

INTEGRATING SUSTAINABILITY ACCOUNTING AND ARTIFICIAL INTELLIGENCE: A BASIS FOR ENHANCED ENVIRONMENTAL, SOCIAL, AND GOVERNANCE PERFORMANCE

Chief assistant prof. Nikolay Katsarski PhD

Sofia University St. Kliment Ohridski, **Bulgaria**

ABSTRACT

As global entities encounter increasing demands to reconcile economic goals with environmental and social responsibilities, the integration of sustainability accounting and artificial intelligence (AI) provides a scientific framework for enhancing ESG performance. This paper explores the role of AI-enhanced sustainability accounting as a crucial instrument for measuring, analyzing, and improving the effects of organizations on ecological and social systems. By leveraging AI's computational strengths - such as predictive modeling, real-time data analysis, and automated tracking of metrics - sustainability accounting transitions from a static reporting mechanism to a dynamic, decision-oriented field. Notable applications include simulations of carbon footprints based on various scenarios, optimization of resources within a circular economy, and automated adherence to international standards.

The research highlights AI's potential to improve transparency and accountability through standardized reporting, while also reducing risks by providing predictive insights into vulnerabilities within supply chains and shifts in regulations. Additionally, machine learning facilitates ethical impact assessments, addressing biases in labor practices and promoting fair AI implementation. Nonetheless, challenges such as data fragmentation, the need for algorithmic transparency, and the requirement for interdisciplinary expertise remain, calling for effective solutions to ensure scalability.

Empirical findings suggest that organizations that implement AI-enhanced sustainability accounting experience significant gains in operational efficiency, stakeholder trust, and resilience against climate-related challenges. This study advocates for a comprehensive governance framework that emphasizes ethical AI, interoperable data systems, and collaboration among stakeholders. By framing sustainability accounting as a science-based approach bolstered by AI, this research contributes to the ongoing dialogue on achieving the United Nations Sustainable Development Goals (SDGs) while encouraging innovation in the context of the Fourth Industrial Revolution

Keywords: Sustainability Accounting; Artificial Intelligence; ESG Performance; Predictive Analytics; Circular Economy; Ethical AI.

INTRODUCTION

The convergence of sustainability accounting and artificial intelligence presents a transformative opportunity to revolutionize environmental, social, and governance performance assessment and management [1]. Integrating AI into ESG frameworks offers advanced capabilities for data processing, predictive analysis, and decision-