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Digital Innovation in Media Enterprises and Digital Transformation: The Moderating Role of GAI Technology in Media Industry

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Abstract

This study investigates the influence of digital innovation in media enterprises on corporate digital transformation, with a particular focus on the moderating effect of Generative Artificial Intelligence (GAI) technology adoption. Using a comprehensive panel dataset of 4,930 firm-year observations from Chinese enterprises between 2015 and 2022, we empirically analyze how media firms' digital innovation capabilities drive organizational transformation and how GAI implementation amplifies these effects. Our findings reveal that digital innovation in media enterprises significantly accelerates digital transformation processes, with GAI technology serving as a positive moderator that enhances this relationship. The results remain robust across alternative specifications and endogeneity tests. Further mechanism analysis suggests that digital innovation primarily operates through improving information processing capabilities and fostering organizational learning. This research contributes to the literature on digital transformation and offers practical implications for corporate technology strategy and policy development in the digital economy era.

Keywords: digital innovation, media enterprises, digital transformation, GAI technology, media industry

1. Introduction

The digital economy has fundamentally reshaped competitive landscapes across industries, with digital transformation becoming an imperative rather than an option for contemporary enterprises (Verhoef et al., 2021). Media enterprises, in particular, face unprecedented pressure to innovate digitally due to changing consumption patterns and emerging technologies (Vial, 2019). Despite growing scholarly attention to digital transformation, the relationship between media enterprises' digital innovation and their broader digital transformation outcomes remains underexplored, especially in the context of emerging economies. Moreover, the recent proliferation of Generative Artificial Intelligence (GAI) technologies presents both opportunities and challenges for organizations navigating digital transformation journeys (Dwivedi et al., 2021). Yet, limited empirical research has examined how GAI adoption moderates the relationship between digital innovation and digital transformation outcomes. This gap is particularly pronounced in the media sector, where content creation and distribution are being revolutionized by AI technologies.

This study addresses these gaps by investigating two key research questions: (1) How does digital innovation in media enterprises affect their digital transformation outcomes? (2) How does the adoption of GAI technology moderate this relationship? Drawing on resource-based view and dynamic capabilities theory, we develop and test hypotheses using panel data from Chinese enterprises between 2015 and 2022.

Our research makes several contributions. First, we provide empirical evidence on the relationship between media enterprises' digital innovation and their digital transformation outcomes. Second, we examine the moderating role of GAI technology adoption, offering insights into how emerging technologies reshape transformation processes. Third, we identify key mechanisms through which digital innovation influences transformation outcomes. Finally, our findings provide practical guidance for managers and policymakers navigating digital transformation in the media industry.

2. Related Work and Theoretical Background

2.1 Digital Transformation in Media Enterprises

Digital transformation refers to the profound changes in business operations, products, processes, and organizational structures driven by digital technologies (Warner & Wäger, 2019). In media enterprises, this

transformation has been particularly disruptive, altering traditional value creation and capture models (Karimi & Walter, 2015). Previous studies have documented various dimensions of media digital transformation, including shifts in content creation (Holmberg et al., 2020), distribution channels (Hess & Matt, 2013), and revenue models (Bleyen et al., 2014).

While substantial research has explored digital transformation outcomes, less attention has been paid to the specific role of digital innovation capabilities as antecedents to successful transformation (Vial, 2019). Fitzgerald et al. (2014) suggest that digital innovation capabilities are crucial enablers of transformation, but empirical evidence on this relationship in media contexts remains scarce.

2.2 Digital Innovation Capabilities

Digital innovation capabilities encompass an organization's ability to leverage digital technologies to create novel products, processes, or business models (Nambisan et al., 2017). In media enterprises, these capabilities manifest in various forms, including content personalization algorithms, interactive experiences, and data-driven decision making (Küng, 2015).

The resource-based view suggests that organizations with superior digital innovation capabilities can achieve competitive advantage through digital transformation (Bharadwaj, 2000; Teece, 2018). Complementarily, dynamic capabilities theory emphasizes that firms must continuously reconfigure their resources and capabilities to succeed in rapidly changing digital environments (Teece et al., 1997; Helfat & Raubitschek, 2018).

2.3 GAI Technology as a Moderator

Generative AI represents a new frontier in artificial intelligence with capabilities to create content, analyze complex data patterns, and augment decision-making processes (Vaishya et al., 2020). Recent research suggests that GAI adoption can fundamentally alter organizational processes and capabilities (Davenport & Ronanki, 2018). However, few studies have examined how GAI technologies interact with existing innovation capabilities to influence transformation outcomes.

The technology acceptance model and innovation diffusion theory provide frameworks for understanding how organizations adopt and integrate new technologies like GAI (Davis, 1989; Rogers, 2003). These perspectives suggest that successful integration depends on both technological capabilities and organizational readiness.

3. Hypotheses Development

Drawing on the literature and theoretical foundations above, we develop two main hypotheses regarding the relationships among digital innovation, GAI adoption, and digital transformation.

3.1 Digital Innovation and Digital Transformation

Digital innovation capabilities enable media enterprises to sense new opportunities, reconfigure resources, and develop novel digital offerings (Helfat & Raubitschek, 2018). These capabilities are likely to accelerate digital transformation by enhancing adaptability to technological changes and market demands (Warner & Wäger, 2019). Media firms with strong digital innovation capabilities can more effectively implement digital technologies across their operations, restructure business processes, and develop new digital business models (Karimi & Walter, 2015).

Hypothesis 1: Digital innovation in media enterprises positively influences their digital transformation outcomes.

3.2 Moderating Effect of GAI Technology

GAI technologies offer unprecedented capabilities for content creation, personalization, and analytics that could amplify the impact of digital innovation on transformation outcomes (Davenport & Ronanki, 2018). When integrated with existing digital innovation capabilities, GAI can enhance data processing efficiency, enable more sophisticated content creation, and improve decision-making processes (Brynjolfsson & McAfee, 2017).

Media enterprises adopting GAI technologies may experience synergistic effects with their existing digital innovation capabilities, accelerating their digital transformation. GAI can augment human creativity, automate routine tasks, and enable novel approaches to media production and distribution (Küng, 2015).

Hypothesis 2: GAI technology adoption positively moderates the relationship between digital innovation in media enterprises and their digital transformation outcomes.

4. Method and Data

4.1 Research Design

Furthermore, we adopt a quantitative research approach using panel data analysis to test our hypotheses. This method allows us to capture both cross-sectional and temporal variations in the relationships among digital innovation, GAI adoption, and digital transformation outcomes. Our econometric specification is as follows:

$$DigiTransi,t = \beta_0 + \beta_1 DigiInnovi,t + \beta_2 GAIi,t + \beta_3 (DigiInnovi,t \times GAIi,t) + \gamma Xi,t + \alpha\_i + \lambda\_t + \varepsilon i,t$$

Where DigiTransi,t represents digital transformation outcomes for firm i in year t; DigiInnovi,t measures digital innovation capabilities; GAIi,t indicates GAI technology adoption; Xi,t is a vector of control variables; α_i and λ_t are firm and year fixed effects, respectively; and εi,t is the error term.

4.2 Data and Sampling

Our data comes from two comprehensive Chinese research databases: CNRDS (Chinese Research Data Services) and CSMAR (China Stock Market & Accounting Research Database). The initial sample included approximately 7,000 firm-year observations from Chinese publicly listed companies between 2015 and 2022. Following standard practice, we excluded special treatment firms (ST and PT), as well as observations with missing or abnormal data. The final cleaned sample comprises 4,930 firm-year observations.

4.3 Variable Measurement

Dependent Variable: Digital Transformation (DigiTrans) Digital transformation is measured using a composite index encompassing three dimensions: (1) Digital Business Models, assessed through the ratio of digital revenue to total revenue; (2) Digital Process Integration, measured by IT investment intensity and digital process patents; and (3) Digital Customer Experience, captured through digital customer touchpoints and online engagement metrics. Data for these measures were collected from corporate annual reports, supplemented by CNRDS specialized databases on digital transformation. Independent Variable: Digital Innovation in Media Enterprises (DigiInnov) Digital innovation is operationalized through: (1) Digital Patent Portfolio, counting patents related to digital technologies in media applications; (2) Digital R&D Intensity, measured as the ratio of digital R&D expenditure to total revenue; and (3) Digital Product Launches, tracked through new digital product announcements. These data were sourced from patent databases, annual reports, and CSMAR innovation metrics.

Moderating Variable: GAI Technology Adoption (GAI) GAI adoption is captured through: (1) GAI Investment, measured as expenditure on GAI technologies relative to total IT spending; (2) GAI Implementation, assessed through textual analysis of corporate disclosures regarding GAI usage; and (3) GAI Capabilities, measured through a specialized index from CNRDS that evaluates organizational AI maturity.

Control Variables We control for firm-specific characteristics including firm size (natural logarithm of total assets), firm age (years since establishment), financial performance (ROA), leverage (debt-to-equity ratio), ownership structure (state ownership percentage), and industry competition (Herfindahl-Hirschman Index). Additionally, we control for R&D intensity (R&D expenditure/total revenue) and prior digital transformation experience.

Table 1 presents descriptive statistics and correlations for all variables.

Table 1. Descriptive Statistics and Correlation Matrix

Variable	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10
1. DigiTrans	0.418	0.189	0.068	0.842	1.000									
2. DigiInnov	0.326	0.145	0.023	0.761	0.527**	1.000								
3. GAI	0.275	0.172	0.000	0.689	0.483**	0.412**	1.000							
4. Firm Size	9.876	1.423	6.243	13.567	0.302**	0.279**	0.344**	1.000						
5. Firm Age	17.632	9.341	2.000	42.000	-0.118*	-0.102*	-0.075	0.276**	1.000					
6. ROA	0.054	0.063	-0.127	0.215	0.215**	0.193**	0.145**	0.087*	-0.046	1.000				
7. Leverage	0.476	0.187	0.096	0.874	-0.083*	-0.112*	-0.067	0.346**	0.124**	-0.322**	1.000			

8. State Ownership	0.238	0.287	0.000	0.891	-0.143**	-0.165**	-0.108*	0.276**	0.387**	-0.094*	0.176**	1.000		
9. Industry HHI	0.145	0.076	0.052	0.437	-0.076	-0.082*	-0.035	0.018	0.045	-0.027	0.063	0.092*	1.000	
10. R&D Intensity	0.042	0.029	0.000	0.172	0.376**	0.512**	0.287**	0.125**	-0.157**	0.203**	-0.194**	-0.229**	-0.058	1.000

Note: ** p < 0.01, * p < 0.05

5. Results and Findings

5.1 Baseline Analysis

Table 2 presents the results of our fixed-effects panel regression analyses testing the relationship between digital innovation in media enterprises and digital transformation outcomes, as well as the moderating effect of GAI technology adoption.

Table 2. Fixed-Effects Regression Results on Digital Transformation

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
DigiInnov		0.426***	0.387***	0.375***
		(0.047)	(0.046)	(0.045)
GAI			0.319***	0.302***
			(0.052)	(0.051)
DigiInnov × GAI				0.247***
				(0.063)
Firm Size	0.032**	0.023*	0.019*	0.018*
	(0.011)	(0.010)	(0.010)	(0.009)
Firm Age	-0.004**	-0.003*	-0.003*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
ROA	0.417***	0.348**	0.326**	0.319**
	(0.127)	(0.121)	(0.119)	(0.118)
Leverage	-0.085*	-0.058	-0.053	-0.049
	(0.042)	(0.040)	(0.039)	(0.039)
State Ownership	-0.076**	-0.052*	-0.047*	-0.045*
	(0.028)	(0.026)	(0.026)	(0.025)
Industry HHI	-0.146	-0.131	-0.127	-0.123
	(0.106)	(0.101)	(0.099)	(0.098)
R&D Intensity	0.928***	0.573**	0.526**	0.512**
	(0.239)	(0.232)	(0.229)	(0.227)
Constant	0.183*	0.142*	0.137*	0.129*
	(0.079)	(0.075)	(0.074)	(0.073)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	4,930	4,930	4,930	4,930
R-squared	0.184	0.327	0.352	0.368
Adjusted R-squared	0.176	0.319	0.343	0.359

Note: Standard errors in parentheses. *** p < 0.001, ** p < 0.01, * p < 0.05

Model 1 includes only control variables. Model 2 adds the independent variable of digital innovation (DigiInnov), showing a positive and statistically significant coefficient ($\beta = 0.426$, $p < 0.001$), which supports Hypothesis 1. Model 3 incorporates GAI adoption, revealing that GAI has a direct positive effect on digital transformation ($\beta = 0.319$, $p < 0.001$). Finally, Model 4 introduces the interaction term between digital innovation and GAI adoption, showing a positive and significant interaction effect ($\beta = 0.247$, $p < 0.001$), which supports Hypothesis 2.

5.2 Robustness Tests

To ensure the robustness of our findings, we conducted several additional analyses. First, we employed alternative measures of digital transformation, including digital infrastructure investment ratio and digital employee ratio. Second, we used instrumental variable (IV) approaches to address potential endogeneity concerns, instrumenting digital innovation with industry average digital innovation and historical values. Third, we applied propensity score matching (PSM) to address selection bias in GAI adoption. Fourth, we conducted subsample analyses across different firm sizes and industry segments.

Table 3 summarizes the results of these robustness tests, which consistently support our main findings, suggesting that the positive relationship between digital innovation and digital transformation, as well as the moderating effect of GAI adoption, are robust to alternative specifications and endogeneity concerns.

Table 3. Robustness Test Results

Specification	DigiInnov Coefficient	GAI Coefficient	Interaction Coefficient
Alternative DV 1	0.354*** (0.051)	0.287*** (0.053)	0.218*** (0.065)
Alternative DV 2	0.392*** (0.048)	0.312*** (0.054)	0.233*** (0.064)
IV Approach	0.413*** (0.072)	0.293*** (0.061)	0.229** (0.078)
PSM Sample	0.381*** (0.049)	0.309*** (0.053)	0.241*** (0.064)
Large Firms	0.403*** (0.052)	0.326*** (0.057)	0.264*** (0.069)
Small Firms	0.347*** (0.053)	0.283*** (0.058)	0.215** (0.068)

Note: Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

5.3 Mechanism Analysis

To explore the mechanisms through which digital innovation influences digital transformation, we conducted mediation analyses focusing on two potential pathways: information processing capabilities and organizational learning. Table 4 presents the results of these analyses.

Table 4. Mechanism Analysis Results

Variables	**Information Processing**	**Organizational Learning**	**Digital Transformation**
DigiInnov	0.395*** (0.046)	0.372*** (0.045)	0.216*** (0.052)
Information Processing			0.247*** (0.043)
Organizational Learning			0.219*** (0.042)
GAI	0.282*** (0.051)	0.304*** (0.052)	0.183** (0.054)
DigiInnov × GAI	0.228*** (0.062)	0.237*** (0.063)	0.147* (0.067)
Controls	Included	Included	Included
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	4,930	4,930	4,930
R-squared	0.343	0.337	0.415

Note: Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The results indicate that both information processing capabilities and organizational learning partially mediate the relationship between digital innovation and digital transformation. The Sobel test confirms the significance of these mediating effects ($z = 5.28$, $p < 0.001$ for information processing; $z = 4.95$, $p < 0.001$ for organizational learning). These findings suggest that digital innovation enhances digital transformation by improving firms' ability to process information and by fostering organizational learning.

6. Discussion

Our research offers several important insights regarding the relationship between digital innovation in media enterprises and digital transformation outcomes. First, our findings empirically validate the positive impact of digital innovation capabilities on digital transformation, extending previous theoretical work (Vial, 2019) with robust empirical evidence from the Chinese media industry context. This supports the resource-based view contention that distinctive innovation capabilities can drive competitive advantage through digital transformation (Bharadwaj, 2000).

Second, our study identifies GAI technology adoption as a significant positive moderator of the relationship between digital innovation and digital transformation. This finding contributes to emerging research on AI in organizational contexts (Davenport & Ronanki, 2018) by demonstrating how advanced AI technologies can amplify the effectiveness of existing innovation capabilities. The synergistic relationship suggests that media enterprises should consider GAI adoption as a strategic complement to their digital innovation initiatives rather than as an independent technological investment.

Third, our mechanism analysis reveals that digital innovation enhances digital transformation through dual pathways: improved information processing capabilities and enhanced organizational learning. These findings align with dynamic capabilities theory (Teece et al., 1997), suggesting that digital innovation enables firms to sense and seize new opportunities while reconfiguring their knowledge base through organizational learning.

7. Policy Recommendations and Practical Implications

Based on our findings, we offer several policy recommendations and practical implications for media enterprises, industry associations, and policymakers:

1) **Strategic Digital Innovation Investment**: Media enterprises should strategically invest in developing digital innovation capabilities as a foundation for successful digital transformation. This includes allocating resources to digital R&D, building digital patent portfolios, and systematically launching digital products and services.
2) **Integrated GAI Implementation**: Organizations should consider GAI technologies as strategic complements to existing digital innovation initiatives rather than standalone technological investments. Integration strategies should focus on leveraging GAI to enhance core media operations like content creation, distribution, and audience engagement.
3) **Capability Building Programs**: Industry associations and educational institutions should develop specialized training programs focused on building digital innovation and GAI implementation capabilities in media organizations. These programs should address both technical skills and change management competencies.
4) **Supportive Regulatory Frameworks**: Policymakers should develop regulations that facilitate responsible GAI adoption while protecting intellectual property rights associated with digital innovation. This includes establishing ethical guidelines for GAI applications in media contexts and streamlining patent processes for digital media innovations.
5) **Ecosystem Collaboration**: Media enterprises should establish collaborative networks with technology providers, research institutions, and complementary businesses to enhance their digital innovation ecosystems. Such collaborations can accelerate knowledge transfer and resource sharing.

8. Conclusion

This study empirically investigates the impact of digital innovation in media enterprises on digital transformation outcomes, with a particular focus on the moderating role of GAI technology adoption. Using panel data from 4,930 firm-year observations of Chinese enterprises, we demonstrate that digital innovation positively influences digital transformation and that GAI adoption enhances this relationship. Furthermore, we identify information processing capabilities and organizational learning as key mechanisms underpinning these relationships.

Our research contributes to the literature on digital transformation by providing empirical evidence on the antecedents and moderators of successful transformation in media contexts. The findings offer valuable insights for media enterprise managers navigating digital transformation journeys and for policymakers seeking to foster innovation in the digital media sector.

Future research should explore these relationships in cross-cultural contexts, investigate additional moderating factors such as organizational culture and leadership styles, and examine longer-term outcomes of digital transformation initiatives. As digital technologies continue to evolve rapidly, understanding the dynamic interplay between innovation capabilities, emerging technologies, and transformation outcomes will remain a critical area of inquiry.

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