Accounting and Corporate Management (2026)
Clausius Scientific Press, Canada

DOI: 10.23977/acccm.2026.080101
ISSN 2523-5788 Vol. 8 Num. 1

Digital transformation of Chinese logistics enterprises: Impact on corporate innovation from the perspective of Fintech

Ji Na[1,2,a,*], Badrul Hisham Bin Kamaruddina[1,b]

[1]City Graduate School, City University, Kuala Lumpur, Malaysia
[2]Beijing Jiaotong University, Weihai, China
[a]jinacnooc@126.com, [b]badrul.hisham@city.edu.my
**Corresponding author: Ji Na*

Keywords: Digital transformation, corporate innovation, Fintech, logistics enterprises

Abstract: The rapid development of digital economy and digital technologies has rendered digital transformation an indispensable strategic imperative for logistics enterprises seeking innovative growth. This study utilizes panel data from China's A-share listed logistics companies spanning 2016 to 2024 to empirically examine the impact of enterprise digital transformation on corporate innovation. The findings demonstrate that digital transformation significantly enhances corporate innovation in China's logistics sector. And heterogeneity analysis reveals this catalytic effect to be particularly pronounced among large-scale non-state-owned enterprises in eastern regions. Further investigation identifies financial technology (Fintech) as playing a positive moderating role in this digital transformation-innovation relationship within China's logistics industry.

1. Introduction

Chinese logistics industry is currently undergoing a pivotal transformation from scale expansion to qualitative upgrading, confronting the dual challenges of rapidly expanding market size and persistently high logistics costs. The *14th Five-Year Plan for Modern Logistics Development* emphasizes the imperative of implementing digital transformation (DT) to enhance digital capabilities, reduce the ratio of total logistics costs to GDP, increase the proportion of intermodal freight volume, and establish modern logistics systems. The *Action Plan for Effectively Reducing Overall Social Logistics Costs* further underscores the necessity for logistics enterprises to optimize operational structures, enhance organizational capabilities, leverage technological solutions for cost reduction and efficiency improvement, and achieve innovation-driven development. Chinese logistics firms urgently need to reform traditional operational models and strengthen value creation capacities to meet increasingly diversified consumer demands as well as the industry's requirements for cost-efficient, high-quality, and innovative development (Gao, et al.,2023; Chen et al., 2023)[1,2].

According to statistics from the China Federation of Logistics & Purchasing (2023), over 60% of leading enterprises have implemented artificial intelligence and IoT technologies in warehousing and transportation operations, achieving significant operational cost reductions. However,

constrained by resource limitations, small and medium-sized enterprises exhibit insufficient adoption of advanced technologies despite initial digital transformation efforts, with 45% still relying on traditional TMS systems. This innovation deficit perpetuates homogeneous competition, contributing to declining profit margins and even cash flow crises affecting 32% of these enterprises. Current academic discourse remains divided regarding the conversion efficiency of digital investments into innovation outputs (Wang, 2023; Chen et al., 2025; ANA et al.,2021)[3-5]. This research context renders the investigation into how enterprise digital transformation impacts corporate innovation both theoretically meaningful and practically consequential.

Innovation serves as the primary driver of development and the strategic foundation for constructing a modernized economic system. It plays a pivotal role in invigorating corporate vitality and enhancing competitive advantage. While generating substantial returns, innovation simultaneously introduces heightened risks and operational uncertainties (Zhang, et al., 2023; and Zhang, et al., 2023)[6,7]. Existing scholarship has predominantly examined determinants of corporate innovation through lenses of internal governance, external policies, and social support mechanisms. With the emergence of novel digital technologies, the interplay between DT and corporate innovation has become an increasingly prominent research focus (Wu, et al., 2023)[8]. Liu Qilei et al. contend that DT inevitably catalyzes transformative shifts in corporate innovation activities[9]. Peng Ying et al. empirically demonstrated that enterprise DT can stimulate innovation by alleviating financing constraints and augmenting R&D investment[10]. However, the majority of extant literature adopts aggregate-level analyses of listed companies, largely overlooking inter-industry heterogeneities.

This study employs panel data from China's A-share listed logistics enterprises to construct benchmark regression and moderated mediation models, systematically examining both the impact of DT on corporate innovation and the regulatory role of fintech in the digitalization-innovation nexus within China's logistics sector.

2. Theoretical basis and research hypotheses

2.1. Digital transformation (DT) and corporate innovation

Distinct from other industries, innovation in logistics places greater emphasis on collaboration, agility, and service orientation. DT accelerates the convergence of innovative elements and stimulates innovation dynamics within enterprises. Technologies such as artificial intelligence, cloud computing, and big data drive innovative business practices in optimizing operational processes, rationalizing resource allocation, and enhancing service efficiency, thereby expanding the frontiers of technological innovation. According to the resource-based view (Barney, 1991), competitive advantage stems from heterogeneous resources and capabilities[11]. DT enables logistics firms to acquire strategic resources such as digital technologies, data assets, intelligent algorithms, and IoT devices, which constitute inimitable barriers facilitating multidimensional innovation including logistics workflow optimizations. Moreover, DT enhances internal resource optimization —through deep analysis of data resources, enterprises can identify critical links in logistics processes and implement targeted improvement measures to elevate innovation efficiency. By replacing resource-intensive conventional technologies with digital solutions, firms reduce material consumption while boosting innovation capacity. Hypothesis 1 is proposed.

Hypothesis 1 (H1): DT is positively correlated with corporate innovation

2.2. Fintech and corporate Digital Transformation (DT)

Fintech refers to an industrial paradigm that employs emerging digital technologies to optimize,

transform, and innovate financial products, services, and business processes. It provides enterprises and users with enhanced accessibility, intelligence, and inclusivity in financial services. Drawing empirical evidence from Chinese firms, Xiang et al. (2023) demonstrated Fintech's statistically significant role in accelerating corporate DT[12]. First, Fintech overcomes traditional financial constraints by utilizing logistics operational data—including shipping records, transaction ledgers, and warehouse documentation—to develop risk assessment models that facilitate collateral-free lending from financial institutions. Additionally, it enables receivable digitization through smart contract-enabled automated settlement, while API-integrated payment systems automate multi-party reconciliation among drivers, shippers, and platforms, significantly reducing manual accounting costs. It further enhances capital efficiency through real-time, low-cost cross-border freight settlements, improving cash flow and turnover ratios while alleviating financing constraints during digital transformation. Second, FinTech's dynamic insurance products combined with intelligent risk control and fraud prevention systems substantially diminish operational risks and cost burdens for logistics enterprises. These mechanisms collectively substantiate Hypothesis 2a. Hence, hypothesis 2a is proposed:

Hypothesis 2a (H2a): Fintech exerts a positive facilitating effect on corporate DT.

2.3. Fintech and corporate innovation

The innovation process necessitates not only premium human capital, cutting-edge instrumentation, and substantial research funding, but also inherently entails measurable risk exposure and outcome uncertainty(Li, et al., 2025)[13]. Fintech not only facilitates corporate innovation through direct research funding but also enhances strategic decision-making by providing comprehensive industry intelligence and market analytics. This dual capability empowers firms to identify emerging technological paradigms and untapped market potentials, thereby accelerating the commercialization and industrial advancement of corporate innovations (Sui, et al., 2024)[14]. Therefore, hypothesis H2b is proposed:

Hypothesis 2b (H2b): There is a positive correlation between Fintech and enterprise innovation.

Based on the above, Hypothesis 2 is proposed:

Hypothesis 2 (H2): Fintech exhibits a statistically significant positive moderating effect of DT on corporate innovation.

3. Methods setting and variable declaration

3.1. Model setting

Equation (1) is constructed to empirically test the impact of DT on corporate innovation in logistics enterprises, and to test hypothesis 1.

$$Enter\_I_{it} = \alpha_0 + \alpha_1 DCG_{it-1} + \sum Controls + \sum Years + \mu_i + \varepsilon_{it} \quad (1)$$

where let i and t denote the firm and year indicators, respectively. The term $Enter\_I_{it}$ captures firm i's innovation capability in period t, while DCG_{it-1} represents firm i's DT intensity in the preceding period (t-1). $\sum Controls$ is a series of control variables, and ε_{it} represents the random error term.

To empirically validate Hypotheses 2a and 2b delineated in Section 2, we implement the following simultaneous modeling framework:

$$DCG_{it} = \beta_0 + \beta_1 F\,\text{int}\,ech_{it} + \sum Controls + \sum \text{Years} + \mu_i + \varepsilon_{it} \quad (2)$$

$$Enter\_I_{it} = \gamma_0 + \gamma_1 F\,\text{int}\,ch_{it} + \sum Controls + \sum \text{Years} + \mu_i + \varepsilon_{it} \quad (3)$$

where, $F\,\text{int}\,ch_{it}$ is a variable that represents corporate innovation.

Based on equations (1)-(3), we augment the baseline framework with interaction terms to formally assess Fintech's moderating role (H2):

$$Enter\_I_{it} = \eta_0 + \eta_1 DCG_{it-1} \times Fintch_{it} + \eta_2 DCG_{it-1} + \eta_3 Fintch_i + \sum Controls + \sum \text{Years} + \mu_i + \varepsilon_{it} \quad (4)$$

3.2. Variable declaration

3.2.1. Dependent variable

Corporate innovation. Corporate innovation is formally defined as the systematic commercialization of novel or substantially enhanced products, service frameworks, manufacturing processes, organizational methodologies, or market-oriented strategies. We specifically delineate four principal dimensions: product innovation, process innovation, business model innovation, and service innovation. Grounded in the institutional characteristics of China's logistics sector, this study employs patent application data as a proxy for corporate innovation. And innovation output is quantified as the weighted sum of patent applications: corporate innovation =ln [design Patents + 2 ×utility Patents + 3 ×invention Patents + 1].

3.2.2. Explanatory variable

DT. Drawing on the methodology established by Wang et al. [15], which characterizes corporate DT through both digital technology adoption and implementation, this study employs textual analysis with Python and Java PDFBox to extract frequency metrics of DT keywords from annual reports. Following standard textual analysis protocol, we apply logarithmic transformation (ln[word frequency+1]) to construct our DT index, where higher values denote more advanced organizational digitization.

3.2.3. Moderating variable

Fintech. Fintech facilitates DT and innovation in logistics enterprises primarily through its dual technological and financial empowerment. This study measures regional Fintech development using the provincial-level (including municipalities and autonomous regions) count of Fintech firms - a higher value indicates more advanced regional Fintech capabilities. And Fintech level is measured as the logarithm of the number of Fintech companies in the firm's region plus one.

Building upon existing research findings, this study selects control variables from both enterprise and decision-maker perspectives. These include the Herfindahl-Hirschman Index (HHI) as a measure of market competition, firm size (measured as the natural logarithm of total assets, Size), firm age (Age, calculated as the difference between the observation year and the establishment year), and ownership concentration (Equity, represented by the proportion of shares held by the largest shareholder)

4. Empirical results and analysis

4.1. Data sources and descriptive statistics

This study employs Shanghai and Shenzhen A-share listed logistics enterprises from 2016 to 2024 as the initial sample, subsequently applying stringent screening criteria: (1) eliminating observations with significant data deficiencies, extreme values, or ST/PT status designations; (2) excluding firms lacking consecutive annual reports and corporate social responsibility disclosures to ensure textual data integrity for content analysis methodologies; (3) removing patent-inactive enterprises to maintain innovation measurement validity; and (4) implementing 1% bilateral winsorization to control for outlier effects. The refined dataset yields 10,036 firm-year observations. Micro-level financial variables were extracted from the CSMAR database, innovation metrics derived from patent filings documented in the Incopat global patent database, while digital transformation indicators were constructed through systematic textual analysis of annual reports acquired from the CNInfo disclosure platform. The descriptive statistical results for the main variables are shown in Table 1.

Table 1 Descriptive statistics of variables

	N	min	max	mean	P50	sd
DCG	149	3.155	4.125	3.592	3.581	0.209
Enter_I	149	0.000	7.185	2.407	2.565	1.900
Fintech	149	0.000	2.863	1.959	1.929	0.769
Size	149	4.828	11.071	7.978	8.590	1.432
Equity	149	0.081	0.726	0.380	0.371	0.158
Age	149	2.303	3.611	3.151	3.178	0.266
HHI	149	0.044	0.894	0.209	0.089	0.225

4.2. Benchmark regression

4.2.1. Impact of DT on corporate innovation

The regression results for Model (1) are presented in Table 2. Column (1) reports the baseline specification without control variables, while column (2) incorporates the full set of covariates. The coefficients for corporate innovation maintain statistical significance at the 1% level with positive signs across both specifications, demonstrating a robust positive association between DT and enterprise innovation. These empirical findings provide strong support for Hypothesis 1.

Table 2 Regression results of the impact of DT on corporate innovation

Variable	(1)	(2)
	Enter-I	Enter-I
DCG	0.320**	0.358**
	(4.099)	(4.545)
Controls & Years	NO	YES
N	149	149
R^2	0.103	0.156
Adj. R^2	0.096	0.127

Note: *, **, and *** represent significant values at the 10%, 5%, and 1% levels respectively with the value of t in parentheses.

4.2.2. Robustness test

To mitigate potential spurious regression results, this study reconstructs corporate digital transformation levels using indicators from the CSMAR database. The composite measure incorporates six weighted dimensions: strategic leadership, technology-driven initiatives, organizational empowerment, environmental support, digital outcomes, and digital applications. Corporate innovation is proxied by the natural logarithm of one plus the weighted sum of authorized utility model patents, design patents, and invention patents. Table 3 presents the corroborating regression results, demonstrating that digital transformation maintains statistically significant positive effects on innovation at the 1% level, consistent with benchmark regression findings. This robustness check substantiates the empirical conclusions.

Table 3 Regression results employing alternative proxy variables

Variable	(1)	(2)	(3)
	Enter_I	L_Enter_I	L_Enter_I
DCG		0.475** (6.762)	
L_DCG	0.473** (4.213)		0.562** (3.072)
Contrles & Years	YES	YES	YES
N	149	149	149
R^2	0.145	0.284	0.114
Adj. R^2	0.138	0.259	0.085

4.2.3. Endogeneity problems

While the aforementioned study has endeavored to control for relevant variables, endogeneity concerns persist. From an enterprise perspective, DT constitutes a deliberate investment decision, rendering its relationship with corporate innovation inherently uncertain. Additionally, the inability to account for all potential confounding factors may compromise the precision of model estimations and predictions. To mitigate endogeneity arising from simultaneity, this study employs a two-stage least squares (2SLS) instrumental variables approach for robustness verification. Regression results reveal that the coefficient for corporate innovation remains statistically significant at the 1% level while retaining its positive sign, corroborating baseline regression findings. This consistency across empirical specifications affirms the robustness of the primary conclusion—namely, that methodological choices do not fundamentally alter the established positive association between enterprise digital transformation and innovation output.

4.2.4. Heterogeneity analysis

The examination of how logistics firms' digital transformation enhances corporate innovation reveals distinct patterns across firm sizes: large-scale enterprises demonstrate a statistically significant positive coefficient (significant at the 0.01 level) for DT, whereas small-scale logistics firms show insignificant effects, as evidenced in columns (1) and (2) of Table 4. This indicates that DT significantly boosts innovation in large logistics firms but exhibits no discernible impact on small-scale counterparts. When analyzing ownership structures, DT exerts positive effects on innovation in both state-owned and non-state-owned logistics enterprises, albeit with notable differences in magnitude. Notably, non-state-owned logistics firms experience stronger innovation-promoting effects from digitalization, as shown in columns (3) and (4) of Table 4. From a regional

perspective, DT demonstrates insignificant innovation effects for firms in China's central and western regions, while exerting a statistically significant positive impact (at the 0.01 level) on eastern-region enterprises, detailed in columns (5) and (6) of Table 4.

Table 4 Heterogeneity analysis based on firm size, ownership structure, and regional characteristics

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Enter_I	Enter_I	Enter_I	Enter_I	Enter_I	Enter_I
DCG	0.194 (1.527)	0.467** (4.501)	0.354** (3.851)	0.300* (3.090)	0.121 (0.680)	0.432** (4.943)
Controls & Years	YES	YES	YES	YES	YES	YES
Classification basis	Small size	Big size	Non state-owned	State-owned	Midwestern	Eastern
	Based on the size		Based on nature of ownership		Based on regional features	
N	76	73	102	47	100	49
R^2	0.042	0.255	0.143	0.261	0.062	0.216
Adj. R^2	0.013	0.213	0.110	0.172	0.061	0.187

4.3. Moderating effect test of Fintech

The emergence of Fintech represents an innovative convergence of finance and digital technologies, which provides favorable external technological conditions to facilitate corporate DT and innovation. Specifically for logistics enterprises, Fintech offers expedited, cost-efficient, and low-risk financial support that enhances both their DT processes and innovation capabilities.

To ensure the robustness and reliability of this study, we adopted the methodology from Wang et al.[3] by employing the natural logarithm of the number of Fintech firms within each provincial unit plus one as a key measure. Additionally, the Digital Financial Inclusion Index was utilized to assess Fintech development levels, thereby validating the stability of regression results. The analysis first examines the direct impact of Fintech on corporate DT and innovation output. Subsequently, Model (4) is employed to test the moderating effect of Fintech on the relationship between DT and enterprise innovation performance, following established econometric procedures to verify these complex interactions.

Table 5 The moderating role of Fintech in the impact of corporate DT on enterprise innovation

Variable	(1)	(2)	(3)	Variable	(4)	(5)	(6)
	DCG	Enter_I	Enter_I		DCG	Enter_I	Enter_I
Fintech	0.031** (4.485)	0.014* (2.321)	0.012 (2.037)	L_Fintech	0.027** (4.238)	0.012* (2.031)	0.009 (1.037)
DCG		0.012** (4.379)	0.008** (3.681)	DCG		0.007** (3.293)	0.006** (3.711)
L_DCG Fintech			0.021** (2.589)	L_DCG L_Fintech			0.015** (2.650)
Controls & Years	YES	YES	YES	Controls & Years	YES	YES	YES
N	149	149	149	N	149	149	149
R^2	0.365	0.386	0.420	R^2	0.357	0.376	0.414
Adj. R^2	0.357	0.367	0.395	Adj. R^2	0.346	0.359	0.407

The results in column (1) of Table 5 demonstrate that Fintech significantly enhances enterprises'

DT at the 0.01 level, supporting hypothesis H2a. Column (2) reveals that, after controlling for DT, FinTech maintains a statistically significant positive effect on corporate innovation at the 0.05 level, thereby confirming hypothesis H2b. Column (3) indicates that the interaction term between Fintech and DT yields a positive coefficient significant at the 0.01 level, suggesting Fintech's significant reinforcing effect on innovation during logistics firms' DT, thus validating hypothesis H2. For robustness checks, columns (4)-(6) present regression results using the Digital Financial Inclusion Index as an alternative Fintech measure, with findings consistent with columns (1)-(3), confirming the stability of these conclusions.

5. Conclusion

This study employs data from Shanghai and Shenzhen A-share listed logistics enterprises from 2016 to 2024 to empirically examine the effects and mechanisms of DT on corporate financial performance enhancement, yielding the following conclusions: Firstly, DT significantly promotes innovation among Chinese logistics enterprises, though this positive effect does not exhibit cumulative characteristics. Secondly, Fintech demonstrates substantial facilitation effects on DT of Chinese logistics firms. Even after controlling for DT, Fintech maintains its positive influence on corporate innovation. Moreover, Fintech positively moderates the effect of DT on enterprise innovation in China's logistics sector. Thirdly, heterogeneity analysis from three perspectives - firm size, ownership type, and regional characteristics - reveals differential impacts of DT on innovation development. Notably, non-state-owned enterprises with larger scales operating in economically developed eastern regions exhibit more pronounced innovation benefits from DT.

References

[1] Gao Di, Yan Zhiwei, Zhou Xiaoyu, et al.(2023) Smarter and prosperous: Digital transformation and enterprise performance[J]. Systems, 7, 1-15.

[2] Chen Xing, Jiang Yang, Xiong Yun. (2023). Research on the Impact Mechanism and Path of Digital Transformation on Enterprise Performance. Reform of Economic System, 2, 112-120.

[3] Wang, Cai. (2021). Research on the mechanism of digital transformation's impact on corporate innovation performance. Contemporary Economy & Management, 43(3), 34–42.

[4] Chen Yi fei,Gu Ruihan, Xiao Peng. (2025) The Impact of Digital Transformation on Innovation Performance of Manufacturing Enterprises: from the Perspective of Absorptive Capacity. Science & Technology Progress & Policy, 1-8.

[5] ANA ROMERO-MARTÍNEZ, FERNANDO E, GARCÍAMUIÑA. Digitalization level, corruptive practices, and location choic ein the hotel industry[J] . Journal of Business Research, 2021, 136 :176-185.

[6] Zhang, Yan., Chen, Qi., & Jiang, Hao. (2023). Digital technology shock, governance models, and enterprise transformation and upgrading. Journal of Lanzhou University (Social Sciences), (2), 35–44.

[7] Zhang, Zhenhui, Xu, Zheng, & Ding, Ying. (2023). Do economic growth target constraints affect firm innovation? Economic Analysis and Policy, 78(C), 373–388.

[8] Wu, Shuang, & Li, Yang. (2023). A study on the impact of digital transformation on corporate ESG performance: The mediating role of green innovation. Sustainability, 15(8), 1–17.

[9] Liu, Qilei, Zhang, Yang, & Chen, Xin. (2023). Digital transformation and corporate innovation: Evidence from Chinese manufacturing firms. Technological Forecasting and Social Change, 186, 122139.

[10] Peng, Ying, & Tao, Chen. (2022). Can digital transformation promote enterprise performance?: From the perspective of public policy and innovation. Journal of Innovation & Knowledge, 7(3), 1-8.

[11] Barney, J. B. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120.

[12] Xiang Hailing, Ding Zijia, Xu Siyang, Wu Fei. (2023). Fintech and enterprise digital transformation. China Soft Science, 5,207-215.

[13] Li Jun, Chen Xi, Wan Liang. (2025). Is digital transformation boosting green innovation in logistics enterprises? Evidence from listed firms in China's logistics industry. JUSTC, 55(1): 0102.

[14] Sui Xiaoning, Jiao Shaopeng, Wang Yiming, et al.(2024). Digital transformation and manufacturing company competitiveness. Finance Research Letters, 59: 104683.

[15] Wang Xin, Huang Sujian, Fu Yumeng. Research on the impact mechanism of enterprise digitalization on internationalization: An integrated framework. Research on Economics and Management, 2023, 44(8):12-26.