BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg

DIGITAL CORPORATE SOCIAL RESPONSIBILITY IN COAL MINING: A CONCEPTUAL FRAMEWORK FOR SUSTAINABLE DIGITAL TRANSFORMATION AND STAKEHOLDER VALUE CREATION

Mirabbos Mira'loyevich Muratayev
Independent Researcher (PhD), Higher School of Business and Entrepreneurship under the Cabinet of Ministers of the Republic of Uzbekistan Tashkent, Uzbekistan
Doi: https://doi.org/10.5281/zenodo.21963428

Abstract: The coal mining industry remains one of the most strategically important sectors for energy security and industrial development. At the same time, it is associated with significant occupational, environmental, and social risks that require mining companies to adopt more responsible and transparent management approaches. Traditional Corporate Social Responsibility has contributed to improving stakeholder engagement, environmental protection, and community development; however, the rapid advancement of Industry 4.0 technologies has fundamentally changed the mechanisms through which corporate responsibility can be implemented. Digital transformation enables mining enterprises to shift from reactive social responsibility practices toward proactive, data-driven, and predictive management systems.

This paper proposes a new conceptual framework entitled Digital Corporate Social Responsibility in Coal Mining. Unlike conventional CSR models, the proposed framework integrates artificial intelligence, the Internet of Things (IoT), big data analytics, geographic information systems, digital twins, and cloud-based monitoring platforms into the governance of occupational safety, environmental protection, stakeholder communication, and corporate transparency. The study argues that digital technologies should not merely support CSR activities but become an institutional component of responsible corporate governance.

The proposed framework introduces the concept of Digital Trust Capital, defined as a strategic intangible asset created through transparent digital information management, cybersecurity, ethical data governance, and real-time stakeholder interaction. The paper further suggests that Digital Trust Capital strengthens organizational resilience, enhances environmental and social performance, improves stakeholder confidence, and contributes to sustainable competitiveness in the mining industry.

The article contributes to CSR theory by reconceptualizing corporate responsibility in coal mining from a static compliance-oriented approach to a dynamic digital governance system. The proposed framework may serve as a theoretical foundation for future empirical studies and practical implementation of digital responsibility strategies in mining enterprises.

Keywords: Corporate Social Responsibility; Digital Corporate Social Responsibility; Coal Mining; Digital Transformation; Industry 4.0; Sustainable Mining; ESG; Stakeholder Theory; Digital Trust Capital.

1. Introduction

Coal continues to play a significant role in the global energy system despite the accelerated transition toward renewable energy sources. According to international energy projections, coal remains indispensable for electricity generation, metallurgy, and several heavy industries, particularly in developing economies where energy demand continues to increase. Consequently,

improving the sustainability and social responsibility of coal mining has become a global research priority rather than solely an industrial challenge.

Coal mining is characterized by high operational complexity and multidimensional risks. Underground gas explosions, roof collapses, dust emissions, groundwater contamination, land degradation, and occupational health hazards continue to affect the industry's sustainability performance. In addition, mining enterprises increasingly face public expectations regarding environmental stewardship, transparent governance, community engagement, and responsible resource utilization. These expectations have transformed Corporate Social Responsibility from a voluntary business initiative into a strategic management function directly influencing corporate reputation, investment attractiveness, and long-term competitiveness.

The traditional understanding of CSR has evolved considerably during the past four decades. Early studies primarily viewed CSR as a voluntary commitment to philanthropic activities and compliance with legal obligations. Subsequently, stakeholder theory expanded this perspective by emphasizing the responsibility of corporations toward employees, customers, investors, governments, suppliers, local communities, and future generations. More recently, sustainability-oriented approaches have integrated environmental, social, and governance principles into corporate decision-making, making CSR an essential component of sustainable development strategies.

However, the digital transformation of industrial production has generated new challenges that conventional CSR frameworks were not designed to address. Modern mining enterprises increasingly rely on artificial intelligence, machine learning, industrial Internet of Things (IoT), unmanned aerial vehicles, autonomous equipment, digital twins, cloud computing, and predictive analytics. These technologies continuously collect, process, and interpret large volumes of operational data, enabling companies to monitor occupational safety, environmental impacts, and production efficiency in real time.

Despite these technological advancements, existing CSR models remain largely focused on social investments, environmental reporting, philanthropic programs, and stakeholder dialogue. Digital technologies are generally treated as supporting instruments rather than as structural components of corporate responsibility itself. Consequently, the theoretical relationship between digital transformation and CSR remains fragmented, particularly within the coal mining sector.

This research argues that digital transformation fundamentally changes the nature of corporate responsibility. In the context of coal mining, responsibility can no longer be evaluated solely by the amount of social investment or environmental expenditure. Instead, responsible corporate behavior increasingly depends on an organization's ability to prevent accidents through predictive analytics, continuously monitor environmental indicators using intelligent sensors, ensure transparent data disclosure, protect digital information assets, and establish real-time communication with stakeholders.

Based on this perspective, the paper introduces the concept of Digital Corporate Social Responsibility in Coal Mining. The proposed concept extends classical CSR by integrating digital governance into every stage of mining operations from geological exploration and underground extraction to environmental rehabilitation and stakeholder engagement. Rather than considering digital technologies as auxiliary management tools, the study positions them as institutional mechanisms for generating sustainable social value.

Another theoretical contribution of this research is the introduction of Digital Trust Capital. Existing CSR literature extensively discusses corporate reputation, stakeholder trust, and social legitimacy; however, limited attention has been devoted to the strategic value of digitally generated

trust. This study defines Digital Trust Capital as the cumulative confidence established through transparent digital governance, reliable information systems, cybersecurity, ethical artificial intelligence, and continuous stakeholder interaction. The paper argues that Digital Trust Capital constitutes a new category of intangible organizational assets capable of improving sustainability performance, strengthening investor confidence, and enhancing corporate resilience.

Therefore, the primary objective of this study is to develop a comprehensive conceptual framework that explains how digital transformation reshapes Corporate Social Responsibility in coal mining enterprises. Specifically, the study aims to:

- examine the theoretical evolution from conventional CSR toward Digital Corporate Social Responsibility;
- identify the principal digital technologies influencing responsible mining governance;
- develop an integrated conceptual model for Digital Corporate Social Responsibility in coal mining;
- introduce Digital Trust Capital as a strategic component of sustainable mining management; and
- provide a theoretical foundation for future empirical research on digital responsibility within the extractive industries.

The findings of this study are expected to contribute to the emerging literature on digital sustainability, responsible mining, and corporate governance while offering practical guidance for policymakers and mining companies pursuing digital transformation strategies aligned with sustainable development objectives.

References:

1. Carroll, A. B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. Business Horizons, 34(4), 39–48. https://doi.org/10.1016/0007-6813(91)90005-G
2. International Energy Agency. (2024). Coal 2024: Analysis and Forecast to 2027. IEA.
3. International Labour Organization. (2022). Safety and Health in Mines Convention and Recommendations. ILO.
4. OECD. (2023). OECD Guidelines for Multinational Enterprises on Responsible Business Conduct. OECD Publishing.
5. Porter, M. E., & Kramer, M. R. (2006). Strategy and society: The link between competitive advantage and corporate social responsibility. Harvard Business Review, 84(12), 78–92.
6. United Nations Global Compact. (2023). The Ten Principles of the UN Global Compact. United Nations.
7. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 28(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003