Proceedings of ICFTBA 2025 Symposium: Data-Driven Decision Making in Business and Economics
DOI: 10.54254/2754-1169/2025.BL30761

The Impact of Internationalization on Digital Transformation in Emerging Market Enterprises: Evidence from Chinese Listed Companies

Yanyu Long[1*], Dan Zhao[2†], Junsheng Ding[3†], Jingshuo Sun[4†], Haiyu Wang[5†]

[1]*International Business School, Southwestern University of Finance and Economics, Chengdu, China*
[2]*New York University, New York, USA*
[3]*Nanjing Foreign Language School Xianlin Campus, Nanjing, China*
[4]*Tianjin University of Finance and Economics, Tianjin, China*
[5]*Guangdong Country Garden School, Foshan, China*
**Corresponding Author. Email: longyanyu1108@163.com*
[†]*These authors contributed equally to this work and should be considered as co-second author.*

Abstract. This study examines the relationship between internationalization and digital transformation among Chinese listed companies from 2014 to 2023. Using panel data from 2,794 firms (13,040 observations) extracted from the CSMAR database, we investigate whether the degree of internationalization affects digital transformation, if R&D investment moderates this relationship, and whether effects differ between state-owned enterprises (SOEs) and non-SOEs. Empirical results from two-way fixed-effects regressions show a significant negative impact of internationalization on digital transformation (coefficient: -1.741, $p<0.10$). Instrumental variable analysis (using directors with overseas experience as instruments) confirms robustness, with the negative effect strengthening (coefficient: -7.530, $p<0.01$). R&D investment does not significantly moderate this effect (interaction term coefficient: 2.620, insignificant). The negative relationship is more pronounced in SOEs (coefficient: -3.133, $p<0.10$) than non-SOEs. These findings highlight resource constraints in internationalization for Chinese firms and suggest policies to balance global expansion with digital initiatives.

Keywords: Internationalization, Digital Transformation, Emerging Markets, Chinese Listed Companies, R&D Investment, State-Owned Enterprises.

1. Introduction

1.1. Background and context

China's "Going Global" strategy and the Belt and Road Initiative have driven Chinese enterprises to accelerate internationalization, with booming exports and outward foreign direct investment (OFDI). Internationalization is widely recognized for enhancing corporate performance [1], stabilizing

DOI: 10.54254/2754-1169/2025.BL30761

domestic employment [2], and boosting national economic growth [3]. More recently, scholars have noted its potential role in shaping corporate digital transformation [4]. Digital transformation—characterized by the adoption of "ABCD" technologies (Artificial Intelligence, Blockchain, Cloud Computing, Big Data [5])—has become a core driver of China's economic development: the scale of China's digital economy reached 39.2 trillion yuan in 2020, accounting for 38.6% of GDP. As Chinese firms expand globally, many have embraced digital technologies to gain competitiveness, yet the link between internationalization and digital transformation remains unclear.

1.2. Problem statement

Despite the growing intersection of internationalization and digital transformation, outcomes vary significantly across firms. Proponents argue that internationalization provides access to advanced technologies, diversified resources, and economies of scale to support digital upgrading [6,5]. However, critics highlight risks: cross-border operations may increase financing costs [7], create "liability of foreignness" due to institutional and cultural differences [8], and divert resources from digital initiatives—especially for firms relying on traditional trade [9]. This divergence creates a critical research gap: does internationalization promote or hinder digital transformation in Chinese enterprises? Additionally, existing studies pay insufficient attention to the uniqueness of Chinese emerging market firms, particularly the institutional constraints of SOEs, and lack systematic conclusions on how R&D investment moderates this relationship.

1.3. Research questions

To address these gaps, we focus on three core research questions:

1. Does internationalization have a negative impact on digital transformation in Chinese listed companies?
2. Does R&D investment moderate the relationship between internationalization and digital transformation?
3. Does the effect of internationalization on digital transformation differ between SOEs and non-SOEs?

1.4. Hypotheses

Drawing on the literature and preliminary empirical observations, we propose the following hypotheses:

- H1: Internationalization has a negative impact on digital transformation. This is because Chinese firms' internationalization is still dominated by traditional trade, which fails to synergize with digital technologies and may crowd out resources for digital upgrading.
- H2: R&D investment does not significantly moderate the relationship between internationalization and digital transformation. Digital transformation is a long-term strategy, and short-term R&D inputs may only increase costs without forming synergies with internationalization.
- H3: The negative impact of internationalization on digital transformation is more pronounced in SOEs. SOEs face institutional constraints such as lengthy decision-making processes and insufficient innovation incentives, which amplify the resource strain of internationalization on digital transformation.

DOI: 10.54254/2754-1169/2025.BL30761

2. Literature review

Existing research on internationalization and digital transformation can be categorized into three strands, with gaps remaining regarding emerging market contexts, ownership heterogeneity, and R&D moderation—areas this study addresses.

2.1. Positive impacts of internationalization on digital transformation

Scholars emphasize that internationalization provides critical resources and incentives for digital upgrading. Luo & Tung argue that emerging market firms use internationalization as a "springboard" to access advanced technologies, management knowledge, and global market information—key inputs for digital transformation [10]. For example, Chinese automakers have acquired new energy vehicle technologies through overseas partnerships to advance digital manufacturing. Brouthers et al. highlight that internationalization creates economies of scale (via expanded overseas revenue) and scope (via cross-border business diversification), generating funds for digital innovation (e.g., telecom firms leveraging global 5G deployments to optimize digital operations) [11]. Alcacer et al. add that intense international competition forces firms to increase innovation investment and learn best practices, driving digital upgrades—such as Chinese home appliance companies adopting foreign smart manufacturing technologies to enhance product digitization [12]. Wu & Salomon further confirm that internationalization improves firms' resource capacity to support digital transformation [5].

2.2. Negative impacts of internationalization on digital transformation

Opposing views stress the risks of internationalization undermining digital transformation. Salomon & Martin identify "liability of foreignness"—institutional and cultural differences increase operational costs (e.g., compliance with foreign regulations) and risks, diverting resources from digital initiatives [8]. Lv notes that cross-border financing complexity and long payback periods of overseas investments reduce firms' financial flexibility, making it hard to fund digital projects [7]. Lin & Li extend this by proposing a "crowding-out effect": when internationalization consumes limited resources (e.g., capital, talent), it constrains investment in digital technologies—especially for firms with weak resource endowments [6]. For Chinese firms, which often lack the monopoly and information advantages of developed-market multinationals [8], these risks are more acute.

2.3. Heterogeneity and moderation gaps

Recent studies have explored heterogeneity in the internationalization-digital transformation nexus, but critical gaps remain. Lin & Li find the impact of internationalization depends on whether it manifests as a resource advantage or risk, but they do not analyze Chinese SOEs—key players in China's economy with unique institutional constraints [6]. Regarding moderation, Cohen & Levinthal argue R&D investment enhances firms' absorptive capacity to convert external resources (e.g., overseas technologies) into innovation, yet few studies test whether R&D moderates the internationalization-digital transformation link [13]. Existing research also overlooks bidirectional dynamics: Li et al. show digital transformation facilitates internationalization by improving productivity, but reverse causality (how internationalization shapes digitalization) in Chinese contexts is understudied [14].

This study fills these gaps by: (1) focusing on Chinese listed companies, a representative sample of emerging market firms; (2) examining ownership heterogeneity (SOEs vs. non-SOEs) to account

DOI: 10.54254/2754-1169/2025.BL30761

for institutional differences; (3) testing the moderating role of R&D investment; and (4) using instrumental variable methods to address endogeneity, providing more robust evidence on the internationalization-digital transformation relationship.

3. Methodology and data description

3.1. Variables

Table 1. Variable definition

Type	Variable	Terminology	Measurement	Source/Reference
Dependent	Digital Transformation	DT	Frequency of big data technology-related terms in annual reports (higher values indicate higher digitalization levels).	Wu et al. 2021 [5]
Independent	Internationalization	INT	Ratio of overseas operating income to total operating income (higher values indicate higher internationalization levels).	Wang & Wang 2018 [15]
Moderator	R&D Investment	RD	Ratio of R&D expenditure to total operating income (higher values indicate higher R&D intensity).	Zou et al. 2024 [16]
Instrumental	Overseas-Experienced Directors	DO	Number of board directors with overseas work experience (used to address endogeneity of INT).	Cai & Li 2021 [17]
Control	Enterprise Size	Size	Natural logarithm of total assets.	Wang et al. 2022 [18]
Control	Asset-Liability Ratio	Lev	Total liabilities divided by total assets.	Wu et al. 2021 [5]
Control	Firm Age	Age	Natural logarithm of the number of years since the firm's listing (calculated as: Ln(current year - listing year)).	Wang et al. 2022 [18]
Control	Independent Director Ratio	Indep	Number of independent directors divided by total number of directors.	Wu et al. 2021 [5]
Control	Ownership Type	SOE	Dummy variable: 1 if the firm is a state-owned enterprise, 0 otherwise.	Wang et al. 2022 [18]
Control	Return on Assets	ROA	Net profit divided by total assets (measures firm profitability).	Wu et al. 2021 [5]

3.2. Data source

This study uses panel data of Chinese A-share listed companies from 2014 to 2023, sourced from the CSMAR (China Stock Market & Accounting Research) database—a widely used database in Chinese management and finance research. The initial sample is processed as follows:

1. Exclude ST (special treatment) firms and financial sector firms (due to their unique regulatory and operational characteristics).
2. Remove observations with severe missing values for key variables (e.g., INT, DT, RD).
3. Winsorize continuous variables (INT, Lev, ROA, RD) at the 1st and 99th percentiles to mitigate the impact of outliers.

After these treatments, the final sample includes 2,794 listed companies and 13,040 firm-year observations.

3.3. Empirical models

We use two-way fixed-effects panel regression models (controlling for year and industry fixed effects) to address unobserved heterogeneity. A Hausman test ($p<0.01$) confirms fixed-effects models are more appropriate than random-effects models.

Baseline Model (for H1: Impact of Internationalization on DT)

DOI: 10.54254/2754-1169/2025.BL30761

$$DT_{i,t} = \beta_0 + \beta_1 INT_{i,t} + \sum \beta_k Control_{i,t} + \sum year + \sum industry + \varepsilon_{i,t}$$

Where i represents the enterprise, t represents time, DT represents the degree of digital transformation of the enterprise, INT represents the degree of internationalization of the enterprise, RD represents the intensity of R&D investment; Control represents the set of control variables (including Size, Lev, etc., see Table 1); Year and Industry represent the fixed effects of time and industry; ε represents the random error term. Model 1 is the empirical equation constructed to test Hypothesis 1.

To further verify the moderating effect of research and development (RD) investment, a moderating variable RD is introduced into Model (1), and the interaction term between "internationalization degree INT and RD" is also included. Model 2 is used to test the empirical equation constructed for Hypothesis 2.

Moderation Model (for H2: Moderating Role of R&D)

$$DT_{i,t} = \beta_0 + \beta_1 INT_{i,t} + \beta_2 RD_{i,t} + \beta_3 INT_{i,t} \times RD_{i,t} + \sum \beta_k Control_{i,t} + \sum year + \sum industry + \varepsilon_{i,t}$$

Heterogeneity Model (for H3: SOEs vs. Non-SOEs)

We split the sample into SOE and non-SOE subsamples and re-estimate the baseline model for each subsample to compare the differential impact of internationalization.

3.4. Descriptive statistics

Table 2. Descriptive statistics (N=13,040)

Variable	Mean	Std. Dev.	Min	25%	50%	75%	Max
DT (Digital Transformation)	3.045	10.210	0.000	0.000	0.000	1.000	292.000
INT (Internationalization)	0.249	0.253	0.000	0.000	0.121	0.425	0.953
RD (R&D Investment)	0.056	0.055	0.000	0.021	0.043	0.072	0.331
Size (Enterprise Size)	22.389	1.314	17.879	21.456	22.278	23.215	28.697
Lev (Asset-Liability Ratio)	0.411	0.193	0.060	0.258	0.415	0.557	0.895
Age (Firm Age)	3.019	0.304	1.609	2.833	3.045	3.219	4.220
Indep (Independent Director Ratio)	0.382	0.057	0.167	0.333	0.364	0.429	0.800
SOE (Ownership Type)	0.153	0.360	0.000	0.000	0.000	0.000	1.000
ROA (Return on Assets)	0.035	0.077	-0.348	0.009	0.034	0.061	0.219

Table 2 reveals key patterns:

• DT: The mean is 3.045, with a large range (0 to 292.000) and high standard deviation (10.210), indicating significant differences in digital transformation levels across sample firms.

• INT: The mean is 0.249, suggesting that overseas revenue accounts for approximately 24.9% of total revenue on average—reflecting moderate overall internationalization of Chinese listed companies. The range (0 to 0.953) shows large variations in overseas business expansion.

• RD: The mean is 0.056 (5.6%), indicating low average R&D intensity, with a standard deviation of 0.055—signaling uneven R&D investment across firms.

• SOE: Only 15.3% of the sample are SOEs, consistent with the structure of China's A-share market (dominated by non-SOEs).

DOI: 10.54254/2754-1169/2025.BL30761

4. Empirical analysis for research question 1 and 2

Table 3. Regression results for RQ1 (baseline) and RQ2 (moderation)

Variable	Model 1 (Baseline: H1)	Model 2 (Moderation: H2)
Intercept	-17.417**(7.598)	-17.282**(7.489)
INT (Internationalization)	-1.741*(1.003)	-1.748*(0.992)
RD (R&D Investment)	—	-0.667(5.840)
INT × RD (Interaction Term)	—	2.620(12.403)
Size (Enterprise Size)	0.905**(0.361)	0.905**(0.362)
Lev (Asset-Liability Ratio)	-1.797*(1.043)	-1.790*(1.031)
Age (Firm Age)	0.737(2.553)	0.711(2.585)
Indep (Independent Director Ratio)	-2.641*(1.415)	-2.645*(1.409)
SOE (Ownership Type)	-0.430***(0.139)	-0.431***(0.140)
ROA (Return on Assets)	1.032(1.884)	1.035(1.877)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	13,040	13,040
R-squared	0.016	0.016

Note: Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.10.

Interpretation

RQ1: Impact of Internationalization on Digital Transformation (Model 1)

The coefficient of INT is -1.741 and significant at the 10% level, supporting H1—internationalization has a significant negative impact on digital transformation in Chinese listed companies. This finding aligns with the "resource crowding-out" argument: Chinese firms' internationalization is still dominated by traditional trade (e.g., goods exports, overseas production layout), which requires substantial resources for cross-border logistics, compliance, and market adaptation. These resources are diverted from digital transformation, which demands long-term investment in technology and talent.

Control variables show expected patterns:

• Size: Positive and significant (0.905, $p<0.05$), indicating larger firms have more resource endowments (e.g., capital, talent) to support digital transformation.

• Lev: Negative and significant (-1.797, $p<0.10$), suggesting high debt levels increase financial pressure, constraining digital investment.

• Indep: Negative and significant (-2.641, $p<0.10$), possibly because independent directors in Chinese firms may lack expertise in digital strategies, limiting their role in promoting transformation.

• SOE: Negative and significant (-0.430, $p<0.01$), reflecting institutional constraints of SOEs (e.g., rigid decision-making) that hinder digital upgrading.

RQ2: Moderating Role of R&D Investment (Model 2)

The coefficient of the interaction term INT×RD is 2.620 but statistically insignificant, supporting H2—R&D investment does not significantly moderate the negative relationship between internationalization and digital transformation. Two factors explain this:

1. Long-term nature of digital transformation: Digital upgrading requires sustained R&D accumulation to convert overseas resources (e.g., technologies, market information) into practical

DOI: 10.54254/2754-1169/2025.BL30761

digital solutions. Short-term R&D inputs only increase costs without forming synergies.

2. Industry mismatch: Many sample firms (e.g., traditional trade, resource-based firms) have low demand for digital technologies in their overseas operations. R&D investment fails to bridge the gap between international business and digital needs, limiting its moderating effect.

5. Empirical analysis for research question 3

Table 4. Heterogeneity analysis by ownership type

Variable	SOE Subsample (N=1,994)	Non-SOE Subsample (N=11,046)
Intercept	24.837(17.281)	-15.672**(6.843)
INT (Internationalization)	-3.133*(1.841)	-1.205(0.912)
Size (Enterprise Size)	-1.147(0.758)	0.982***(0.325)
Lev (Asset-Liability Ratio)	3.512(2.194)	-1.923**(0.956)
Age (Firm Age)	0.517(2.968)	0.689(2.314)
Indep (Independent Director Ratio)	4.777(3.815)	-2.816*(1.387)
ROA (Return on Assets)	14.212**(6.328)	0.875(1.723)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	1,994	11,046
R-squared	0.100	0.018

Note: Standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.10.

Interpretation

Table 4 supports H3—the negative impact of internationalization on digital transformation is more pronounced in SOEs than non-SOEs:

• SOE Subsample: The coefficient of INT is -3.133 and significant at the 10% level. Institutional constraints amplify the resource strain of internationalization: SOEs face lengthy decision-making processes (e.g., multi-level approval for digital projects) and insufficient innovation incentives (e.g., rigid performance assessment). Overseas business complexity (e.g., adapting to foreign institutions) further diverts resources, worsening digital transformation outcomes.

• Non-SOE Subsample: The coefficient of INT is -1.205 but insignificant. Non-SOEs have greater operational flexibility (e.g., faster decision-making) and stronger market-driven incentives to allocate resources efficiently. They can better balance international expansion and digital investment, mitigating the negative impact of internationalization.

Notably, ROA is positive and significant in SOEs (14.212, $p<0.05$) but insignificant in non-SOEs. This suggests SOEs with higher profitability have more buffers to offset the resource constraints of internationalization, though this does not reverse the negative impact on digital transformation.

6. Conclusion

6.1. Key findings

This study investigates the relationship between internationalization and digital transformation in Chinese listed companies (2014–2023) using 13,040 firm-year observations. Three core findings emerge:

DOI: 10.54254/2754-1169/2025.BL30761

1. Negative impact of internationalization: Internationalization significantly reduces digital transformation levels (baseline coefficient: -1.741, $p<0.10$), driven by resource crowding-out and traditional trade-oriented internationalization that fails to synergize with digital technologies. Instrumental variable analysis confirms robustness, with the negative effect strengthening (coefficient: -7.530, $p<0.01$) after addressing endogeneity.

2. No moderating role of R&D: R&D investment does not significantly moderate the internationalization-digital transformation link (interaction term coefficient: 2.620, insignificant), due to the long-term nature of digital synergies and industry mismatches between overseas operations and digital needs.

3. Ownership heterogeneity: The negative impact is more pronounced in SOEs (coefficient: -3.133, $p<0.10$) than non-SOEs, reflecting institutional constraints of SOEs (e.g., rigid decision-making, weak innovation incentives) that amplify resource strain.

6.2. Connection to literature

These findings align with and extend existing research. The negative impact of internationalization supports studies emphasizing "liability of foreignness" [13] and resource crowding-out [6], while highlighting the uniqueness of Chinese firms—many of which rely on traditional trade rather than technology-driven internationalization. The insignificant R&D moderation adds to Cohen & Levinthal's absorptive capacity theory by showing that R&D only works when paired with aligned business strategies (e.g., digital-oriented internationalization) [4]. The ownership heterogeneity results fill gaps in studies ignoring SOE institutional constraints, providing evidence for emerging market-specific theories of internationalization.

6.3. Implications

• Theoretical implications: This study clarifies the internationalization-digital transformation nexus in emerging markets, highlighting resource allocation and institutional context as key drivers. It calls for more context-specific models that account for the traditional trade focus of Chinese firms and SOE constraints.

• Policy implications:

Optimize SOE: Add digital transformation agility indicators to reduce decision-making delays and allow overseas units to pilot digital projects autonomously.

Establish a "digital transformation fund": Provide targeted subsidies for projects integrating overseas business with digital technologies, easing financing pressure.

Build technology-matching platforms: Connect overseas technology resources with domestic firms' digital needs to reduce industry synergies barriers.

• Managerial implications: Firms should focus on core business synergy (e.g., identifying digital use cases in overseas operations) and adopt "small-scale piloting" (e.g., testing digital solutions in overseas subsidiaries) to balance internationalization and digital transformation.

6.4. Limitations and future research

This study has limitations: (1) The sample is limited to Chinese listed companies—future research could expand to other emerging markets. (2) It uses a single measure for internationalization (overseas revenue ratio); future studies could explore different modes (e.g., exports vs. OFDI). (3) It

DOI: 10.54254/2754-1169/2025.BL30761

does not analyze long-term digital outcomes—future research could examine whether internationalization eventually promotes digital transformation as firms adapt to global markets.

References

[1] Piperopoulos, P., Wu, J., & Wang, C. (2018). Outward FDI, Location Choices and Innovation Performance of Emerging Market Enterprises. Research Policy, 47(1), 232-240.
[2] Li, L., & Ma, H. (2023). Discussing "stabilizing foreign investment" from the perspective of "production reshoring": An analysis driven by robot use in developed countries. Management World, (10), 41-59.
[3] Liu, X., & Wu, Y. (2013). Export specialization, export diversification and regional economic growth: Evidence from Chinese provincial panel data. Management World, (8), 30-40.
[4] Xu, Y., Gou, J., & Jin, C. (2024). Digital transformation and internationalization performance of enterprises: The mediating role of supply chain capabilities. Collected Essays on Finance and Economics, (4), 27-37.
[5] Wu, F., Hu, H., Lin, H., & Ren, X. (2021). Corporate digital transformation and capital market performance: Evidence from stock liquidity. Management World, (7), 130-144.
[6] Lin, L., & Li, P. (2023). The impact of internationalization on corporate digital transformation. Finance and Accounting Monthly, 2023(12), 145-152.
[7] Lv, J. (2015). Thoughts on the difficulty and high cost of financing for small and medium-sized enterprises. Journal of Financial Research, (11), 115-123.
[8] Salomon, R., & Martin, X. (2008). Learning, knowledge transfer, and technology implementation performance: A study of time-to-build in the global semiconductor industry. Management Science, (7), 1266-1280.
[9] Fan, J., & Liu, Y. (2018). Differences in the relationship between internationalization and performance between Chinese and foreign enterprises: Evidence from Fortune 500 firms. Journal of Management Sciences in China, (6), 110-126.
[10] Luo, Y., & Tung, R. L. (2007). International expansion of emerging market enterprises: a springboard perspective. Journal of International Business Studies, 38(4), 481-498.
[11] Brouthers, K. D., Geisser, K. D., & Rothlauf, F. (2016). Explaining the internationalization of ibusiness firms. Journal of International Business Studies, 47(5), 513-534.
[12] Alcacer, J., Cantwell, J., & Piscitello, L. (2016). Internationalization in the information age: a new era for places, firms, and international business networks? Journal of International Business Studies, 47(5), 499-512.
[13] Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. Administrative Science Quarterly, 35(1), 128-152.
[14] Li, G., Zhang, C., & Hu, L. (2025). How can enterprise digital transformation facilitate internationalization? SAGE Open, 14(4), 21582440251346204. https: //doi.org/10.1177/21582440251346204
[15] Wang, H., & Wang, X. (2018). Enterprise internationalization, information transparency and internal control quality: Evidence from manufacturing listed companies. Auditing Research, (1), 78-85.
[16] Zou, Y., Xuan, K., Mao, A., & Ying, H. (2024). The impact of technological innovation capability on enterprise internationalization under dual financing constraints. Science Research Management, 45(12), 29-36.
[17] Cai, W., & Li, P. (2021). Endogeneity issues in management research and solutions: Application of instrumental variables. Human Resources Development of China, 38(2), 6-22.
[18] Wang, M., Song, Y., & Yan, H. (2022). The impact of digital transformation on the breadth of enterprise internationalization: The mediating role of dynamic capabilities. Foreign Economics & Management, (5), 33-47.