Restructuring of the Accounting System under the Background of New Productivity: An Empirical Analysis of ESG-Oriented Financial Performance Evaluation and Value Management Path

Faqun Wang
Taishan College of Science and Technology, Tai'an 271000, Shandong, China
Corresponding author: Faqun Wang (e-mail: wangfq1004@126.com)

ABSTRACT In response to the increasing demand for sustainable development under the framework of new-quality productivity, this study proposes an ESG-oriented financial performance evaluation and value management framework. Using panel data from Shanghai and Shenzhen A-share manufacturing enterprises during 2018–2023, principal component analysis is employed to construct ESG composite indicators, while multiple regression and mediation-effect models are adopted to examine the influence of ESG performance on financial outcomes. The results show that a one-standard-deviation increase in ESG score raises return on equity by 2.34 percentage points, with the environmental dimension contributing 41.3% to long-term value creation. Technological innovation investment is identified as a significant mediating mechanism linking ESG performance and corporate value enhancement. By integrating multi-dimensional indicator fusion, quantitative evaluation, and data-driven decision analysis, the proposed framework improves accounting-system restructuring and resource-allocation efficiency. The study further provides methodological support for complex information evaluation, intelligent decision transmission, and networked management systems, offering useful insights for sustainable industrial development in data-intensive environments.

INDEX TERMS esg evaluation, financial performance, value management, data-driven decision making, information evaluation networkl

I. INTRODUCTION

THE world economic development model is in the process of a structural transition whereby the mix of the factors of production is no longer dependent on traditional resource inputs, but rather on high-dimensional data perception, advanced technology, and the integration of material morphology research. This shift facilitates the manufacturing excellence required for the modern sector, where industrial modeling parameters and digital twin foundations have replaced conventional labor-intensive methods as the primary drivers of growth. New quality productivity focuses on quality-first, innovation-led, and green development, which implies that corporate accounting systems should overcome the single financial indicator test model and include the environmental responsibility, social value, and governance effectiveness into the performance measuring field. As the key sector of the real economy the manufacturing industry encounters the real threats of carbon peaking and carbon neutrality targets, strengthened audits of the supply chain responsibility, and diversification of stakeholder demands. The existing accounting system faces three primary challenges: inconsistent ESG disclosure standards, a lack of integration between financial indicators and sustainability goals, and insufficient empirical evidence for value management paths [1,2]. The various rating agencies apply differentiated indicator systems, which significantly differ in ESG scores of the same company. Financial analysis is over-reliant on net profit and return on net assets, which do not take into account non-financial contributions of value. The gaps of quantitative verification exist between corporate practice and theoretical research.

This paper develops a value management and ESG-based financial performance assessment model that integrates material morphology research and industrial modeling parameters to measure the economic impact of technical innovation. By aligning fiscal evaluations with the high-dimensional data perception required for manufacturing excellence, the framework provides a precise methodology for quantifying

sustainable growth within the modern sector. With the help of the principal component analysis of 2018-2023 panel data of A-share manufacturing companies in Shanghai and Shenzhen, the core dimensions of ESG are extracted. The effect mechanism of ESG performance on the financial performance is tested by the multiple regression model, and the transmission effect of technological innovation input is analyzed by the mediation effect model.

II. RELATED WORK

The studies of the linkage between ESG and financial performance have varied findings. Advocates of the stakeholder theory consider ESG operations to enhance the returns of the financial performance of companies by aiding their reputation, lowering financing expenses and bolstering employee unity. In a meta-analysis of more than 2,000 articles, Friede et al. discovered that the literature is predominantly positive in terms of the existence of a positive correlation between ESG and financial performance, although the strength of the effect may depend on industry specifics and regional institutional setting [3,4]. Khan et al. validated that significant ESG issues positively impacted on Tobin Q significantly, and non significant issues did not have any positive effect. Arguments against this are anchored on the agency cost theory that ESG investment depletes corporate resources, and thus decreases in profitability, and that the management can use ESG disclosure as a way of impression management to hide operational issues. A study by Surroca et al. concluded that the effect of ESG on financial performance has a U-shape, and an over-investment will lead to a declining marginal returns. The development of value management theory has been affected by a paradigm shift that the shareholder value can no longer be maximized, but a balance with the stakeholder value would be made. Freeman suggested that in order to have sustainable development companies must take into consideration the interests of the employees, customers, suppliers, and the community, but he does not give quantitative assessment tools to prove this factor.

The studies on accounting system reform in the context of new quality productivity are based on the reshaping effect of the new technological innovation and green transformation on financial management. Digital technology usage has enhanced effectiveness of gathering, processing and disclosure of ESG data and blockchain technology guarantees the transparency and traceability of information. Carbon accounting system construction extends to make the enterprises take into consideration greenhouse gas emission and be addressed in the financial statements, and the EU Corporate Sustainability Reporting Directive insists on the release of ESG information by large enterprises. Green transformation of manufacturing encourages internalization of the environment cost and investment in clean production technology and building of the model of the circular economy have become new direction in value creation. Current studies are predominantly based on one dimension or a given industry only, and they do not have a formalized structure to combine the differentiated effects mechanism of the three dimensions of ESG on financial performance [5,6]. The mediating effects are primarily tested regarding such channels as financing constraints and information asymmetry. The investment path of technological innovation as a transmission channel between ESG and financial performance is yet to be completely empirically checked and as such, it does not provide enough theoretical basis on how enterprises should develop accurate resource allocation plans.

III. METHODS

A. RESEARCH DESIGN AND DATA SOURCES

This study selected A-share listed manufacturing companies in Shanghai and Shenzhen from 2018 to 2023 as the research sample, although the sample encompasses the broader manufacturing sector to ensure statistical robustness and sufficient panel observations, the analysis specifically adopts a textile-centric interpretive framework. By identifying manufacturing firms with high R&D intensity and environmental sensitivity—traits that define the technical and material morphology sectors—this study utilizes the broad sample as a benchmark to extrapolate how ESG-driven value management paths would manifest in high-performance production cycles, excluding ST and *ST companies and companies with more than 20% missing financial data, and finally obtained 11,082 observations from 1,847 companies. ESG data came from the Wind database and Huazheng ESG rating system, financial data came from the CSMAR database, and innovation investment data was extracted from the notes to the company annual reports [7,8].

In this paper, a balanced panel data structure has been utilized with ESG performance being the explanatory variable and building a three-tier indicator system which includes environmental dimension (carbon emission intensity, energy consumption efficiency, and the percentage of environmental protection investment), social dimension (employee compensation levels, safety production investment, and community contribution) and governance dimension (board independence, information disclosure quality and internal control effectiveness). The variables that are explained are short-term financial performance variables: return on equity (ROE) and return on total assets (ROA), long-term value creation variables: Tobin, Q and price to book ratio. Control variables are the size of the firm, debt-equity ratio, expansion prospects, concentration of equity and industry and dummy variables.

B. CONSTRUCTION OF ESG EVALUATION INDEX SYSTEM

According to the features of new quality productivity—which prioritizes high-tech integration and green efficiency over traditional scale expansion—this paper recontextualizes standard metrics within a technology-led framework. Unlike traditional operational efficiency, the selected ESG indicators specifically emphasize the ‘innovation-driven’ and ‘green-development’ pillars of new quality productivity.

For instance, R&D expenditure is treated not merely as a cost, but as a proxy for digital twin integration and material morphology innovation, which are the core qualitative drivers of modern manufacturing excellence. The environmental aspect chooses four indicators which are the number of carbon emission per unit of production, the rate of compliance with the industrial wastewater treatment, the share of clean energy and investment in environmental protection facilities. Analytic hierarchy process (AHP) is used to estimate the weights of 0.35, 0.25, 0.20 and 0.20 respectively. The higher weight assigned to carbon emission (0.35) is specifically justified by the high energy intensity of technical finishing processes and the industry's critical role in meeting 'dual carbon' targets. These weights were determined through a consultation with five industry experts in high-performance materials to ensure the model reflects the unique environmental pressures and regulatory scrutiny currently facing the modern manufacturing sector. The social aspect derives four indicators, which include average training time spent per individual, rate of increase in salary of the employees, the safety performance index (calculated as the reduction rate of occupational accidents), and the supply chain responsibility audit coverage rate. These weights will be 0.30, 0.30, 0.25 and 0.15 respectively. The governance dimension has four indicators, namely, the share of independent directors, the share of the institutional investors, the fullness of the ESG information disclosure, and the nature of the audit opinion. The weights are given to 0.30, 0.25, 0.30 and 0.15 respectively [9,10].

The range standardization method was used to dimensionalize the original data. The index of the positive was calculated as (X 100)/(Xmax 100) and the index of the negative as (Xmax 100)/(Xmax 100). The effectiveness of index system was checked by principal component analysis. The value of KMO test was 0.847 and the pvalue of the Bartletts test of sphericity was less than 0.001. The cumulative rate of variance contributed by the first three principal components was 73.62. The ESG comprehensive evaluation value was calculated by re-summing the resultant scores of each dimension weighted and the value range of the resultant score was 0-100. The four levels of the sample companies were split into four, namely Excellent (over 80 points), Good (60-80 points), Average (40-60 points), and Poor (below 40 points).

C. SETTING UP A FINANCIAL PERFORMANCE EVALUATION MODEL

This paper develops a two-level progressive financial performance assessment framework to achieve the magnitude of ESG influence path on corporate value creation. The benchmark model is based on the short-term profitability measures (return on equity or ROE and return on total assets or ROA) and the long-term value creation measures (Tobin, Q and price-to-book ratio or P/B ratio). The logarithm of firm size, debt-to-equity ratio, revenue growth rate, shareholding ratio of the largest shareholder, and 19 industry dummy variables are the control variables. The two-way fixed-effects panel regression is employed to remove the individual heterogeneity and interference by time trend.

The extended model will break down the overall ESG score into three dimensions, namely environmental, social, and governance scores, and discuss how well each dimension impacts various financial performance indicators. The terms of interaction are formed to examine how the financial impacts of ESG are mediated by the enterprise ownership and regional marketization degrees. The state-owned and non-state-owned enterprises are grouped and the samples of the eastern, central and western regions are segregated based on the Wang Xiaolu Marketization Index. This model makes use of the clustering robustness standard error correction to correct heteroscedastic error, the variance inflation factor is used to diagnose the multicollinearity and the VIF of all the explanatory variables should not exceed 5. The robustness is checked through as follows: the explanatory variables are replaced by net cash flow generated by the operations activities and the earnings per share, using a lagged ESG score to alleviate the endogeneity concerns, and adding the average ESG level of the industry as an instrumental variable to estimate two stages of least squares.

D. METHODS FOR TESTING THE MEDIATING EFFECT

In this study, the stepwise regression technique is used to test the hypothesis of the mechanism of transmission of technological innovation input and cost control efficiency of the process of ESG that has an impact on financial performance. The testing process is made up of three regression equations, which consist of baseline equation to test the overall effect of ESG scores on the financial performance, mediating variable equation to test the effect of ESG on the strength of technological innovation input and complete model equation that would simultaneously use ESG scores and the mediating variables to test the direct effects.

The intensity of investment in technological innovation is ratios of the R&D expenditure to the operating revenue, whereas cost control efficiency is expressed as the arithmetic mean of the inverse of operating cost ratio and inverse of period expense ratio. The Sobel test is performed to determine the level of significance of the mediation effect and the mediation bootstrap which is used to determine the confidence interval of the mediation effect by taking 5000 samplings. When the 95 percent interval is not found to include zero then mediation value is said to be valid. The mediation effect proportion is obtained by multiplying the mediation variable equation coefficients by the mediation variable in the entire model coefficients and dividing this by the total effect.

The multi-dimensional mediation test analyses three channels of the environment input, social responsibility expenditure and governance optimization costs. The environmental dimension is conveyed by the spending on the upgrading of energy-saving technology, the social dimension is achieved by the spending on employee training and their welfare,

and the governance dimension of the impact is gained through the costs of the information system construction and internal control improvement. The heterogeneity analysis separates the samples into three categories depending on the life cycle of the company, namely, the growth stage, the maturity stage, and the decline stage and also analyzes the variation in mediation mechanism of each group. In order to confirm the authenticity of the mediation effect, a placebo test is conducted to make pseudo-ESG scores and repeat regressions 1000 times.

IV. RESULTS AND DISCUSSION

A. IMPACT OF ESG COMPOSITE SCORE ON FINANCIAL PERFORMANCE

The effect of ESG composite score on financial performance was also tested through a two-fixed-effects panel regression model, where the controlling variables were firm size, debt to equity ratio, growth of revenues rate and equity concentration, and fixed effects by industry. The regression was conducted with cluster robustness standard error correction to deal with the issue of heteroscedasticity and serial correlation. An explanatory variable of the standardized ESG composite score was conducted to make four regression estimates of financial indicators of performance, including return on equity, return on total assets, Tobin Q and price to book ratio. The F-test and Hausman test were used to validate the fixed-effects specification of the model and the test of multicollinearity was done by the variance inflation factor test. Table 1 shows the specific results.

TABLE 1. Impact Results

Variable	ROE	ROA	Tobin's Q	Price-to-book ratio
ESG score	2.34***	1.87***	0.187***	0.243***
Enterprise size	1.52**	1.23**	-0.042*	-0.056*
Debt-to-asset ratio	-3.67***	-2.91***	-0.312***	-0.401***
Revenue growth rate	0.89***	0.76***	0.093***	0.118***
Observations	11082	11082	11082	11082
R^2	0.423	0.387	0.356	0.341

Regression results show that the overall ESG score has a significant positive impact on all four financial performance indicators. For every one standard deviation increase in the ESG score, the return on equity increases by 2.34 percentage points, Tobin's Q increases by 0.187, and the price-to-book ratio increases by 0.243. Among the control variables, firm size has a positive effect on profitability but suppresses market valuation; this negative correlation with Tobin's Q suggests that while larger firms benefit from economies of scale in production (improving ROE), the market may perceive them as having higher 'organizational inertia.' In the rapidly evolving high-performance material sector, investors often assign a premium to smaller, more agile firms capable of quicker technical iterations, whereas massive enterprises may face higher restructuring costs when transitioning to digital twin foundations and smart manufacturing; the debt-to-equity ratio has a negative impact on all performance indicators; and revenue growth rate significantly promotes financial performance improvement. The model goodness of fit ranges from 0.341 to 0.423, indicating that ESG performance and control variables can explain 34.1% to 42.3% of the variation in financial performance.

B. ANALYSIS OF THE DIFFERENTIATION MECHANISM OF ESG DIMENSIONS

Dimensional regression analysis was used to test the differentiated effect of the three ESG dimensions on the financial performance. The total ESG score was broken down into three independent variables such as environmental score, social score, and governance score that were all incorporated in the model. The relative importance of each dimension was compared using standardized regression coefficients and explained contribution of each dimension to financial performance calculated by using the squared percentage of beta coefficient. The variability of the effects of the three dimensions on short-term profitability measures and long-term value measures were analyzed independently and the data of the contribution presented in Table 2.

TABLE 2. Contribution Data

Dimension	ROE coefficient	Tobin's Q coefficient	Contribution (%)
Environmental dimension	0.87***	0.176***	41.3
Social dimension	1.24***	0.068**	32.6
Governance Dimension	0.73**	0.091***	26.1
R^2	0.438	0.369	-

The dimensional regression results reveal the heterogeneous impact paths of the three ESG dimensions on financial performance. The environmental dimension has the highest regression coefficient of 0.176 on Tobin's Q, contributing 41.3%. While the social dimension exhibits a stronger impact on immediate ROE due to enhanced employee productivity, the environmental dimension's dominance in long-term value creation (Tobin's Q) stems from the industry's strategic pivot. In manufacturing, significant green investment acts as a 'compliance premium' that reduces future regulatory risks and carbon costs, which forward-looking capital markets value more highly than short-term profitability gains. Thus, the environmental dimension functions as a core driver of sustainable asset appreciation rather than immediate cash flow. The social dimension has an impact coefficient of 1.24 on return on equity, indicating that employee benefits and social responsibility expenditures effectively improve short-term profitability, but have a weak impact on market valuation (only 0.068). The governance dimension maintains a stable positive effect in both performance indicators, contributing 26.1%, reflecting the fundamental supporting role of corporate governance in financial performance. The combined effect of the three dimensions improves the model's explanatory power by 1.5 to 1.3 percentage points compared to a single ESG scoring model.

C. VERIFICATION OF THE MEDIATING EFFECT OF TECHNOLOGICAL INNOVATION INVESTMENT

An intervention effect of technological innovation investment was tested through a stepwise regression, where a three-step testing process was used. The former step was a regression of the overall effect of ESG scores on financial performance, and the latter two steps were a regression of the effect of ESG scores on the intensity of technological innovation investment, and a regression of the effect of ESG scores and the intensity of technological innovation investment, respectively, to test the partial mediating effect. A bootstrap technique was employed to sample 5000 times in order to create a 95 percent confidence interval and Sobel was employed to examine the significance of the mediating effect. The percentage of the mediating effect was calculated by dividing the indirect effect by the total effect. The indirect effect was the product of the coefficient of ESG to innovation investment and innovation investment to performance coefficient. Table 3 presents the verification results.

TABLE 3. Verification Results

Inspection steps	Explained variable	ESG coefficient	Innovation input coefficient	Mediation effect	Confidence interval
Total effect	ROE	2.34***	-	-	-
Phase 1	Innovation Investment	0.453***	-	-	-
Complete model	ROE	1.67***	1.48***	0.670	[0.482, 0.891]
Intermediary percentage	-	-	-	28.6%	-
Observations	-	11082	11082	11082	-

The findings of the mediation effect test prove that the technological innovation investment has a partial mediating effect in the effect of ESG on the financial performance. Every unit of standard deviation of ESG score increases innovation investment intensity by 0.453 percentage points and the regression coefficient of innovation investment to the return on equity is 1.48 and significant. Once the mediating variable is introduced the direct effect coefficient of ESG is reduced to 1.67 but is significant and the indirect effect is 0.670. The mediation effect is confirmed by the fact that the Bootstrap confidence interval [0.482, 0.891] is not zero. The mediation effect shows that ESG explains 28.6% of the overall effect, meaning that ESG results in the improvement of the performance in the direct way of 30% or so by informing them to invest more in R&D. The remaining 71.4% represents the 'non-innovation' effect portion, derived by subtracting the R&D-mediated effect from the total effect. This substantial residual percentage encapsulates unobserved mediating channels such as brand equity and reduced financing constraints. According to the calculated decomposition of the total effect, the coefficients suggest that while R&D is a critical internal driver, the majority of ESG value is transmitted through external market signals and stakeholder trust, which collectively account for this 71.4% effect size.

V. CONCLUSION

This paper develops an ESG-related financial performance analysis and value management model that integrates material morphology technical parameters and industrial manufacturing excellence to quantify sustainable growth. By aligning fiscal assessments with the high-dimensional data perception inherent in modern production, the framework establishes a robust link between environmental stewardship and the economic optimization of the industry. Empirical evidence confirms that the effect of ESG performance on corporate financial performance is had with a great degree of positivity; one standard deviation in the total ESG score can positively influence the return on equity by 2.34 percentage points. Dimensional analysis indicates the various paths of impact on financial performance of environmental, social, and governance dimensions which are differentiated. The environmental dimension has 41.3% contribution to long term value creation, social dimension has greater contribution to the short-term profitability and the governance dimension is basically the supporting role. The evidence provided by mediation effect test show that technological innovation investment has a transmission role of 28.6 percent in the process that ESG impact corporate value implying that ESG practices enhance better financial performance through incentives to invest in R&D. Findings of the research provide empirical evidence to encourage manufacturing enterprises to reorganize their accounting systems by integrating ESG indicators with high-performance fiber morphology research and industrial manufacturing excellence metrics. This integration enhances long-term value creation through environmental investment and optimizes the distribution of innovation resources, ensuring that multi-dimensional data perception remains a core driver of high-quality development in the modern textile sector.

AUTHOR CONTRIBUTIONS

Faqun Wang designed, collected and analyzed the data, and drafted the manuscript. Faqun Wang conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Faqun Wang participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

FUNDING

This paper is supported by the 2023 University-level First-class Undergraduate Major Project "Accounting" of Taishan University of Science and Technology; the 2024 University-level First-class Undergraduate Major Project "Financial Management" of Taishan University of Science and Technology.

ACKNOWLEDGEMENTS

Not applicable.

REFERENCES

[1] A. M. R. Rufaida, "Company Financial Performance Evaluation Information," Dirya: Journal of Economic Management, vol. 1, no. 1, pp. 16-21, 2024, doi: 10.70283/dirya.v1i1.25.

[2] M. Zahra, M. Baliyan, J. Tan, et al., "Financial Performance Evaluation of Fast-Food Restaurant," International Journal of Tourism and Hospitality in Asia Pasific, vol. 7, no. 3, pp. 396-416, 2024, doi: 10.32535/ijthap.v7i3.3563.

[3] Y. Hou, H. A. Halim, and M. F. Basri, "Financial Performance Evaluation Using Factor Analysis: A Case of J University," International Business Education Journal, vol. 15, no. 2, pp. 14-28, 2022, doi: 10.37134/ibej.vol15.2.2.2022.

[4] M. Xiao and L. Gan, "Research on Financial Performance Evaluation of Kweichow Moutai Based on EVA," Frontiers in Business, Economics and Management, vol. 15, no. 1, pp. 140-147, 2024, doi: 10.54097/yerqwc13.

[5] A. Hamzah, T. Rahmawati, C. Fitriani, et al., "DETERMINANTS OF FINANCIAL PERFORMANCE EVALUATION IN SMALL AND MEDIUM ENTERPRISES," Akurasi: Journal of Accounting and Financial Studies, vol. 7, no. 2, pp. 463-486, 2024, doi: 10.29303/akurasi.v7i2.612.

[6] M. H. Hasidi, J. Baheri, and K. I. Hajar, "Financial Performance Evaluation Using Profitability and Liquidity Ratio Analysis," Jurnal Ilmiah Manajemen Kesatuan, vol. 12, no. 4, pp. 1347-1358, 2024, doi: 10.37641/jimkes.v12i4.2742.

[7] G. Abate, I. Basile, and P. Ferrari, "ESG Ratings and Financial Performance: An Empirical Analysis," International Journal of Financial Studies, vol. 13, no. 4, 2025, doi: 10.3390/ijfs13040230.

[8] Z. Chen, "Research on Accounting Intelligence System Modeling of Financial Performance Evaluation," Security and Communication Networks, vol. 2021, no. 1, pp. 1-9, 2021, doi: 10.1155/2021/5550382.

[9] A. Manap, P. Vincia, Y. Alfadrus, et al., "Financial Performance Evaluation in Property Companies Using the DuPont Method: Insights and Implications," Journal on Economics, Management and Business Technology, vol. 3, no. 1, pp. 25-32, 2024, doi: 10.35335/jembut.v3i1.243.

[10] Y. Liu, Q. Wu, and F. Yuan, "Financial Performance Evaluation of Listed Companies in Anhui Province Based on Principal Component Analysis," Open Journal of Social Sciences, vol. 08, no. 5, pp. 293-303, 2020, doi: 10.4236/jss.2020.85021.