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Article

The Importance of Esg Principles and Digital Technologies in Developing a Corporate Social Governance System in the Context of Sustainable Development

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Abstract: This article examines the integration of ESG principles Environmental, Social, and Governance and digital technologies in the development of a corporate social governance (CSM) system. The purpose of the study is to determine the impact of ESG integration on the efficiency of enterprises in the context of digital transformation and to develop practical mechanisms for its implementation. Methodology as systematic analysis , correlation -regression model and expertise assessment from methods used . Research as a result digital technologies (blockchain , artificial Integrated system for monitoring ESG indicators through intelligence , IoT offer In 30 enterprises of Uzbekistan held empirical research ESG- digitization current reached in enterprises financial efficiency increased by 18–24% showed . Production released KIB- Digital Synthesis (KRS) model in our country enterprises for practical manual task It passed.

Keywords: ESG principles, corporate social management, digital transformation, blockchain, artificial intelligence, IoT, sustainable development, KRS model

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1. Introduction

21st century business in the environment corporate social management (KIB) system of enterprises far term competitiveness provision , investment attractiveness increase and interested sides with stable relationships of formation important to the factor around Traditional financial indicators with one in line of the enterprise ecological , social and management his / her activity market value and strategic to stability noticeable impact In this regard , ESG (Environmental, Social, Governance) principles , digital technologies and corporate management each other awakening modern management priority from directions one is considered [1].

Bloomberg LP Bloomberg Intelligence data According to the world in 2023 ESG assets by volume 40.5 trillion USA dollar organization reached by 2025 this indicator 50 trillion from dollars increase forecast is being done. This trend of ESG approach in global financial to the system deep integrating going and investors for important decision acceptance to do to the criterion spinning shows [2].

Digital technologies , including artificial intelligence , big data, blockchain, cloud platforms and IoT solutions corporate social management system new to the stage take is coming out . This technologies to track ESG indicators in real time monitoring , reporting in the mode automation , data transparency increase and risks management efficiency reinforcement opportunity gives [3].

Uzbekistan In the Republic corporate management and digital transformation acceleration according to consistent reforms done In particular , Uzbekistan Republic Presidential Decree No. PF-6079 of October 5, 2020 with approved " Digital "Uzbekistan - 2030" strategy economy in networks digital technologies wide current to grow and management systems modernization to do in mind [4]. Thus together , ESG principles corporate to management integration to do issue national economy for increasingly current importance profession is doing .

There is scientific research on ESG factors enterprise to the efficiency positive impact to show based on gave Although [5], ESG principles and digital of technologies corporate social management to the system complex the impact , especially Uzbekistan under the circumstances student scientific affairs enough at the level not [6]. This situation this of the research relevance defines .

The concept of ESG (Environmental, Social, Governance). first launched in 2004 by the United Nations Global Compact prepared *Who Cares Wins* in the report scientific into circulation [7] This approach enterprises activity ecological , social and management criteria based on evaluation in mind holds .

Friede, Busch , and Bassen over 2000 empirical meta- analysis of studies so , ESG indicators with financial efficiency in the middle positive dependency the existence [8]. Research by Robert G. Eccles, Ioannou , and Serafeim and stability standards high was companies far within the period stock ownership value noticeable at the level increase [9] Eugene F. Fama and Kenneth R. French ESG factors capital value reduction and investors risk to reduce service to do based on given [10].

Digital technologies corporate social management system transparency and efficiency in increasing important role Blockchain Revolution authors blockchain technology corporate transparency provider innovative tool as. Howson also evaluated ESG information reliable verification in doing blockchain opportunities shown.

Wire and others artificial intellect and ESG indicators of Industry 4.0 technologies forecast and monitoring efficiency increase Manita and others digital transformation level high was in enterprises corporate management quality and ESG information reveal to grow level noticeable accordingly improvement [11].

Uzbekistan and In Central Asia Kholmatov and ESG standards in the studies of Tursunova, Rajabov and digital technologies current of reaching institutional problems analysis [12]. However this ESG principles in research and digital transformation corporate social to management integrated model enough at the level working not released . This research exactly this scientific the space to fill focused .

2. Materials and Methods

This ESG principles in research and digital of technologies corporate social management to the system the impact assessment for comparative analysis , monographic observation , expert assessment and econometric from methods In particular , local and foreign scientific literature , international standards and regulatory and legal documents systematic accordingly Research ESG indicators within the framework , digital transformation level and enterprise efficiency between dependency correlation -regression analysis based on was evaluated . Also, experts opinion KRS (KIB – Digital Synthesis (model) structural elements and their each other impact level was found . Research of the results practical importance check for the purpose offer model Uzbekistan enterprises in the example of from approval passed and received results comparative analysis based on generalized.

3. Results

Digital transformation in the context of ESG principles corporate social management to the system the impact assessment modern enterprise management important from directions one ESG criteria of the enterprise ecological , social and management activity descriptive , numerical technologies this processes in real time monitoring , analysis in the mode to do and management opportunity gives . Therefore ESG principles and digital of technologies each other integration corporate management efficiency increase important factor as is considered [13].

KRS (KIB– Digital Synthesis) model ESG principles , digital technologies and corporate social management efficiency between cause and effect connection to explain service The model does logical based on According to ESG principles of the enterprise stable development direction defines , numerical technologies and this principles to practice current of reaching technological intermediary as manifestation will be . As a result corporate social management efficiency increase , financial and non-financial results will improve [14].

Table 1. KRS (KIB– Digital Synthesis (model) conceptual structure

LEVEL I ESG PRINCIPLES	LEVEL II DIGITAL MEDIATOR	LEVEL III KIB EFFICIENCY
E: Eco-friendly responsibility	Blockchain platforms	Financial profitability
S: Social justice	Artificial intelligence / ML	Transparency level
G: Management quality	IoT sensor networks	Investment attractiveness
	Great information analysis	Social capital

The table shows that ESG principles are the main factor shaping the strategic goals of the enterprise, while digital technologies allow them to be implemented and monitored. As a result of this integration, the financial profitability, management transparency, investment attractiveness and social reputation of the enterprise are significantly improved. Thus, the KRS model systematically analyzes the impact of ESG and digital transformation on the effectiveness of corporate social management. accordingly explaining gives [15].

Digital technologies ESG principles to practice current of reaching main instruments They are ecological real - time indicators monitoring in the mode , social processes analysis to do and corporate management transparency increase opportunity gives . Each to the ESG components of technology impact level various to be , their functional opportunities and application field with is determined .

Table 2. Digital technologies and ESG criteria between each other impact matrix

Digital technology	E-criteria	S-criteria	G-criteria	Overall impact
Blockchain	Carbon credits emission	Labor rights chain	Financial transparency	**High (+++)**
Artificial Intelligence (AI)	Environmental risk forecast	HR analysis, personnel policy	Decision-making system	**High (+++)**
IoT sensors	Real-time monitoring	Worker safety control	Asset management	**Medium (++)**
Big Data	ESG reporting is automatic.	Employee satisfaction analysis.	Risk management	**Medium (++)**

Cloud computing	Digital carbon footprint	Remote work opportunity	Data security	**Low (+)**

The table data shows that blockchain and artificial intelligence are the technologies with the highest performance in supporting ESG principles. IoT sensors and Big Data analytics operational monitoring and risks in management important role plays . Cloudy technologies and information storage and remote management opportunities expands . In general when receiving , digital technologies ESG indicators clear measurement , transparency increase and corporate social management efficiency strengthening important factor is considered .

The KRS model empirical based on check for the purpose to research attraction 30 enterprises made ESG index by , digital transformation level and financial efficiency indicators between dependency correlational analysis using was evaluated . Pearson correlation ESG and digital technologies enterprise to the efficiency where at the level impact to show determination opportunity gave .

Table 3. ESG and digitization indicators according to correlational analysis results

Indicator pair	r (correlation)	p-value	Conclusion
ESG index → ROE	**0.724****	< 0.001	Strong positive
ESG index → ROA	**0.681****	< 0.001	Strong positive
Level of digitization → ESG	**0.793****	< 0.001	Very strong positive
Blockchain implementation → G-criteria	**0.658****	0.003	Strong positive
IoT implementation → E-criteria	**0.612****	0.004	Average positive
Implementation of AI → S-criteria	**0.589****	0.006	Average positive

Note : ** at the p < 0.01 level statistic significant

Source : Author calculations .

Table results ESG indicators with financial efficiency in the middle strong positive dependency the existence shows . Especially digital transformation level with ESG index coefficient of 0.793 between digital technologies ESG principles effective current in the process of important role to play This confirms the KRS model . theoretical the basics initial statistic at the level supports .

Correlational analysis the results deeper check for the purpose many A factorial regression model was constructed . This model is based on the ESG index , a numerical transformation level and their each other synergistic of the impact corporate social management to the effectiveness the impact assessment opportunity gave .

$$KIB_{samara} = \alpha_0 + \beta_1 ESG + \beta_2 Raqam + \beta_3 (ESG \times Raqam) + \varepsilon$$

Model's statistic indicators as follows determined : $R^2 = 0{,}841$, $F = 47{,}3$, $p < 0{,}001$, $DW = 1{,}97$.

Table 4. Many factorial regression analysis results

Variable	β-coefficient	Std. Error	t-value	p-value
Constant (α0)	1.24	0.31	4.00	0.001
ESG Index (β1)	**0.412****	0.087	4.74	< 0.001
Digitization (β2)	**0.358****	0.091	3.93	< 0.001
Synergistic impact (ESG×Number , β 3)	**0.187***	0.074	2.53	0.018

Note : * p < 0.05; ** p < 0.01.

Source : Author calculations .

Regression analysis results this shows that the ESG index and digital transformation level corporate social management to the effectiveness noticeable positive impact shows . The most important result as synergistic impact The coefficient ( ) $\beta_3 = 0{,}187$is statistically significant , confirming that the efficiency of the KIB increases further when ESG and digital technologies are used together . The high explanatory power of the model ( ) $R^2 = 0{,}841$indicates that the KRS model is empirically reliable .

Companies should adopt ESG principles current to grow and digital transformation to the level see segmentation to do K-means clustering for the purpose analysis done This method enterprises similar to the characteristics looking at to groups separation and every one cluster financial and management the results compare opportunity gave .

Table 5. Enterprises' KIB and digitization to the level see clusters

Cluster	Description	Number of enterprises	Average ESG score	Average ROE, %
I	Leader	5	**8.4**	**23.7**
II	Progressive	9	**6.7**	**18.4**
III	In transition	11	**4.9**	**12.1**
IV	Lagging behind	5	**3.1**	**7.3**

Source**:** Author's calculations.

The results of the table show that companies with high levels of ESG and digital transformation have a significant advantage in terms of financial performance. In particular, the average ESG score of leading companies was 8.4 and the ROE indicator was 23.7 percent. In lagging companies, these indicators were 3.1 points and 7.3 percent, respectively.

According to the results of the cluster analysis, the financial efficiency of leading enterprises is approximately 3.2 times higher than that of lagging enterprises. In particular, the significant difference in the ROE indicator confirms that the integration of ESG principles and digital technologies plays a decisive role in increasing the competitiveness and investment attractiveness of the enterprise. This results of the KRS model practical efficiency again one there is proves .

KRS (KIB– Digital Synthesis (model) enterprise to practice current to grow step by step done increase to the goal This approach is in line with ESG principles . and digital technologies of the enterprise there is management to the system consistent integration to do , organizational risks reduce and expected to the results achieve opportunity gives .

Table 6. KRS model to the enterprise current to grow road map

Stage	Deadline	Main activities	Achievement indicator
1	1–2 months	ESG- diagnostics : available situation evaluation , gap analysis	Full diagnostic report
2	2–4 months	Digital infrastructure : IoT, AI, blockchain platform choice	Technical agreement concluded
3	4–8 months	Pilot test : one KRS is valid in the department to grow	Pilot results positive
4	8–18 months	Systematic current to : all to departments expansion	20%+ increase in ESG score
5	18–24 months	Monitoring and optimization : KRS dashboard adjustment	Annual ESG report published

Source **:** Author development .

In the table cited road map KRS model current of reaching logical sequence reflection initially on the company's ESG current status is evaluated , then necessary digital infrastructure is selected and pilot test will be held . Successful test from the results then the model is complete enterprise along current monitoring and permanent improvement to the stage He wished .

This approach ESG indicators for companies systematic accordingly improvement , management transparency increase and investment attractiveness reinforcement opportunity gives . With this together , step by step current to grow model enterprise from resources reasonable use and to changes adaptation process effective organization to reach service does .

KRS (KIB– Digital Synthesis (model) republic on a scale wide current to grow for relevant institutional and regulatory and legal conditions create necessary . In this, the state by encouragement mechanisms formation , ESG reporting system develop and enterprises digital to transformation direction important importance profession will reach .

Research results based on following institutional recommendations working output:

1. Uzbekistan ESG reporting in the Republic of legal the basics formation and large enterprises for step by step mandatory report system current to be
2. ESG standards appropriate activity running enterprises for tax and financial encouragement mechanisms application
3. Government procurement and ESG rating in tender processes additional assessment criterion as implementation to be
4. ESG indicators and digital transformation according to national information platform create
5. High education institutions and corporate study ESG, sustainable in centers development and digital technologies according to special education programs organization to be

This recommendations to practice implementation to grow implementation of ESG principles in enterprises popularization , digital of technologies wide current to be and corporate social management system efficiency to increase service does . As a result

national of the economy stability , investment attractiveness and international competitiveness further increases .

4. Discussion

Research results ESG principles and enterprise efficiency between positive dependency existence by Gunnar Friede, Timo Busch , and Alexander Bassen (2015) meta - analysis conducted conclusions It is also applicable in Uzbekistan . manifestation In particular , this ESG index in research and ROE correlation coefficient 0.724 organization international in research record done average from indicators high that This situation has been identified . digital technologies ESG principles efficiency amplifier additional factor as manifestation to be with explained .

Rome Ben Manita and in the research of co-authors (2020) digital transformation with corporate management quality between correlation at 0.54 level evaluated if so , this in research blockchain technology current to grow with management indicators between The correlation is 0.658 . organization This result developing in economies digital technologies , especially blockchain transparency increase and institutional restrictions in mitigation role higher to be possible shows .

With this together , research some restrictions exists . First of all, in the analysis used enterprises number relatively limited (30 enterprises) , the results all to networks in generalization Caution is required . besides , research mainly section to the information based be , be far term dynamic effects complete reflection not delivered .

Future in research sample size expand , panel data use and separately networks ESG and digital transformation the impact deeper study to the goal appropriate This is the KRS model . practical application circle further expansion opportunity gives .

5. Conclusion

The study demonstrates that the integration of ESG principles and digital technologies creates a synergistic effect on the development and effectiveness of corporate social management systems. The findings indicate that aligning sustainable development principles with digital transformation can improve management efficiency, investment attractiveness, and financial performance. In particular, the combined application of ESG principles and digital technologies was found to increase corporate social management efficiency by an additional **18.7%** compared with their separate implementation. Enterprises that achieved advanced implementation of the proposed KRS model recorded an average **ROE of 23.7%**, which was **3.2 times higher** than that of organizations lagging behind in implementation. The analysis also showed that blockchain technology has the strongest relationship with the governance (G) dimension of ESG, while IoT technologies demonstrate considerable potential for improving environmental performance. Based on these findings, a five-stage implementation roadmap was proposed as a practical mechanism for the systematic integration of ESG principles and digital technologies into enterprise activities. Overall, the study provides a theoretical and practical framework for integrating ESG principles and digital transformation into corporate social management in Uzbekistan, contributing to the development of a sustainable corporate culture, greater management transparency, improved organizational performance, and the long-term competitiveness of the national economy.

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