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A Study of Corporate Digital Transformation and ESG Performance Based on the Moderating Effect of Female Executives

Liao Can*

Department of Information Management, Hubei University of Economics, Wuhan, China, 430205

* Corresponding Author Email: caca1012@163.com

Abstract. The digital transformation and ESG performance of enterprises have gradually become key indicators of their high-quality development. Female executives, due to their different leadership styles and risk preferences compared to males, play a unique role in this process, but the specific mechanisms of these gender traits on enterprise high-quality development have not been fully studied. Therefore, this research focuses on A-share listed companies in China from 2018 to 2022, exploring the relationship between digital transformation and ESG performance, and the moderating role of female executives. The study further conducts subgroup analyses based on the nature of enterprise ownership and enterprise life cycle. The findings indicate that digital transformation has a lagging promoting effect on ESG performance, which is more significant in mature enterprises. The proportion of female executives negatively moderates this effect, particularly in state-owned and mature enterprises. Female executives' shareholding proportion inhibits this phenomenon, and this effect is more pronounced in non-state-owned enterprises. Compensation incentives have little impact on the moderation by female executives. This study provides a new perspective for the digital transformation and ESG practices of enterprises at the management level and enriches empirical evidence in the field of gender studies.

Keywords: Digital Transformation, ESG Performance, Female Executives, Strategic Decision-Making.

1. Introduction

In today's competitive business environment, building a strong corporate image and focusing on long-term sustainability are essential for growth. With ESG gaining traction in China and green transformation and "dual-carbon" goals becoming national priorities, improving ESG performance is crucial for competitiveness and long-term success. Simultaneously, digital transformation, driven by the Fourth Industrial Revolution, is a key engine for sustainable growth and innovation, requiring comprehensive changes in technology, strategy, management, and culture. However, the unique perspectives and management styles of women executives are often overlooked, significantly impacting sustainable development.

A review of existing literature reveals that current research on female executives primarily focuses on two dimensions: corporate strategic decision-making and corporate performance. In terms of corporate strategic decision-making, the main areas include risk decisions (female executives are generally less adept at making risky strategic decisions for the company; however, their distinct cognitive characteristics from male executives bring more diverse information and perspectives to team decisions, which is beneficial for risk management [1]), corporate ethical behavior (female executives positively promote corporate social responsibility, charitable donations, and environmental performance), and innovation strategies (female executives tend to adopt transformational leadership styles, driving exploratory innovation [2]; they help companies achieve ambidextrous strategic orientation). Regarding corporate performance, the focus is on financial performance (the proportion of women on the board enhances the company's return on investment) and non-financial performance (female executives consistently promote business model innovation [3] and increase the number of patents; according to signaling theory and the mediating role of corporate social responsibility, female executives positively influence corporate reputation; from a

cognitive diversity perspective, the proportion of female executives has a positive impact on corporate crisis turnaround [4]). While these studies explore the diverse impacts of female executives on corporate development, there is a lack of research on the relationship between corporate digital transformation, ESG performance, and female executives. In the study of the relationship between corporate digital transformation and ESG performance, internal aspects of the company, such as technological efficiency and enhanced information transparency, are often the focus [5], while external aspects, like financing constraints, are also considered [6]. However, there is limited research on the role and transmission mechanisms at the management level, especially concerning female executives.

This paper uses a sample of A-share listed companies in China from 2018 to 2022 to investigate the relationship between corporate digital transformation and ESG performance, and whether female executives play a moderating role in the relationship between ESG performance and corporate performance. Furthermore, it explores the differentiated impact of female executives in companies with different ownership structures and at various stages of the corporate life cycle.

The marginal contribution of this paper lies in two main aspects: first, from the research perspective, it measures the moderating role of female executives using three indicators: the proportion of female executives, the shareholding proportion of female executives, and the average compensation of female executives. Second, at the theoretical level, it is the first to link corporate digital transformation, ESG performance, and female executives, thereby broadening the relevant theories of corporate sustainable development.

2. The basic fundamental

2.1. The digital transformation and ESG performance of enterprises

Stakeholder theory posits that companies should consider the interests of all stakeholders, not just shareholders. This holistic approach suggests that a company's success depends on balancing the needs of all stakeholders, including financial, social, and environmental impacts. However, companies often prioritize using limited resources for market returns over ESG activities due to the perceived high costs and delayed benefits. Companies face an asymmetry between the immediate costs and long-term benefits of ESG practices. While ESG can enhance corporate value and attract investments in the long run, the initial expenses are often seen as additional costs. Decision-makers tend to prioritize short-term financial performance, delaying the implementation of ESG activities. Therefore, digital transformation becomes essential for achieving market leadership and sustainable development. Ming Yuzhuo and Zhang Jinsong [7] found that digital transformation partially mediates the impact of ESG performance on corporate value. First, it improves overall efficiency through technological advancements [8]. Second, it reduces the direct costs of ESG activities by introducing efficient automation and data analysis technologies [9], enhancing resource use efficiency and decision-making transparency. In summary, this paper proposes Research Hypothesis 1: Corporate digital transformation can enhance ESG performance.

2.2. The moderating role of female executives

(1) The moderating role of the proportion of female executives

Upper echelons theory suggests that senior managers interpret situations based on their unique experiences, cognitive frameworks, and psychological traits, influencing their decisions. Gender differences in traits like higher empathy, risk aversion, and moral standards are evident in corporate leadership. Research shows that female executives tend to inhibit risky strategic decisions, being more cautious, especially with long-term investments and high-risk projects. Digital transformation involves high-risk, rapid decision-making, requiring substantial upfront investments and long payback periods. Thus, this paper proposes Research Hypothesis 2: The proportion of female

executives negatively moderates the relationship between corporate digital transformation and ESG performance.

(2) The moderating role of the shareholding proportion of female executives

Role incongruity theory suggests that behavior misaligned with traditional gender roles leads to negative evaluations or biases. In professional settings, society expects women to be gentle and caring, while leaders are seen as decisive and authoritative. This discrepancy can bias perceptions of female executives. The shareholding proportion often symbolizes decision-making power, and an increase in female executives' shareholding can exacerbate this bias. Investors may underestimate female CEOs' leadership abilities, leading to negative perceptions and adversely affecting stock market responses and financing efforts. This hinders capital-intensive activities like digital transformation and ESG improvements. Additionally, female executives' risk aversion may lead to overly cautious decision-making, missing high-risk, high-reward opportunities, and impeding rapid change and innovation. Therefore, this paper proposes Research Hypothesis 3: The proportion of female executives' shareholding negatively moderates the relationship between corporate digital transformation and ESG performance.

(3) The moderating role of the average compensation of female executives

Compensation incentives effectively meet the material and emotional needs of senior managers, enhancing their motivation and productivity, thus driving high-quality corporate development. Female executives, often more risk-averse, can benefit from well-designed compensation incentives that balance risk and reward in their decision-making. These incentives provide material benefits and emotional satisfaction, fostering professional achievement and recognition. Digital transformation, a strategic decision with challenges and uncertainties, requires higher compensation to encourage female executives to explore and implement high-risk digital solutions actively. Therefore, this paper proposes Research Hypothesis 4: Compensation positively moderates the relationship between corporate digital transformation and ESG performance for female executives.

3. Research Design on Female Executives' Moderation

3.1. Moderation Effect Model Specification

To test Hypothesis 1, we set up Model (1) as follows:

$$ESG_{i,t+1}=\beta_0+\beta_1 Dig_{i,t}+\beta_{i,t}\ Controls_{i,t}+\sum Year+\sum Individual+\varepsilon_{i,t} \quad (1)$$

To test whether the proportion of female executives, the shareholding proportion of female executives, and the average compensation of female executives have a moderating effect on the relationship between corporate digital transformation and ESG performance, we introduce the first-order interaction terms of digital transformation with the proportion of female executives (Dig ×FMR), digital transformation with the shareholding proportion of female executives (Dig×FPR), and digital transformation with the average compensation of female executives (Dig×FAS). We set up Models (2), (3), and (4) as follows:

$$ESG_{i,t+1}=\beta_0+\beta_1 Dig_{i,t}+\beta_2 FMR_{i,t}+\beta_3 ESG_{i,t}\times Dig_{i,t}+\beta_{i,t} Controls_{i,t}+\sum Year+\sum Individual+\varepsilon_{i,t} \quad (2)$$

$$ESG_{i,t+1}=\beta_0+\beta_1 Dig_{i,t}+\beta_2 FPR_{i,t}+\beta_3 ESG_{i,t}\times Dig_{i,t}+\beta_{i,t} Controls_{i,t}+\sum Year+\sum Individual+\varepsilon_{i,t} \quad (3)$$

$$ESG_{i,t+1}=\beta_0+\beta_1 Dig_{i,t}+\beta_2 FAS_{i,t}+\beta_3 ESG_{i,t}\times Dig_{i,t}+\beta_{i,t} Controls_{i,t}+\sum Year+\sum Individual+\varepsilon_{i,t} \quad (4)$$

Where ESG is the ESG performance of the firm, Dig is the degree of digital transformation of the firm, FMR, FPR and FAS are the proportion of female executives, the proportion of female executive shareholding, and the average remuneration of female executives, respectively, i denotes individual, t denotes time, and Controls denotes a series of control variables as described in the previous section, including firm size, financial leverage, firm growth, firm operational capability, Corporate Equity Concentration, Return on Equity, Corporate Age and Corporate Nature. (The financial data of enterprises in this paper are from Wind database, the data of corporate executives are from CSMAR database, the ESG performance data of enterprises are from CSI ESG rating system, and the data of digital transformation of enterprises are obtained from text analysis and word frequency statistics of annual reports of listed companies, which are from the official websites of Shenzhen Stock Exchange (SZSE) and Shanghai Stock Exchange (SSE).)

In order to eliminate the influence of extreme values, this paper applies winsor2 shrinkage of 1% up and down to all micro-level continuous variables. In addition, considering that it takes a certain lag for the impact of corporate digital transformation to corporate ESG performance, this paper lags the core explanatory variables (Dig) and moderating variables (FMR,FPR,FAS) by 1 period, which not only takes into account the time delay required for the transfer of effects between variables in the actual situation, but also effectively reduces the intrinsic intervention problem caused by reverse causality at the technical level. Dummy variables for Individual and Year were also controlled to absorb fixed effects as much as possible.

3.2 Descriptive Statistical Analysis

Descriptive statistics reveal significant variation in ESG performance among companies, with most performing below average, indicating a need for improvement. Many companies lag in digital transformation, showing a wide disparity in adoption levels. Female executive representation is generally low, with some companies having none, and their shareholding proportions are minimal. Average compensation for female executives is around 230,000 RMB, but this varies significantly between companies. Control variables also differ substantially, potentially affecting ESG performance.

3.3 Baseline Regression Analysis

From the baseline regression results in row (1) of Table 2, it is evident that corporate digital transformation boosts ESG performance (coef.=0.036, $p<0.01$). This demonstrates that digital transformation significantly enhances ESG performance and economic benefits, integrating sustainable development and corporate responsibility, thus validating Research Hypothesis 1.

3.4 Moderation Effect Test

The results from rows (2) to (4) of Table 1 examine the moderating effects of the proportion of female executives, their shareholding proportion, and their average compensation. In row (2), the digital transformation coefficient is significantly positive (coef. = 0.038, $p<0.01$), but the interaction term between digital transformation and the proportion of female executives is significantly negative (coef. = -0.243, $p<0.01$), indicating that a higher proportion of female executives dampens the positive impact of digital transformation on ESG performance. Row (3) shows the digital transformation coefficient remains significantly positive (coef. = 0.035, $p<0.01$), with a negative interaction term for the shareholding proportion of female executives (coef. = -0.388, $p<0.01$), similarly inhibiting the positive effect. In row (4), the digital transformation coefficient is significantly positive (coef.=0.034, $p<0.01$), but the interaction term with the average compensation of female executives is not significant. This suggests that compensation incentives do not significantly enhance ESG performance through digital transformation, possibly due to gender-related differences in decision-making that are less influenced by material incentives.

Table 1. Benchmark model regression results.

	L_Dig	L_FMR	L_Dig×L_FMR	l_FPR	L_Dig×L_FPR	L_FAS	L_Dig×L_FAS	Controls	Individual	Year	_cons	N	adj.R^2
ESG(1)	0.036*** (0.000)							Yes	Yes	Yes	-2.189*** (0.000)	8711	0.131
ESG(2)	0.038*** (0.000)	-0.469*** (0.000)	-0.243*** (0.000)					Yes	Yes	Yes	-1.980*** (0.000)	8711	0.134
ESG(3)	0.035*** (0.000)			1.053*** (0.000)	-0.388*** (0.001)			Yes	Yes	Yes	-2.432*** (0.000)	8711	0.135
ESG(4)	0.034*** (0.000)					0.019*** (0.000)	-0.001 (0.793)	Yes	Yes	Yes	-2.405*** (0.000)	8711	0.131

Note: t-statistics in parentheses, *p<0.1, **p<0.05, ***p<0.01 (same table below).

3.5 Robustness Test

3.5.1. Variable Substitution

(1) Replacing the dependent variable measurement: Different third-party rating agencies have significant discrepancies in ESG ratings for the same company due to varying data, standards, and institutional and corporate characteristics. These inconsistencies, influenced by political, cultural, and economic factors, indicate that a single agency's ESG rating cannot accurately reflect a company's true ESG performance [10]. Therefore, this paper uses the comprehensive ESG score from the Wind financial terminal, a 10-point scale aligning with international ESG frameworks and considering China's market and regulatory context.

Testing the impact of digital transformation on ESG performance, row (1) of Table 2 shows a significantly positive coefficient (coef.=0.039, p<0.01). Rows (2) and (3) indicate that the interaction terms between digital transformation and the proportion of female executives and their shareholding proportion are significantly negative (coef.=-0.086, p<0.1; coef.=-0.141, p<0.1). The interaction term with average compensation in row (4) remains not significant. This confirms that digital transformation enhances ESG performance, while the proportion and shareholding of female executives inhibit this effect, and their compensation has no significant impact, demonstrating the robustness of these results.

(2) Replacing the measurement method of the explanatory variable: This paper uses the digital transformation index from the CSMAR database as an alternative explanatory variable. The test results (Table 3) show that digital transformation significantly enhances corporate ESG performance (coef.=0.006, p<0.01). However, the proportion and shareholding proportion of female executives significantly inhibit this effect (coef.=-0.049, p<0.01; coef.=-0.044, p<0.01), while the average compensation of female executives has no significant impact. This verifies the validity of Research Hypotheses 2 and 3.

Table 2. Robustness Tests for Replacing Explained Variables.

	L_Dig	L_FMR	L_Dig×L_FMR	l_FPR	L_Dig×L_FPR	L_FAS	L_Dig×L_FAS	Controls	Individual	Year	_cons	N	adj. R^2
ESG(1)	0.039*** (0.000)							Yes	Yes	Yes	3.800*** (0.000)	8712	0.070
ESG(2)	0.040*** (0.000)	-0.095 (0.184)	-0.086* (0.072)					Yes	Yes	Yes	3.786*** (0.000)	8712	0.070
ESG(3)	0.039*** (0.000)			0.370*** (0.003)	-0.141* (0.081)			Yes	Yes	Yes	3.666*** (0.000)	8712	0.071
ESG(4)	0.037*** (0.000)					0.024*** (0.000)	0.002 (0.542)	Yes	Yes	Yes	3.543*** (0.000)	8712	0.072

Table 3. Robustness test for replacement of explanatory variables.

	L_Dig2	L_FMR	L_Dig2×L_FMR	l_FPR	L_Dig2×L_FPR	L_FAS	L_Dig2×L_FAS	Controls	Individual	Year	_cons	N	adj. R^2
ESG(1)	0.006*** (0.000)							Yes	Yes	Yes	-2.112*** (0.000)	8711	0.131
ESG(2)	0.006*** (0.000)	-0451*** (0.000)	-0.049*** (0.000)					Yes	Yes	Yes	-2.087*** (0.000)	8711	0.136
ESG(3)	0.006*** (0.000)			1.101*** (0.000)	-0.044*** (0.010)			Yes	Yes	Yes	-2.514*** (0.000)	8711	0.136
ESG(4)	0.006*** (0.000)					0.012* (0.005)	-0.000 (0.843)	Yes	Yes	Yes	-2.441*** (0.000)	8711	0.132

3.5.2. Sample Size Adjustment

Due to significant differences in the number of female employees across industries and to avoid the impact of outliers related to female executive variables, this study excludes industries with over 60% female employees, as indicated in the "Global Gender Gap Report 2022." These industries include education and training, professional services, and pharmaceutical and healthcare. Based on the

CSRC's 2018 industry classification, the study also excludes the education, textile, pharmaceutical manufacturing, and textile apparel and accessory industries. This results in a final sample of 7,871 companies, ensuring the research results are representative and not influenced by industries with a high proportion of female employees.

As shown in Table 4, digital transformation continues to significantly promote corporate ESG performance (coef.=0.027, p<0.01). The proportion and shareholding proportion of female executives still significantly inhibit this effect (coef.=-0.342, p<0.01; coef.=-0.425, p<0.01). Consistent with previous conclusions, the average compensation of female executives does not have a significant moderating effect.

Table 4. Robustness test to exclude industries with a high proportion of female practitioners.

	L_Dig	L_FMR	L_Dig×L_FMR	l_FPR	L_Dig×L_FPR	L_FAS	L_Dig×L_FAS	Controls	Individual	Year	_cons	N	adj. R^2
ESG(1)	0.027*** (0.001)							Yes	Yes	Yes	-1.526*** (0.000)	7871	0.144
ESG(2)	0.029*** (0.000)	-0.311** (0.003)	-0.342*** (0.000)					Yes	Yes	Yes	-1.399*** (0.000)	7871	0.147
ESG(3)	0.027*** (0.001)			0.982*** (0.000)	-0.425*** (0.000)			Yes	Yes	Yes	-1.752*** (0.000)	7871	0.148
ESG(4)	0.025*** (0.002)					0.022*** (0.002)	-0.003 (0.572)	Yes	Yes	Yes	-1.770*** (0.000)	7871	0.145

3.5.3. Model Substitution

Although the baseline regression model controls for various factors affecting corporate ESG performance, some factors like regional characteristics might be overlooked. Regional economic prosperity can influence female executives' decision-making and execution in the digital domain. Economically developed regions may have more resources for digital transformation and ESG practices, affecting female executives' actions. Additionally, regional labor market characteristics, such as education levels and the availability of technical professionals, can impact a company's capacity for digital transformation and ESG activities.To address this, the study controls for the GDP value (natural logarithm) and higher education rate (proportion of the population with a college education or higher) of the sample's provinces. As shown in row (1) of Table 5, digital transformation continues to significantly promote corporate ESG performance at the 1% significance level. Rows (2), (3), and (4) of Table 5 indicate that incorporating regional economic characteristics maintains the robustness of the previous conclusions.

Table 5. Robustness test of the replacement model.

	L_Dig	L_FMR	L_Dig×L_FMR	l_FPR	L_Dig×L_FPR	L_FAS	L_Dig×L_FAS	Controls	Individual	Year	Provincial features	_cons	N
ESG(1)	0.071***(0.000)							Yes	Yes	Yes	Yes	-1.460***(0.000)	55 67
ESG(2)	0.073***(0.000)	-0.509***(0.000)	-0.179**(0.021)					Yes	Yes	Yes	Yes	-1.336***(0.000)	55 67
ESG(3)	0.069***(0.000)			1.266***(0.000)	-0.553***(0.000)			Yes	Yes	Yes	Yes	-1.706***(0.000)	55 67
ESG(4)	0.070***(0.005)					0.006(0.505)	0.001(0.839)	Yes	Yes	Yes	Yes	-1.627***(0.000)	55 67

3.5.4. Endogeneity Test

First, the previous experiments applied a one-period lag to all explanatory and moderating variables, minimizing the endogeneity issue caused by reciprocal causality between digital transformation and corporate ESG performance.

Second, following Li Tang et al.[11], this study uses the cube of the difference between a company's digital transformation and the industry and provincial average as an internal instrumental variable to address potential endogeneity. Table 6 presents the regression results using the two-stage least squares method with instrumental variables. In the first stage, the coefficient of the instrumental variable (DT_iv) is significantly positive at the 1% level, indicating it meets the correlation condition with the endogenous explanatory variable. In the second stage, the Kleibergen-Paap rk LM statistic rejects the null hypothesis of under-identification at the 1% significance level. Both the Cragg-Donald Wald F statistic and the Kleibergen-Paap rk Wald F statistic exceed the Stock-Yogo weak instrument identification F-test critical value of 16.38 at the 10% significance level, rejecting the null hypothesis that the instrumental variable is weak. Additionally, the coefficient of Dig remains significantly positive (coef.=0.077, $p<0.05$). Therefore, the core conclusions of this study remain robust and credible.

Table 6. Instrumental variable approach.

variant	DT_iv	Dig	Kleibergen-Paap rk LM statistic	Cragg-Donald Wald F statistic	Kleibergen-Paap rk Wald F statistic	Controls	Individuals	year	N
Dig	0.124***(0.000)					Yes	Yes	Yes	10880
ESG		0.077**(0.000)	280.950 [0.000]	6649.480 {16.380}	209.670 {16.380}	Yes	Yes	Yes	10880

Note: The p-value of the statistic in [ ] and the critical value at the 10 per cent level of the Stock-Yogo test in {}.

3.6 Further Analysis of the Moderating Effect of Female Executives

3.6.1. Heterogeneity Analysis Based on the Nature of Enterprise Ownership

Based on ownership, the sample is divided into state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs). Regression results of Table 7 show that digital transformation significantly promotes ESG performance in both groups, with the proportion of female executives negatively moderating this effect. The average compensation of female executives does not significantly moderate this phenomenon in either group. The positive impact of digital transformation on ESG performance is stronger in SOEs, as is the negative moderating effect of female executives' proportion. The shareholding proportion of female executives does not significantly impact SOEs. Several reasons explain these results. SOEs have stringent, hierarchical structures where digital transformation more effectively standardizes processes and improves efficiency, significantly impacting ESG performance. SOEs are more influenced by government policies and social responsibility, making digital transformation more policy-driven and focused on ESG improvements for public image. Additionally, SOEs are more likely to secure resources for digital transformation due to government support. SOEs' decisions are more influenced by government departments, making them more stable and long-term oriented, with the shareholding proportion of female executives having little impact on strategic decisions. This stability allows investors to more accurately assess risks and potential benefits.

Table 7. Analysis of heterogeneity in the nature of ownership.

		L_Dig	L_FMR	L_Dig×L_FMR	l_FPR	L_Dig×L_FPR	L_FAS	L_Dig×L_FAS	Controls	Individual	Year	_cons	N	adj.R^2
SOEs	(1)	0.069*** (0.000)							Yes	Yes	Yes	-2.952*** (0.000)	2383	0.205
	(2)	0.076*** (0.000)	-0.230 (0.248)	-0.353*** (0.009)					Yes	Yes	Yes	-2.834*** (0.000)	2383	0.207
	(3)	0.070*** (0.000)			1.162 (0.115)	-0.679 (0.134)			Yes	Yes	Yes	-3.191*** (0.000)	2383	0.206
	(4)	0.061*** (0.000)					0.039*** (0.000)	0.013 (0.174)	Yes	Yes	Yes	-3.402*** (0.000)	2383	0.209
Non-SOEs	(5)	0.028*** (0.003)							Yes	Yes	Yes	-1.577*** (0.000)	6328	0.102
	(6)	0.029*** (0.002)	-0.556*** (0.000)	-0.188*** (0.015)					Yes	Yes	Yes	-1.348*** (0.000)	6328	0.106
	(7)	0.027*** (0.004)			0.995*** (0.000)	-0.356*** (0.003)			Yes	Yes	Yes	-1.821*** (0.000)	6328	0.107

	(8)	0.027*** (0.003)					0.059 (0.348)	-0.001 (0.914)	Yes	Yes	Yes	-1.692*** (0.000)	6328	0.102

3.6.2. Heterogeneity Analysis Based on the Enterprise Life Cycle

Following Dickinson's approach[12], companies were screened based on their cash flow combinations, selecting those that met the criteria in Table 8 for at least three years between 2018 and 2022. These companies were categorized into three stages: growth, maturity, and decline. Group regression analysis showed that digital transformation significantly promotes ESG performance in growth and maturity stage companies, with a stronger effect in the latter. However, it does not significantly impact ESG performance in declining stage companies, likely due to financial and resource constraints that prioritize survival and short-term gains over long-term ESG goals. In maturity stage companies, the proportion and shareholding proportion of female executives significantly negatively moderate the relationship between digital transformation and ESG performance, while average compensation does not. In growth stage companies, none of the three moderating variables significantly affect the relationship. This can be explained by several factors: growth stage companies focus on revenue and market expansion, potentially neglecting ESG factors; declining stage companies, facing unstable environments and pressures from shareholders and creditors, make conservative decisions, and a higher proportion of female executives may exacerbate this conservatism and conflicts of interest.

Table 1. Characteristics of cash flow distribution by stage.

Cash Flows	Growth		Maturity	Recession				
	Introductory	Growth	Maturity	Recession	Phase-Out	Phase-Out	Phase-Out	Phase-Out
Net operating	-	+	+	-	+	+	-	-
Net investment	-	-	-	-	+	+	+	+
Net financing	+	+	-	-	+	-	+	-

4. Conclusions

Taking A-share listed companies from 2018-2022 as a sample, this paper examines the impact of digital transformation on corporate ESG performance and the moderating effects of female executives in terms of their proportion, shareholding, and average salary. The main conclusions are: (1) Digital transformation promotes corporate ESG performance with a lag. (2) The proportion and shareholding of female executives negatively moderate the impact of digital transformation on ESG performance, while compensation incentives have no significant moderating effect. This conclusion remains robust after various tests. (3) Digital transformation has a greater impact on ESG performance in state-owned enterprises (SOEs), with the proportion of female executives having a more pronounced inhibiting effect. In non-state-owned enterprises (non-SOEs), the shareholding proportion of female executives has a more significant inhibiting effect. (4) In mature enterprises, digital transformation better promotes ESG performance, while the proportion and shareholding of female executives more significantly negatively moderate this effect. This study offers new perspectives on digital transformation and corporate ESG practices in China, enriching empirical evidence in gender-responsive research.

For enterprises: Firstly, they should embrace long-term returns and recognize the dual value of digital transformation: improving operational efficiency and innovation while enhancing ESG performance. Secondly, they should consider the complex role of female executives in driving ESG performance through digital transformation. While the presence of female executives and shareholders may have a short-term negative moderating effect, in the long term, increased gender diversity at the decision-making level promotes comprehensive and prudent decision-making, mitigating risks like groupthink.

For the government: Implement tax incentives and financial support to reduce the financial burden of digital transformation for enterprises, especially non-state-owned and growth companies, and attract talent through preferential policies. Additionally, ensure workplace gender equality by optimizing labor laws and corporate governance rules, raise the visibility of female executives through awards and certifications, and establish platforms for experience sharing and strategy discussions among female leaders, increasing their recognition in the investment market.

References

[1] Post C, Lokshin B, Boone C. What changes after women enter top management teams A gender-based model of strategic renewal[J]. Academy of Management Journal, 2022, 65（1）: 273-303.

[2] Wu Q, Dbouk W, Hasan I, et al. Does gender affect innovation Evidence from female chief technology officers[J]. Research Policy, 2021, 50(9): 104327.

[3] Narayan S, Sidhu J S, Volberda H W. From attention to action: The influence of cognitive and ideological diversity in top management teams on business model innovation[J]. Journal of Management Studies, 2021, 58(8): 2082-2110.

[4] Xu Gaoyan, Li Guifang, Tao Yan, et al. "Helping the Building to Tumble: Female Executives, Crisis Firm Reversals, and Managerial Perceptions[J]. Foreign Economics and Management, 2020, 42(5):42-59.

[5] Zhabg Yongji, Zhai Jianqiao, Zhu Yaxuan, Wang Ke. How digital transformation affects corporate ESG performance[J]. Journal of China University of Geosciences (Social Science Edition), 2023, 23(06): 126-141.

[6] Hu Jie, Han Yiming, Zhong Yong. How Corporate Digital Transformation Affects Corporate ESG Performance - Evidence from Chinese Listed Companies[J]. Industrial Economics Review, 2023,(01): 105-123.

[7] Ming Yuzhuo, Zhang Jinsong. Research on the impact of ESG performance on enterprise value based on digital transformation[J]. Operation and Management,2022,1-12.

[8] Jiao Hao, Yang Jifeng, Wang Peinuan, Li Qian. Research on the role mechanism of data-driven enterprise dynamic capability--an analysis of digital transformation process based on data full life cycle management[J]. China Industrial Economy,2021,(11):174-192.

[9] Tang Tao, Li Fangjing, Xia Lun. The impact of enterprise digitization on labour productivity - Empirical evidence from Chinese private firms[J]. Journal of China University of Geosciences(Social Science Edition),2022,22(06):112-124.

[10] Guo K, Bian Y, Zhang D, et al. ESG performance and corporate external financing in China: The role of rating disagreement[J]. Research in International Business and Finance, 2024, 69: 102236.

[11] Li Tang, Li Qing, Chen Chuxia. The effect of data management capabilities on firm productivity - New findings from a Chinese firm-labour matching survey[J]. China Industrial Economy,2020,(06):174-192.

[12] Dickinson V. Cash flow patterns as a proxy for firm life cycle [J]. The accounting review, 2011, 86(6): 1969-1994.