International Business & Economics Studies
ISSN 2640-9852 (Print) ISSN 2640-9860 (Online)
Vol. 6, No. 4, 2024
www.scholink.org/ojs/index.php/ibes

Original Paper

Empirical Analysis of the Impact of Human Capital on Corporate Digitalization

Jiaxin Zhang[1]

[1] School of Economics and Management, Chongqing Normal University, Chongqing 401331, China

Received: May 06, 2024 Accepted: May 11, 2024 Online Published: July 02, 2024

doi:10.22158/ibes.v6n4p1 URL: http://dx.doi.org/10.22158/ibes.v6n4p1

Abstract

Using panel data from A-share listed companies between 2007 and 2021, this study empirically examines the theoretical mechanisms through which human capital influences the digitalization of Chinese enterprises. The findings reveal that upgrading corporate human capital effectively empowers the digitalization of Chinese firms, a conclusion that is robust across a series of tests. Mechanism analysis indicates that the enhancement of human capital primarily facilitates corporate digitalization through improvements in R&D innovation and management levels. Heterogeneity analysis shows that the positive impact of human capital upgrading on corporate digitalization is more pronounced in the eastern and central regions, technology-intensive firms, and high-tech enterprises. These conclusions provide valuable insights for further promoting corporate human capital enhancement and digitalization.

Keywords

Human Capital, R&D Innovation, Overseas-returned Executives, Corporate Digitalization

1. Introduction

The 14th Five-Year Plan emphasizes increasing the added value of core industries in the digital economy and promoting the deep integration of the digital economy with traditional economic sectors. Against this backdrop, digital transformation has become a necessary response for enterprises to align with technological advancements and government directives. The concept of new-quality productivity underscores the imperative of technological innovation (Xu et al., 2023), leading to an increase in corporate R&D activities (Zhao et al., 2021). Digital transformation significantly reduces costs in production, operations, organization, and transactions, thereby increasing profits and easing financing constraints, which allows firms to invest more in R&D innovation (Ji et al., 2023). Additionally, digital technologies such as 5G and big data effectively reduce information asymmetry between firms,

promoting the flow of information and technology across industries and enabling firms to swiftly adapt to market trends and increase their R&D investments (Tu & Yan, 2022).

However, while technology and equipment updates are apparent, human capital remains the core driver of corporate innovation. The rise of new-quality productivity places higher demands on human capital, making the recruitment of highly educated, skilled, and high-quality talent ("three highs") a trend among enterprises. Skilled employees can quickly master advanced technologies (Ye et al., 2022), and highly educated employees are better equipped to adapt to technological advancements. High-skilled labor tends to complement advanced technologies, facilitating rapid digital transformation (He et al., 2019). Moreover, the strategic direction of a company is steered by its management. Research focusing on managerial human capital characteristics, such as that by Zhang (2021), shows that the age and gender diversity within executive teams significantly impact digital transformation efforts. Executives with international backgrounds play a crucial role, as their exposure to cutting-edge knowledge and diverse practical experiences enables them to adopt more open-minded perspectives, which is beneficial for digital transformation (Gan & Liu, 2022).

Given the limited research on the relationship between corporate human capital levels and digital transformation in China, and recognizing the indispensable role of human capital in this process, this study aims to empirically investigate the mechanisms through which human capital levels influence corporate digital transformation. The goal is to provide new insights into overcoming the challenges of digital transformation for enterprises.

2. Theoretical Analysis and Research Hypotheses

With changes in China's demographic landscape, the demographic dividend is rapidly transitioning into a talent dividend. For enterprises, this shift entails two primary aspects: firstly, the ongoing implementation of the talent-driven national strategy facilitates access to a large pool of highly qualified employees. Secondly, as the technological content in production, operation, and management processes continues to rise, firms increasingly demand higher skills and qualifications from their employees. Compared to physical capital, human capital is becoming more crucial, and companies are more inclined to recruit highly educated and skilled employees to optimize and upgrade their human capital structure (Xiao et al., 2022). R&D teams can leverage data analysis and mining to provide valuable insights, enhance market competitiveness, and streamline business processes. Additionally, cross-disciplinary collaboration among R&D personnel is vital for fostering innovation across different departments and driving comprehensive digital transformation within enterprises.

Corporate strategic decisions are often the result of executives' values and preferences, which can be predicted based on their age, tenure, professional background, education, and social networks. These characteristics directly or indirectly influence corporate strategy and future development. Previous studies indicate that executives with overseas experience significantly impact various aspects of corporate performance, including internationalization (Chen et al., 2021), export product quality

(Zhang et al., 2021), foreign investments (Wu et al., 2021), and innovation performance (Wang et al., 2020). The influence of these executives can be attributed to several advantages: Human Capital Advantage: Executives with international backgrounds often possess advanced degrees and professional skills, which enhance the accumulation of human capital within the firm; International Perspective: These executives can keenly perceive changes in domestic and international market environments and utilize their extensive social networks to benefit the firm in international trade and investment (Zhang et al., 2021); Innovation Advantage: Overseas experience makes these executives more aware of the importance of innovation and fosters a culture of innovation within the company (Deng et al., 2020; Zhang et al., 2019).

China is entering a digital era, where innovation-driven and high-quality development are crucial for economic breakthrough. Strategic emerging industries characterized by high technology, high talent, and high capital are the new engines for economic growth and are essential for promoting high-quality economic development. The 19th Party Congress explicitly stated the importance of entrepreneurs in technological innovation. Academic research supports this view, indicating that executives, as primary initiators and guides of strategic decisions, significantly impact all aspects of a company's operations (Giannetti, 2015). High-quality economic development requires fully respecting market entities and stimulating the innovative potential of corporate managers. Currently, many firms are at the initial stage of digital development, facing challenges such as reluctance to change. The core task of digital transformation is to improve and innovate the production and management models and value creation systems using digital technology, not merely to apply digital technology within the enterprise. This complex and long-term digital transition process heavily relies on human resources. The upgrade of the human capital structure towards higher quality will profoundly influence the implementation of corporate strategies. This paper posits that the enhancement of human capital levels can promote corporate digitalization for the following reasons:

Enhancement of R&D and Innovation Capabilities: Human capital can boost a firm's R&D and innovation capabilities. The overall demand for high-skilled labor increases with the use of digital intelligence, promoting digital transformation. According to the theory of knowledge spillover, high-quality employee teams possess greater competence, essential for digital transformation, providing the necessary human resources support and guarantee. This drives managers to increase R&D funding, leveraging knowledge and skills to control R&D activities, thereby breaking resource constraints on digital R&D projects (Dai et al., 2020; Liu et al., 2022). Furthermore, human capital is a crucial carrier of innovation activities and a core factor influencing innovation levels. High-level human capital exhibits strong curiosity, critical thinking, and exploratory spirit, leading to greater creativity and practical ability, which are vital for enhancing innovation capabilities. Innovation provides the required hardware and software for digital transformation, overcoming knowledge and technology barriers (Yang & Xu, 2023). Innovation enables firms to more comfortably handle risks and uncertainties, embracing digital transformation processes and organizational changes. Therefore, we

propose Hypothesis 1.

Hypothesis 1: Human capital promotes corporate digital development by enhancing R&D and innovation levels.

Impact on Executive Decision-Making: The theoretical framework suggests that executives, as primary decision-makers, significantly impact all production and operational activities within firms. The upper echelon theory proposes that the personal traits and experiences of executives influence corporate decision-making. Research has confirmed that executive teams affect the digital orientation (Singh et al., 2020; Shen et al., 2022), effective digitalization (Zhang et al., 2021), digital innovation capabilities (Yuan et al., 2012), and innovation capabilities of high-tech enterprises (Wu et al., 2021). These studies indicate that the background and experience of executive teams play a crucial role in corporate digital development, with executives having overseas experience becoming increasingly influential. Influenced by foreign values and business ethics, these executives are more likely to perceive technological changes in the external environment and recognize the importance of digital development, thereby making strategic decisions to enhance corporate value. Their comprehensive theoretical knowledge and professional management skills, gained through overseas work or study, make them confident in their abilities, willing to take on the market risks associated with digital transformation (Song et al., 2017). From a resource perspective, digital development requires social resources and capital. Executives with overseas experience can bring advanced technology, management practices, and international social networks, contributing strategic and valuable resources for digital development. Therefore, we propose Hypothesis 2.

Hypothesis 2: Human capital enhances corporate digital development by improving executive management levels.

3. Research Design

3.1 Sample Selection and Data Sources

This study selects A-share listed companies from 2007 to 2021 as the initial sample and processes the data as follows: (1) Excludes samples from the financial industry; (2) Excludes samples from ST (Special Treatment) companies; (3) Excludes samples with missing key variables; (4) To avoid the impact of extreme values, all continuous variables at the company level are minorized at the 1% level. The process of obtaining indicators for corporate digital development is based on the study by Wu Fei et al. (2021). Using Python, the annual reports of listed companies are analyzed to form text frequency measures related to corporate digitalization. Data on returnee executives and company-level data are sourced from the CSMAR (China Stock Market and Accounting Research) and WIND databases. Ultimately, this study obtains 35,927 firm-year observations.

3.2 Regression Model and Variable Definition

To test the research hypothesis, this paper constructs the following model:

$$Digital_{it} = \alpha_0 + \alpha_1 \text{Human}_{it} + \alpha_{it} \sum Control_{it} + \varepsilon_{it} \quad (1)$$

Among them, the explained variable Digital is a proxy indicator of the digital development of the enterprise; the explanatory variable Human is a proxy indicator of the human capital level of the enterprise (expressed by the proportion of employees with a bachelor's degree or above to the total number of employees); Control is the control variable.

3.3 Explanation of Variables

3.3.1 Explained Variables

Enterprise digital development (*Digital*). Referring to the research of (Wu et al., 2021), Python crawler data was used to download the annual reports of A-share listed companies in Shanghai and Shenzhen from 2007 to 2021, and the relevant keywords were searched and counted using the vocabulary. Specifically, five vocabulary libraries, including artificial intelligence technology, big data technology, cloud computing technology, blockchain technology, and digital technology application, were analyzed first. Then, the characteristic words in the annual report were searched, matched, and the word frequency was counted. Finally, the word frequency was added up to obtain the enterprise digital level index. The larger the value, the higher the degree of digitalization of the enterprise.

3.3.2 Explanatory Variables

Human capital level (*Human*). This paper constructs the following indicators to measure the human capital level of enterprises, the proportion of employees with bachelor's degree or above in the total number of employees.

3.3.3 Control Variables

Referring to previous studies, this paper selected relevant variables from the aspects of enterprise characteristics and corporate governance as control variables, including enterprise size (*Size*), net profit margin of total assets (*ROA*), debt-to-asset ratio (*Lev*), company establishment years (*FirmAge*), shareholding ratio of the largest shareholder (*TOP1*), dual-position (*Dual*), and independent director ratio (*Indep*). In addition, the industry, province, enterprise, and year fixed effects were also controlled. The specific definitions of each variable are shown in Table 1.

3.3.4 Intermediary Variables

R&D innovation level (*Inn*): This paper uses the proportion of R&D funds to represent the R&D innovation level of enterprises.

Management level (Oversea_pro): This paper uses the proportion of returned executives in the executive team to measure the management level of enterprises.

Table 1. Variable Definition

Variable Type	Variable Name	Variable Symbol	Variable Definition

Explained Variable	Enterprise digital development	Digital	Enterprise digital word frequency analysis statistics obtained from enterprise annual report text analysis
Explanatory Variable	Undergraduate proportion	Human	The proportion of employees with a bachelor's degree or above in the total number of enterprises
Intermediate Variable	R&d and Innovation level	Inn	Investment in research and development as a proportion of total investment
	Management level	Oversea_pro	The proportion of overseas executives in the senior management team of enterprises
Control Variable	Enterprise scale	Size	The natural logarithm of a firm's total assets
	Net profit rate on total assets	ROA	The ratio of net profit to total assets of an enterprise
	Asset-liability ratio	Lev	The ratio of total liabilities to total assets of an enterprise
	Establishment years of enterprises	FirmAge	Establishment time of enterprise
	The proportion of the largest shareholder	TOP1	The proportion of the largest shareholder
	Dual function	Dual	If the chairman and general manager are the same person, take 1, otherwise take 0
	Proportion of independent directors	Indep	Number of independent directors/total number of board of directors

Note: ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

4. Empirical Analysis

4.1 Baseline Regression Results

According to model (1), the benchmark regression results table in Table 2 reports the impact of the improvement of human capital on the digital development of enterprises. Among them, column (1) means no control variables are added and only the industry and year are fixed. Column (2) means control variables are added and the industry and year are fixed. Column (3) means the industry, province and year are fixed after adding control variables. Column (4) adds control variables and fixes the company and year. The impact coefficients are all significantly positive at the 1% level, indicating that improving human capital levels can promote the digital development of enterprises.

Table 2. Reference Regression

	(1)	(2)	(3)	(4)
Variable	model1	model2	model3	model4
Human	0.014***	0.012***	0.013***	0.007***
	(13.56)	(12.54)	(12.95)	(7.51)
Size		0.148***	0.148***	0.253***
		(13.01)	(13.03)	(12.50)
ROA		-0.062	-0.084	-0.176*
		(-0.51)	(-0.70)	(-1.89)
Lev		-0.116*	-0.092	-0.076
		(-1.69)	(-1.35)	(-1.02)
FirmAge		-0.075*	-0.084**	0.183*
		(-1.90)	(-2.11)	(1.76)
Top1		-0.344***	-0.349***	-0.689***
		(-4.30)	(-4.34)	(-5.35)
1.Dual		0.089***	0.075***	-0.008
		(3.58)	(3.06)	(-0.36)
Indep		0.218	0.182	-0.394**
		(1.11)	(0.96)	(-2.57)
Observed value	35,895	35,893	35,893	35,893
R^2	0.244	0.265	0.274	0.379
Industry fixation	YES	YES	YES	NO
Provincial fixation	NO	NO	YES	NO
Enterprise fixation	NO	NO	NO	YES
Year fixation	YES	YES	YES	YES

Note: ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

4.2 Heterogeneity Analysis

4.2.1 Regional Heterogeneity

Due to significant differences in economic conditions, institutional environments, and policy incentives across different regions, this study investigates the heterogeneity of the impact of human capital on corporate digitalization by categorizing the sample firms based on their geographical locations into eastern, central, and western regions. The analysis results are presented in Table 3.

In the eastern and central regions, the enhancement of human capital significantly promotes corporate digitalization levels. However, in the western region, the impact is not significant. This discrepancy can

be attributed to several factors. The eastern and central regions were opened to foreign investment earlier, are more economically developed, and have higher levels of education and human capital. In contrast, the western region has historically been more isolated, with lower levels of economic development and less developed institutional environments, making it difficult to attract and retain highly educated talent (Zhang et al., 2016).

Table 3. Regional Heterogeneity Analysis

	(1)	(2)	(3)
Variable	Eastern region	Central region	Western region
Human	0.007***	0.005***	0.003
	(6.67)	(2.83)	(1.22)
Control	YES	YES	YES
Enterprise fixation	YES	YES	YES
Year fixation	YES	YES	YES
Observed value	25,226	6,290	4,377
R^2	0.393	0.357	0.357

Note: ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

4.2.2 Type Heterogeneity

This article conducts heterogeneity analysis from the two dimensions of enterprise intensity type and technological attributes, and groups the samples as follows: First, referring to the research of Dong et al. (2021), according to the different factor intensity of the industry in which the enterprise is located, it is divided into labor-intensive There are three sub-samples of type, capital-intensive and technology-intensive enterprises. As can be seen from columns (1), (2) and (3) of Table 4, among these three types of intensive enterprises, the human resources of technology-intensive enterprises and capital-intensive enterprises and capital coefficients are both significant. This is because technology-intensive and capital-intensive enterprises have much higher requirements for innovation and R&D than labor-intensive enterprises. This means that these enterprises need to have more divergent thinking and more outstanding innovation capabilities. of highly educated talents.

Table 4. Heterogeneity Analysis of Firm Intensive Types

	(1)	(2)	(3)
Variable	Labor intensive	Capital intensive	Technology-intensive
Human	-0.001	0.006***	0.011***
	(-0.51)	(3.36)	(7.80)
Control	YES	YES	YES

Enterprise fixation	YES	YES	YES
Year fixation	YES	YES	YES
Observed value	9,748	10,159	15,986
R^2	0.374	0.316	0.434

Note: ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

Second, referring to the method of Peng and Mao (2017), the sample enterprises are divided into two sub-samples: "high-tech enterprises" and "non-high-tech enterprises" according to whether they belong to the high-tech industry. It can be seen from columns (1) and (2) of Table 5 that compared with non-high-tech enterprises, high-tech enterprises have higher requirements for innovation and R&D, and R&D requires not only divergent thinking, but more importantly, a large amount of professional knowledge as a foundation. The higher the education level of employees, the more cutting-edge knowledge and technology they master, and the stronger their sense of identity with the company's innovation practices (Huang et al., 2010), which is also more conducive to the smooth implementation of the company's R&D plan.

Table 5. Analysis on the Heterogeneity of Technological Attributes of Enterprises

	(1)	(2)
Variable	High technology	Non-high-tech
Human	0.013***	0.001
	(9.91)	(1.22)
Control	YES	YES
Enterprise fixation	YES	YES
Year fixation	YES	YES
Observed value	20,323	15,570
R^2	0.402	0.361

Note. ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

4.3 Mechanism Analysis

4.3.1 The Level of Human Capital Will Promote the Digital Development of Enterprises by Improving the Level of R&D and Innovation

The regression results of R&D innovation level (*Inn*) as the mediating variable are shown in columns (1) to (3) in Table 6. The results in column (1) show that the regression coefficient is 0.013 and is significant at the 1% level, indicating that the improvement of human capital levels promotes the digital

development of enterprises. The results in column (2) show that the regression coefficient of the improvement of human capital level on the level of R&D innovation is 0.048, and is significant at the 1% level, which means that digital infrastructure construction improves the level of technological innovation of enterprises. Column (3) incorporates human capital level and enterprise R&D innovation level into the regression model at the same time, and finds that the regression result of human capital level is 0.103, and is significant at the 1% level. The regression coefficient of column (3) is still significantly positive. This result shows that the mediating effect of R&D innovation level exists, that is, the level of human capital will promote the digital development of enterprises by improving the level of R&D innovation. Hypothesis 1 has been verified.

Table 6. Innovation Influence

	(1)	(2)	(3)
Variable	step1	step2	step2
Human	0.012***	0.001	0.012***
	(12.54)	(0.68)	(12.53)
Inn			0.003**
			(2.54)
Control	YES	YES	YES
Enterprise fixation	YES	YES	YES
Year fixation	YES	YES	YES
Observed value	35,894	35,894	35,894
R^2	0.492	0.416	0.492

Note. ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

4.3.2 Human Capital Enhances Corporate Digitalization through Management Level Improvement

The regression results for management level (Oversea_pro) as a mediating variable are presented in columns (1) to (3) of Table 7. Column (1) shows a regression coefficient of 0.013, significant at the 1% level, indicating that an improvement in human capital significantly promotes corporate digitalization. Column (2) reports a regression coefficient of 0.000 for the impact of human capital improvement on management level, also significant at the 1% level, suggesting that human capital enhancement positively affects management level. When both human capital level and management level are included in the regression model in column (3), the regression coefficient for human capital remains positive and significant at 0.012 at the 1% level. These results confirm the presence of a mediating effect, indicating that human capital enhancement promotes corporate digitalization through the improvement of management level, thus validating Hypothesis 2.

Table 7. Management Level Influence

	(1)	(2)	(3)
Variable	step1	step2	step2
Human	0.013***	0.000***	0.012***
	(12.77)	(4.37)	(12.58)
Oversea_pro			0.785***
			(5.27)
Control	YES	YES	YES
Enterprise fixation	YES	YES	YES
Year fixation	YES	YES	YES
Observed value	35,895	35,895	35,895
R^2	0.492	0.100	0.494

Note. ***, **, and * represent significant at the 1%, 5%, and 10% levels respectively.

5. Conclusion and Recommendations

Using a sample of A-share listed companies in China from 2007 to 2021, this study empirically examines the impact of human capital on the digital transformation of Chinese listed companies. The findings reveal that human capital is a significant driver of corporate digitalization, with this conclusion remaining robust after a series of stability tests. Mechanism analysis shows that upgrading human capital levels empowers corporate digital development by enhancing R&D innovation and management levels, with empirical results validating the mediating effect. Heterogeneity analysis indicates that improvements in human capital levels are more conducive to promoting digitalization in Eastern and Central regions compared to Western regions; human capital enhancements significantly impact the digital transformation of technology-intensive and capital-intensive enterprises, as well as high-tech industries.

The findings of this study have significant implications for enterprise development and policy formulation. The government should adopt a dual approach of attracting and nurturing talent, enhancing policy guidance and support. This includes providing financial aid and tax incentives to enterprises, building digital infrastructure, promoting data sharing, and fostering the development and application of new productivity-related technologies to aid enterprises in achieving digital transformation. It is also crucial to focus on cultivating international talent by continuously developing and improving the training system for overseas students. Policies and services that make returning to China more appealing, alongside attractive career development plans and compensation packages, can enhance domestic enterprises' attractiveness to overseas talent.

Enterprises: First, pay close attention to the latest policy requirements issued by the state, and make timely adjustments to the enterprise development model; second, they should establish a digital consciousness, increase technological investment, utilize the new quality productivity to promote

innovation, cultivate digital talents, optimize business processes, and make data-driven decisions. To keep pace with the development of the times, business managers should have out-of-the-box thinking and not be too traditional, pay attention to enterprise innovation and digital talent training and recruitment, enhance the use of information infrastructure, and formulate the direction of enterprise development according to the market requirements; thirdly, the enterprise government and enterprises need to strengthen cooperation and exchange, and jointly explore convenient digital paths to promote industrial upgrading and innovative development, enhance overall competitiveness, and contribute to the high-quality development of economy, and better improve the overall competitiveness. boost the high-quality development of the economy, and better adapt to the new challenges and opportunities of the digital era. At the same time, enterprises should strengthen information exchange, help each other, and work together to contribute to the development of China's digital economy.

References

Cao, H. P., Ma, Y. F., & Ding, Y. F. (2023). Digital transformation of overseas executives and enterprises—Experiential evidence from Chinese A-share listed companies. *Research on Financial Development*, (09), 22-30.

Chen, Q. J., Wang, Y. M., & Wan, M. F. (2021). Study on the same group effect and its influencing factors of enterprise digital transformation. *Journal of Managemen*t, *18*(05), 653-663.

Dai, Y. H., & Kong, D. M. (2017). Whether the overseas experience of senior executives can improve the investment efficiency of enterprises. *The World Economy*, *40*(01), 168-192.

Deng, X. M., Liu, Y., Long, X. Y., Ye, Z., & Luo, H. (2020). Study on the Relationship between heterogeneity of executive Team functions and Corporate Performance: A mediation analysis based on manager cognition and team conflict. *Journal of Management Engineering*, *34*(03), 32-44.

Dong, F. Y., & Guo, Z. G. (2021). Venture capital and enterprise technology innovation—Based on the difference of factor intensity industry research. *Finance and Trade Research*, *32*(08), 99-110.

Gan, W. Y., & Liu, M. (2022). Returnees' senior executives and enterprise innovation: Based on the perspective of cultural convergence. *Journal of Shanghai University of Finance and Economics*, *24*(01), 92-106.

Giannetti, M., Liao, G. M., & Yu, X. Y. (n.d.). The Brain Gain of Corporate Boards: Evidence from China. *The Journal of Finance*, *70*(4), 1629-1682. https://doi.org/10.1111/jofi.12198

Huang, X., Li, C. H., & Xue, Y. M. (2010). The relationship between knowledge structure characteristics of senior management team and enterprise growth—Based on the small and medium-sized enterprise sector]. *Economic problems*, (02), 89-94.

Ji, Y. Y., Zhou, X., & Zhang, Q. (2023). Digital transformation and enterprise innovation—Based on the perspective of R & D investment and R & D efficiency. *Financial Research*, (04), 111-129.

Karl, S. R., & Warner, M. W. (2018). Building dynamic capabilities for digital transformation: An

ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 326-349. https://doi.org/10.1016/j.lrp.2018.12.001

Liu, J. H., Tian, Q., & Wu, F. (2022). Chairman's R & D background and enterprise digital transformation—The empirical evidence of big data identification from the annual report text of Chinese listed enterprises. *Technical Economy*, *41*(08), 60-69.

Peng, H. X., MAO, X. S. (2017). Government innovation subsidy, company executive background and R & D investment—Empirical evidence from China's high-tech industry. *Finance and Trade Economy*, *38*(03), 147-161.

Shen, F., Tao, Q. Z., & Zhang, Y. (2022). Research on the influence of directors' overseas background on enterprise green technology innovation—A Perspective based on corporate reputation. *Journal of Shanghai University of Finance and Economics*, 24(03),108-122.

Singh, A., Klarner, P., & Hess, T. (2020). How do chief digital officers pursue digital transformation activities? The role of organization design parameters. *Long Range Planning*, *53*(3), 101890. https://doi.org/10.1016/j.lrp.2019.07.001

Song, J. B., Wen, W., & Wang, D. H. (2017). Can overseas executives promote corporate risk taking—Empirical evidence from Chinese A-share listed companies. *Finance and Trade Economy*, *38*(12), 111-126.

Tu, X. Y., & Yan, X. L. (2022). Digital transformation, knowledge spillover and total factor productivity of enterprises—Empirical evidence from listed manufacturing companies. *Research on Industrial Economy*, (02), 43-56.

Wang, S. Y., & Xing, Y. (2020). Dual-dimensional analysis of the diversification of senior management teams affecting enterprise innovation ability—Empirical test based on gem data. *Management Review*, *32*(12), 101-111.

Wu, F., Hu, H., Z., Lin, H. Y., & Ren, X. Y. (2021). Enterprise digital transformation and capital market performance—Empirical evidence from stock liquidity. *Manage World*, *37*(07), 130-144 + 10.

Xiao, T. S., Sun, R. Q., Yuan, C., & Sun, J. (2022). The digital transformation of enterprises, human capital structure adjustment and labor income share. *Management World*, *38*(12), 220-237.

Xu, Z., Zheng, L. H., & Cheng, M. Y. (2023). The internal logic and practical conception of new-quality productivity enabling high-quality development. *Contemporary Economic Research*, (11), 51-58.

Yang, J. P., & Xu, N. (2023). The influence of dynamic ability and the configuration effect of executive social capital on the digital transformation of enterprises—Take gem listed companies as an example. *Technical Economy*, *42*(04), 97-109.

Ye, Y. W., Li, X., & Liu, G. C. (2022). Digital transformation and the upgrading of enterprise human capital. *Financial Research*, (12), 74-92.

Yuan, C., Xiao, T. S., & Geng, C. X. (2021). Digital transformation and enterprise division of labor: specialization or vertical integration. *Industrial Economy of China*, (09), 137-155.

Zhang, D., Hu, W. L., & MAO, X. S. (2021). Research and development background Executive power and corporate innovation. *China's Industrial economy*, (04), 156-174.

Zhang, K. X., & Chen, X. R. (2021). Who is pushing for digital?—An empirical study based on the perspective of higher-order theory and brand theory. *Economics and Management Research*, *42*(10), 68-87.

Zhang, X. D., & Wu, J. (2016). *Can overseas returnee executives promote enterprise technological innovation*?. *Science and Science and Technology Management*, *37*(01), 115-128.

Zhang, Z. G., Hu, A. T., & Huang, J. M. (2019). Functional background of senior executive team and enterprise innovation performance—The intermediary role of "energy" and "resources". *Scientific and technological Progress and Countermeasures*, *36*(24), 143-152.

Zhao, C. Y., Wang, W. C., & Li, X. S. (2021). How the digital transformation affects the total factor productivity of enterprises. *Finance and Trade Economy*, *42*(07), 114-129.