;	3.25	1.28	3.00
Environmental issues' (both good and negative) impact on organizations should be quantified and reflected in financial accounts;	3.46	1.34	4.00
Users of annual reports value the disclosure of environmental information;	3.57	1.29	4.00
Annual reports should include required disclosure of environmental data;	3.53	1.38	4.00
Wherever possible, environmental data should be disclosed in quantitative form;	3.65	1.19	4.00
Environmental data should be disclosed in annual reports in quantitative form wherever possible;	3.57	1.23	4.00
Environmental information should be prepared for public distribution by reporting companies;	3.55	1.37	4.00
Regular annual financial reports should include an assessment of environmental effect (both positive and negative);	3.34	1.57	4.00
Environmental information should be disclosed outside of the annual report;	3.22	1.44	3.00

Source: *The authors*

Note: *Cronbach's Alpha=0.915*

The Mann-Whitney U test indicated that gender and field of education have no significant influence on the respondents' attitudes about the aforementioned claims, as shown by the descriptive statistics in Table 3 ($p > 0.05$) (Table 4).

Table 4: *Mann-Whitney U test results*

	<i>Gender</i>			<i>Field of education</i>		
	Mann-Whitney U	Z	p	Mann-Whitney U	Z	p
Environmental issues are beyond the domain of accountants;	417.5	-0.734	0.463	335.5	-0.883	0.377
The accountant should contribute to the company's environmental management;	442	-0.378	0.705	310.5	-1.281	0.2
An accountant has a professional responsibility to represent environmental issues in the financial elements of firm administration;	437	-0.45	0.653	344	-0.746	0.456
Environmental issues' (both good and negative) impact on organizations should be quantified and reflected in financial accounts;	416	-0.756	0.449	348	-0.684	0.494
Users of annual reports value the disclosure of environmental information;	421	-0.689	0.491	390.5	-0.008	0.994
Annual reports should include required disclosure of environmental data;	464	-0.059	0.953	361.5	-0.472	0.637
Wherever possible, environmental data should be disclosed in quantitative form;	416	-0.762	0.446	347	-0.705	0.481
Environmental data should be disclosed in annual reports in quantitative form wherever possible;	421.5	-0.68	0.496	346	-0.72	0.471
Environmental information should be prepared for public distribution by reporting companies;	425	-0.63	0.529	339	-0.833	0.405
Regular annual financial reports should include an assessment of environmental effects (both positive and negative);	460	-0.117	0.907	391	0	1
Environmental information should be disclosed outside of the annual report.	398.5	-1.012	0.311	388	-0.048	0.962

Source: *The authors*

Using the Kruskal Wallis test, it was determined that the respondents' age, level of education, and years of experience have no statistically significant influence on their attitudes toward the aforementioned statements, the descriptive statistics for which are shown in Table 3 ($p > 0.05$) (Table 5).

Only the Kruskal Wallis test revealed a statistically significant difference in the respondents' attitudes regarding the claim that information about the environment should be disclosed outside the annual report of different groups according to the respondents' level of education (Gp1 - High school, $n=4$; Gp2 - College - $n=13$; Gp3 - Faculty - bachelor degree, $n=18$; Gp4 - Faculty - master degree, $n=14$; Gp5 – Faculty - magister degree, $n=6$; Gp6 - Doctoral academic studies, $n=8$) $n=63$, Chi -Square = 12.645, $df=5$, $p=0.027$ (Table 5).

Table 5: Results of the Kruskal Wallis test

	Age			Level of education			Years of work experience		
	Chi-Square	df	p	Chi-Square	df	p	Chi-Square	df	p
Environmental issues are beyond the domain of accountants;	1.071	4	0.899	3.35	5	0.646	1.882	2	0.39
The accountant should contribute to the company's environmental management;	2.779	4	0.595	4.346	5	0.501	0.415	2	0.813
An accountant has a professional responsibility to represent environmental issues in the financial elements of firm administration;	6.758	4	0.149	5.352	5	0.374	0.896	2	0.639
Environmental issues' (both good and negative) impact on organizations should be quantified and reflected in financial accounts;	6.253	4	0.181	2.609	5	0.76	0.623	2	0.732

Users of annual reports value the disclosure of environmental information;	2.409	4	0.661	2.059	5	0.841	1.263	2	0.532
Annual reports should include required disclosure of environmental data;	6.076	4	0.194	3.847	5	0.572	2.806	2	0.246
Wherever possible, environmental data should be disclosed in quantitative form;	3.536	4	0.472	5.453	5	0.363	3.028	2	0.22
Environmental data should be disclosed in annual reports in quantitative form wherever possible;	2.633	4	0.621	3.955	5	0.556	0.933	2	0.627
Environmental information should be prepared for public distribution by reporting companies;	4.551	4	0.337	1.993	5	0.85	0.58	2	0.748
Regular annual financial reports should include an assessment of environmental effects (both positive and negative);	5.322	4	0.256	3.589	5	0.61	0.746	2	0.689
Environmental information should be disclosed outside of the annual report;	1.014	4	0.908	12.645	5	0.027	0.641	2	0.726

Source: *The authors*

By reviewing the mean (average) values of the ranks of the groups, it was observed that the agreement with the statement that information about the environment should be disclosed outside the annual report is at the highest level in Gr1 – the respondents who completed high school (Mean Rank=44.75), and the least in Gr6 – the respondents who completed doctoral academic studies (Mean Rank=15.63) (Table 6). The respondents who completed high school in Gr1 have a higher median result

(Median=5.00) than the respondents who completed other higher levels of education (Table 7).

Table 6: *Kruskal Wallis test results with calculated mean rank*

	Level of education	N	Mean Rank
Environmental information should be disclosed outside of the annual report	High School	4	44.75
	College	13	32.77
	Faculty - bachelor degree	18	39.00
	Faculty - master degree	14	31.11
	Faculty - magister degree	6	24.75
	Doctoral studies	8	15.63
	Total	63	

Source: *The authors*

Table 7: *Environmental information should be disclosed outside of the annual report and level of education*

Level of education	Mean	N	Std. Deviation	Median
High School	4.2500	4	1.50000	5.0000
College	3.3077	13	1.25064	3.0000
Faculty - bachelor degree	3.7778	18	1.39560	4.0000
Faculty - master degree	3.1429	14	1.56191	3.0000
Faculty- magister degree	2.6667	6	0.81650	3.0000
Doctoral studies	1.8750	8	1.12599	1.5000
Total	3.2222	63	1.44182	3.0000

Source: *The authors*

Eta Squared coefficient η^2 is determined below (Table 8).

Table 8: *Eta Squared coefficient η^2 – size of impact*

	Eta	Eta Squared
<i>Environmental information should be disclosed outside of the annual report *</i> Level of education	0.452	0.204

Source: *The authors*

20.4% of the total variance of the respondent's agreement with the statement - Environmental information should be disclosed outside of the annual report is determined by the respondent's level of education (Table 8).

Discussion about integrating „green“ information and providing guidelines for effective implementation

Environmental Accounting challenges can be recognized in two ways: first, through increased awareness in the accounting education system, and second, by a more aggressive response from accounting authorities. Such an approach would aid in defining the role of accountants in environmental management during internal decision-making and in meeting external responsibility duties. Furthermore, this would assist in overcoming management and accountants' apparent reluctance to engage in environmental management (Wilmschurst & Frost, 2001).

There is ongoing debate concerning the existence of numerous issues in integrating „green“ information and providing suggestions for efficient implementation. Thus, the academic community could make a substantial contribution by resolving the question of how it is possible to achieve excellence in two dimensions while monitoring environmental and financial performance (Knežević et al., 2024).

This study discovered a statistically significant difference in the respondents' attitudes towards the notion that environmental information should be provided outside of the annual report of different groups based on the respondents' level of education. Specifically, the respondents who have completed high school show the highest level of agreement with the aforementioned statement, while the respondents who have completed doctoral academic studies express the lowest level of agreement. This statement indicates that a higher degree of education supports the claims that information regarding the environment and related issues should be published in the annual report, and that as much of it as feasible should be expressed quantitatively. This necessitates fresh answers and investments in multiple dimensions, all of which will have a good impact.

Acknowledgements

This research is supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia by the Decision on the scientific research funding for teaching staff at the accredited higher education institutions in 2024 (No. 451-03-65/2024-03/200375 of February 5, 2024).

References

1. Alewine, H. C., Allport, C. D., & Shen, W. C. M. (2016). How measurement framing and accounting information system evaluation mode influence environmental performance judgments. *International Journal of Accounting Information Systems*, 23, 28-44.
2. Bebbington, J., Larrinaga, C., O'Dwyer, B., & Thomson, I. (Eds.). (2021). *Routledge handbook of environmental accounting*. Routledge.
3. Dyball, M. C., & Thomson, I. (2013). Sustainability and accounting education. *Accounting Education*, 22(4), 303-307.
4. Godschalk, S. (2008). Does Corporate Environmental Accounting Make Business, in in Environmental Management Accounting for Cleaner Production, *Eco-Efficiency In Industry And Science 24*, (pp. 249-271) Editors: Stefan Schaltegger, Martin Bennett, Roger L. Burritt, Christine Jasch, Springer Science + Business Media B.V.
5. Gray, R., & Bebbington, J., (2001). *Accounting for the Environment*. 2nd ed. SAGE Publications, London.
6. Jasch, C., & Savage, D.E. (2008). The IFAC International Guidance Document on Environmental Management Accounting, in Environmental Management Accounting for Cleaner Production, *Eco-Efficiency In Industry And Science 24* (pp. 321-336), Editors: Stefan Schaltegger, Martin Bennett, Roger L. Burritt, Christine Jasch, Springer Science + Business Media B.V.
7. Knežević, S., Milojević, S., Mitrović, A., & Beke Trivunac, J. (2024). Cost accounting as a support for the environmental management system. *Ecologica*, 31(113), 58-66.
8. Liu, G., Yin, X., Pengue, W., Benetto, E., Huisingh, D., Schnitzer, H., Wang, Y., & Casazza, M. (2018). Environmental accounting: In between raw data and information use for management practices. *Journal of Cleaner Production*, 197, 1056-1068.
9. Marelli, A. (2015). The evolving role of environmental management accounting in internal decision-making: a research note. *International*

Journal of Accounting, Auditing and Performance Evaluation, 11(1), 14-47.

10. Mylonakis, J., & Tahinakis, P. (2006). The use of accounting information systems in the evaluation of environmental costs: a cost–benefit analysis model proposal. *International journal of energy research*, 30(11), 915-928.

11. Pallant, J. (2007). *SPSS Survival Manual: A step by step Guide to Data Analysis Using SPSS for Windows*; Open University Press, Berkshire, UK.

12. Stanescu, S. G., Cucui, I., Ionescu, C. A., Paschia, L., Coman, M. D., Nicolau, N. L. G., Uzlaui, M. C., & Lixandru, M. L. (2021). Conceptual model for integrating environmental impact in managerial accounting information systems. *International Journal of Environmental Research and Public Health*, 18(4), 1791.

13. Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental Design Using ANOVA*, Duxbury, Belmont, CA.

14. Thomson, I., de Aguiar, T. R. S., & Bebbington, J. (2021). Financial accounting and the natural environment. In *Routledge Handbook of Environmental Accounting* (pp. 95-107). Routledge.

15. Wilmshurst, T. D., & Frost, G. R. (2001). The role of accounting and the accountant in the environmental management system. *Business strategy and the environment*, 10(3), 135-147.