

Digital Capability, Organizational Agility and Service Innovation Performance: Evidence from Chinese Service Enterprises under Environmental Dynamism

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Abstract. Service enterprises are increasingly organised around digital information systems, yet the organisational mechanisms that convert digital capability into service innovation outcomes remain insufficiently specified. Drawing on dynamic capability's theory, this study examines whether organisational agility transmits the association between digital transformation capability and service innovation performance, and whether environmental dynamism conditions that transmission. Survey data were collected from 326 middle and senior managers in Chinese service enterprises spanning financial services, information technology, tourism, education and logistics. Confirmatory factor analysis, multiple regression with heteroskedasticity-robust standard errors, and bootstrap resampling were employed for hypothesis testing. Digital transformation capability is positively associated with service innovation performance ($\beta = .219$, $p < .001$), both directly and indirectly through organisational agility (indirect effect = .147, 95% bias-corrected CI [.096, .211]), with the indirect path carrying approximately 40 percent of the total effect. Environmental dynamism positively moderates the capability–agility relationship ($\beta = .186$, $p < .001$), and the index of moderated mediation (.064, 95% CI [.030, .110]) indicates that the full transmission pathway is contingent on market turbulence. The study contributes to the service innovation and information systems literatures by identifying agility as the organisational mechanism through which digital information capability is converted into service innovation, and by specifying the environmental conditions under which that conversion is strongest. For practice, the findings suggest that investment in digital information infrastructure yields service innovation returns chiefly where it is accompanied by agility-enabling organisational arrangements, particularly in volatile markets.

Keywords: Digital transformation capability; Organisational agility; Service innovation performance; Environmental dynamism; Service science; Moderated mediation

1. Introduction

The global service sector has undergone substantial structural changes as digital technologies advance. Cloud computing, big data analytics, artificial intelligence, and the Internet of Things have reshaped how service enterprises design, deliver, and improve their offerings. Service industries now account for more than 60 percent of gross domestic product in major economies, and digitally enabled service firms have demonstrated stronger growth trajectories than their traditional counterparts (Li et al., 2023). Applying digital technologies for organizational transformation has accordingly become a strategic priority for service enterprises that seek to maintain competitive advantages and achieve sustainable development (Gu et al., 2026; Mann et al., 2022).

Service innovation is the introduction of new or significantly improved service products, processes, and delivery models. It is a primary pathway through which service enterprises create value and respond to evolving customer expectations (Cobelli et al., 2026; Polat et al., 2026). Existing research has established that digital transformation positively contributes to innovation outcomes across various industries (Sarbu, 2022; Ding et al., 2024). Much of this literature, however, has focused on manufacturing firms or treated digital transformation as a binary state rather than examining the specific organizational capabilities that enable service enterprises to translate digital investments into measurable innovation outcomes (Xie et al., 2021; Liu et al., 2026). How digital transformation capability influences service innovation performance remains insufficiently understood.

Scholars have called for deeper investigation into the intermediate processes that connect digital transformation to innovation results (Ursic and Cater, 2025; Chang et al., 2024). Studies have explored individual mediators such as knowledge management, absorptive capacity, and dual innovation, yet the role of organizational agility as a transmitting mechanism has received limited attention in the service sector (Fan and Yang, 2026; Zhou et al., 2025). Organizational agility enables firms to sense market changes quickly and reconfigure resources in response, a quality that matters especially for service enterprises operating in fast-changing environments (Garrido-Moreno et al., 2024; Sambamurthy et al., 2003). Whether external environmental conditions moderate this transmission process remains an open question. Environmental dynamism, the pace of technological change, fluctuation in customer demand, and shifts in competitive landscapes, may amplify the translation of digital transformation capability into organizational agility, yet empirical evidence on this boundary condition is scarce.

This study addresses these gaps by investigating the impact mechanism of digital transformation capability on service innovation performance, with specific attention to the mediating role of organizational agility and the moderating role of environmental dynamism. Drawing on dynamic capabilities theory (Teece et al., 1997; Teece, 2007), the study proposes that digital transformation capability functions as a dynamic capability through which service enterprises sense emerging opportunities, seize service innovation possibilities, and reconfigure organizational resources. Organizational agility is the operational mechanism that translates these capability advantages into improved service innovation outcomes, and environmental dynamism strengthens this translation process.

The study makes three contributions. It identifies organizational agility as a mediating mechanism, opening the intermediate process that prior studies have treated as a black box. It introduces environmental dynamism as a boundary condition that clarifies when digital transformation capability exerts a stronger influence on organizational agility. It also situates the analysis within the Chinese service sector, providing empirical evidence from a major emerging economy where service enterprises are actively engaged in digital transformation (Khan et al., 2025; Lu et al., 2025).

The remainder of this paper proceeds as follows. Section 2 presents the theoretical foundation and develops the research hypotheses. Section 3 describes the research methodology. Section 4 reports the empirical results. Section 5 discusses the findings. Section 6 concludes with limitations

and directions for future research.

2. Literature Review and Hypothesis Development

2.1.Theoretical Foundation: Dynamic Capabilities Theory

Dynamic capabilities theory provides the theoretical lens for this study. Teece et al. (1997) defined dynamic capabilities as a firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Teece (2007) refined this framework by identifying three processes at its core: sensing opportunities and threats, seizing opportunities through resource mobilization, and reconfiguring organizational assets to sustain competitive advantage. Eisenhardt and Martin (2000) further elaborated the concept by arguing that dynamic capabilities consist of identifiable strategic and organizational processes that create value by manipulating resources into new value-creating strategies. The perspective suits the study of digital transformation in service enterprises well, because integrating digital technologies requires continuous adaptation of organizational processes and resource configurations rather than one-time investments (Huikkola et al., 2022; Nguyen et al., 2023).

Digital transformation capability is conceptualized here as a higher-order dynamic capability. It encompasses a service enterprise's capacity to detect digital opportunities in the market, mobilize digital resources for service process redesign, and reconfigure organizational structures to support technology-enabled service delivery (Tang et al., 2026; Tran and Do, 2025). Unlike static resource endowments, this capability reflects an ongoing organizational process that enables firms to adapt their service offerings as technology and customer demand evolve. Dynamic capabilities theory therefore provides a coherent foundation for understanding both how digital transformation capability generates service innovation performance through intermediate organizational processes and how external environmental conditions shape its effectiveness.

2.2.Digital Transformation Capability and Service Innovation Performance

Digital transformation capability refers to an organization's integrated competence in applying digital technologies to sense environmental changes, reconfigure business processes, and create new value propositions (Yang et al., 2025; Lu et al., 2025). The capability extends beyond adopting digital tools; it is a systematic organizational competence that integrates technological infrastructure, data governance, and digitally oriented management practices (Tsou, 2025; Do et al., 2025).

Service innovation performance captures the extent to which an enterprise successfully introduces new or improved services, optimizes service delivery processes, and creates novel service experiences for customers (Xie et al., 2021; Tian et al., 2026). The concept encompasses both the output dimension of innovation, such as new service offerings and improved delivery methods, and the process dimension, including the efficiency and effectiveness of the innovation process itself (den Hertog et al., 2010). Prior studies have provided evidence that digital transformation positively contributes to innovation outcomes in various sectors. Sarbu (2022) demonstrated that Industry 4.0 adoption increased the propensity for service innovation in German firms. Li et al. (2023) found that firm-level digitalization significantly promoted innovation output, with the effect being more pronounced in service industries. Xie et al. (2021) confirmed that digital capability facilitates service innovation performance through enhanced relationship learning and knowledge absorptive capacity.

From the perspective of dynamic capabilities theory, digital transformation capability enables service enterprises to scan for emerging customer needs, integrate digital tools into service design, and restructure service delivery systems to accommodate new service formats (Kim et al., 2025; Khan et al., 2025). Enterprises with stronger digital transformation capability can process market information more efficiently and respond to customer feedback more rapidly, developing innovative

service solutions that align with changing demand patterns (Ku, 2026; Ding et al., 2024). These arguments lead to the following hypothesis:

H1. Digital transformation capability is positively associated with service innovation performance.

2.3.The Mediating Role of Organizational Agility

Organizational agility is the capacity of an enterprise to detect changes in the business environment rapidly and respond through the timely reconfiguration of resources, processes, and strategies (Garrido-Moreno et al., 2024; Toufaily and Zalan, 2023). In service industries, agility manifests in the speed of service redesign, the flexibility of resource reallocation, and the responsiveness of front-line operations to shifting customer preferences (Liu et al., 2025). Overby et al. (2006) conceptualized enterprise agility as comprising sensing and responding capabilities, both of which are essential for firms to capitalize on opportunities and manage threats in volatile markets.

Digital transformation capability is expected to strengthen organizational agility through several interrelated mechanisms. Digital technologies such as real-time data analytics and cloud-based platforms enhance a firm's capacity to monitor market signals and customer behavior patterns, improving environmental sensing (Zhou et al., 2025; Wang et al., 2025). Digital process automation and integrated information systems allow service enterprises to reduce operational rigidity and accelerate decision-making cycles, both of which are fundamental to organizational responsiveness (Duan et al., 2025; Huang et al., 2025). Digitally enabled communication and collaboration tools also facilitate cross-functional coordination, enabling faster deployment of new service initiatives (Fan and Yang, 2026). Sambamurthy et al. (2003) provided a foundational framework linking information technology investments to organizational agility through digital options and entrepreneurial alertness. Taken together, these arguments suggest that digital transformation capability is an important antecedent of organizational agility. Therefore:

H2. Digital transformation capability is positively associated with organizational agility.

Organizational agility, in turn, is expected to promote service innovation performance. Agile service enterprises can identify emerging service opportunities ahead of competitors and allocate resources toward promising innovation projects more quickly (Nguyen et al., 2023). Rapid prototyping, testing, and refinement of new service concepts reduces time-to-market and increases the likelihood of successful market introduction (Garrido-Moreno et al., 2024). Agile organizations are also better positioned to learn from early-stage service experiments and incorporate customer feedback into iterative service improvement (Toufaily and Zalan, 2023; Zhang, L. and Yi, 2024). Based on these arguments:

H3. Organizational agility is positively associated with service innovation performance.

Combining H2 and H3, this study proposes that organizational agility mediates the relationship between digital transformation capability and service innovation performance. Digital transformation capability provides the technological foundation and informational infrastructure that enable organizational agility, which in turn translates into improved service innovation outcomes. This mediation pathway is consistent with the dynamic capabilities framework, which posits that capabilities generate performance outcomes through intermediate organizational processes rather than through direct and unmediated effects (Teece, 2007; Chang et al., 2024). Accordingly:

H4. Organizational agility mediates the relationship between digital transformation capability and service innovation performance.

2.4.The Moderating Role of Environmental Dynamism

Environmental dynamism refers to the rate and unpredictability of change in an enterprise's external environment, including technological evolution, customer demand shifts, and competitive intensity

fluctuations (Du et al., 2025; Song and Yang, 2024). Dynamic capabilities theory suggests that the value of organizational capabilities depends on external conditions, with dynamic capabilities yielding greater returns in environments characterized by rapid and uncertain change (Teece, 2007; Eisenhardt and Martin, 2000).

In highly dynamic environments, service enterprises face more frequent disruptions to existing service models and encounter a greater volume of emerging customer needs. Under such conditions, the ability to apply digital technologies for environmental scanning and resource reconfiguration becomes more valuable, because firms with strong digital transformation capability can detect and respond to environmental shifts more effectively than those with weaker capabilities (Zhang, Y. and Hao, 2025; Arif et al., 2026). The translation of digital transformation capability into organizational agility is thus expected to be amplified when environmental dynamism is high. Firms operating in turbulent markets derive greater agility benefits from their digital capabilities because the demand for rapid sensing and responding is more pronounced (Huikkola et al., 2022; Cobelli et al., 2026).

In stable environments, by contrast, customer needs and competitive structures change slowly. The marginal contribution of digital transformation capability to organizational agility may be attenuated because the urgency for rapid adaptation is lower and existing organizational routines may suffice to maintain service innovation activities. This reasoning leads to the following hypothesis:

H5. Environmental dynamism positively moderates the relationship between digital transformation capability and organizational agility, such that the positive effect of digital transformation capability on organizational agility is stronger when environmental dynamism is high.

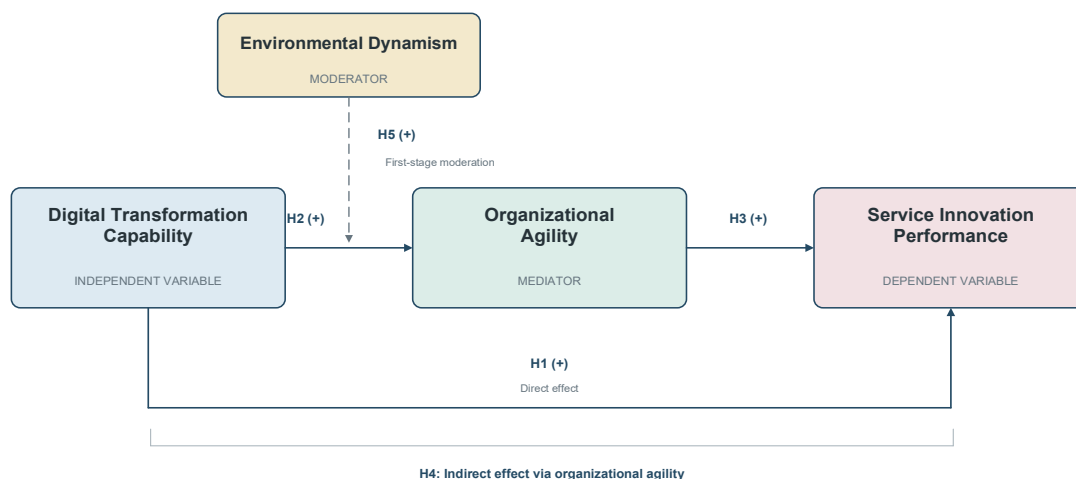


Fig.1: Conceptual Model and Hypothesized Relationships

3. Research Methodology

3.1. Research Design and Context

This study adopted a quantitative research design using a cross-sectional survey to test the proposed hypotheses. The research context was the Chinese service sector, encompassing financial services, information technology services, tourism and hospitality, education and training, and logistics services. China was selected for two reasons. The Chinese service sector has experienced accelerated digital transformation in recent years, with government policies actively encouraging service enterprises to adopt digital technologies for innovation and upgrading. The diversity of service sub-industries also provides sufficient variation in both digital transformation capability levels and

environmental dynamism conditions, which is necessary for testing the proposed moderation effect.

3.2.Sample and Data Collection

Data were collected through a structured questionnaire survey administered between March and June 2025. The target respondents were middle and senior managers in service enterprises who possessed direct knowledge of their firm's digital transformation activities and service innovation initiatives. Managers at these levels are typically involved in both strategic technology adoption decisions and innovation performance evaluation, making them suitable informants.

The questionnaire was distributed through industry associations in major service sectors across eastern China and through professional networks in Shanghai, Hangzhou, Shenzhen, and Guangzhou. The distribution relied on association-brokered and personally networked channels, which is common in survey research targeting senior managers in China but may introduce selection effects that limit generalizability to firms outside these professional networks. A total of 450 questionnaires were distributed, and 351 responses were returned, yielding a response rate of 78.0 percent. This response rate is relatively high for a survey targeting middle and senior managers, likely attributable to the personalized distribution approach and the engagement of industry association contacts who facilitated respondent cooperation. After removing incomplete responses and those with identifiable patterns of inattentive responding, 326 valid responses remained, representing a valid response rate of 72.4 percent.

The sample showed the following characteristics. Financial services accounted for 22.7 percent, information technology services for 20.9 percent, tourism and hospitality for 18.1 percent, education and training for 16.9 percent, logistics services for 12.6 percent, and other service sectors for 8.9 percent. Regarding firm size, 28.5 percent of the sampled firms had fewer than 100 employees, 39.3 percent had 100 to 499 employees, and 32.2 percent had 500 or more employees. For firm age, 15.3 percent had been established for fewer than 5 years, 41.7 percent for 5 to 15 years, and 43.0 percent for more than 15 years. The respondents' positions included department directors (34.4 percent), deputy general managers (28.5 percent), and general managers or above (37.1 percent), ensuring that respondents had sufficient organizational knowledge to provide informed assessments.

3.3.Measures

All constructs were measured using multi-item scales adapted from established instruments in the literature. Items were measured on seven-point Likert scales ranging from 1 (strongly disagree) to 7 (strongly agree). The questionnaire was originally developed in English, translated into Chinese by two bilingual researchers, and back-translated by an independent translator to ensure conceptual equivalence.

Digital transformation capability was measured using five items adapted from Yang et al. (2025) and Gu et al. (2026), capturing the firm's ability to apply digital technologies for environmental sensing, resource integration, process optimization, data-driven decision-making, and service delivery redesign. A sample item is: "Our enterprise effectively uses digital technologies to identify new service opportunities in the market."

Organizational agility was measured using four items adapted from Garrido-Moreno et al. (2024) and Nguyen et al. (2023), assessing the firm's speed of market response, flexibility of resource reallocation, adaptiveness of organizational processes, and timeliness of strategic adjustment. A sample item is: "Our enterprise can quickly adjust its service processes in response to market changes."

Service innovation performance was measured using five items adapted from Xie et al. (2021) and Zhou et al. (2025), covering new service introduction, service process improvement, service delivery innovation, customer experience enhancement, and service quality advancement. A sample item is: "Our enterprise has successfully introduced new service offerings in the past two years."

Environmental dynamism was measured using four items adapted from Du et al. (2025) and

Song and Yang (2024), capturing the rate of technological change, unpredictability of customer preferences, intensity of competitive rivalry, and frequency of regulatory change in the firm's operating environment. A sample item is: "The technology in our industry changes rapidly."

Control variables included firm size (measured as the natural logarithm of the number of employees), firm age (measured as the number of years since establishment), and industry type (coded as five dummy variables with financial services as the reference category).

3.4. Analytical Procedure

The data were analyzed using Stata 17 following the two-step approach recommended by Anderson and Gerbing (1988). In the first step, a confirmatory factor analysis (CFA) was conducted to evaluate the measurement model for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Model fit was assessed using the chi-square statistic, root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker-Lewis index (TLI), and standardized root mean square residual (SRMR). Discriminant validity was assessed using both the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio of correlations.

In the second step, unit-weighted composite scores were calculated as the mean of their respective item responses and then standardized. Multiple regression analysis with heteroskedasticity-robust standard errors was employed to test the structural relationships. The organizational agility equation included digital transformation capability, environmental dynamism, their interaction term, and all control variables (firm size, firm age, and five industry dummy variables). The service innovation performance equation included digital transformation capability, organizational agility, environmental dynamism, and all control variables. Mediation effects were tested using the bootstrap procedure with 5,000 resamples, and bias-corrected 95 percent confidence intervals were reported for indirect, direct, and total effects (Preacher and Hayes, 2008). The moderated mediation effect was assessed by computing the moderated mediation index and its bias-corrected bootstrap confidence interval.

3.5. Common Method Bias Assessment

Common method bias was assessed using two approaches. Harman's single-factor test indicated that no single factor accounted for more than 37.9 percent of the total variance, below the 50 percent threshold. Additionally, a single-factor CFA model was compared with the hypothesized four-factor measurement model; the single-factor model yielded substantially worse fit (CFI = .554, RMSEA = .179, SRMR = .140) compared to the four-factor model, providing further evidence that common method variance does not account for the observed relationships. The survey instrument did not include a theoretically unrelated marker variable; therefore, the marker variable technique was not applied. Given the reliance on a single informant, single instrument, and single time point, these diagnostic tests provide limited but supportive evidence that common method bias is unlikely to be a serious concern. This limitation is acknowledged and addressed in the discussion of study limitations.

4. Results

4.1. Measurement Model

The measurement model was evaluated through confirmatory factor analysis. A four-factor model corresponding to the four focal constructs (digital transformation capability, organizational agility, service innovation performance, and environmental dynamism) was estimated. The model demonstrated good fit: $\chi^2(129) = 137.978$, $p = .278$, RMSEA = .015, CFI = .997, TLI = .997, SRMR = .033. All fit indices met or exceeded recommended thresholds, indicating that the hypothesized factor structure adequately represents the data.

Table 1 presents the item-level measurement model results. All standardized factor loadings ranged from .720 to .845, exceeding the .70 threshold. Item-level variance inflation factors ranged

from 1.719 to 2.466, well below the critical value of 5.0, indicating that multicollinearity among indicators is not a concern.

Table 1: Item-Level Measurement Model Results

Item	Construct	Mean	SD	Std. Loading	Loading SE	VIF
DTC1	DTC	4.656	1.078	.814	.023	2.383
DTC2	DTC	4.819	1.121	.799	.024	2.302
DTC3	DTC	4.933	1.124	.769	.026	2.159
DTC4	DTC	4.794	1.031	.768	.026	2.078
DTC5	DTC	4.844	1.130	.830	.021	2.466
OA1	OA	4.567	1.148	.722	.032	1.766
OA2	OA	4.610	1.022	.752	.030	1.870
OA3	OA	4.610	1.142	.845	.023	2.326
OA4	OA	4.699	1.071	.720	.032	1.719
SIP1	SIP	4.393	1.049	.799	.024	2.253
SIP2	SIP	4.558	1.059	.768	.027	2.028
SIP3	SIP	4.552	1.096	.800	.024	2.228
SIP4	SIP	4.445	1.105	.740	.029	1.927
SIP5	SIP	4.632	1.095	.795	.025	2.211
ED1	ED	5.061	1.071	.803	.025	2.179
ED2	ED	5.224	1.124	.832	.023	2.342
ED3	ED	5.092	1.040	.788	.026	2.184
ED4	ED	5.175	1.039	.786	.026	2.176

$N = 326$. Std. Loading = standardized CFA loading. SE = standard error of loading.

Table 2 presents construct-level reliability and convergent validity. Cronbach's alpha values ranged from .843 to .896, and composite reliability values ranged from .846 to .897, both exceeding the .70 benchmark. Average variance extracted (AVE) values ranged from .580 to .644, all above the .50 threshold, confirming convergent validity.

Table 2: Construct Reliability and Convergent Validity

Construct	Items	Cronbach's α	CR	AVE	$\sqrt{\text{AVE}}$	Mean	SD
DTC	5	.896	.897	.634	.796	4.809	0.922
OA	4	.843	.846	.580	.761	4.622	0.904
SIP	5	.886	.886	.609	.781	4.516	0.896
ED	4	.879	.879	.644	.803	5.138	0.915

Discriminant validity was assessed using the Fornell-Larcker criterion and the HTMT ratio. Table 3 presents the Fornell-Larcker matrix. The square root of the AVE for each construct (bold diagonal entries) exceeded its correlations with all other constructs, confirming discriminant validity.

Table 3: Fornell-Larcker Discriminant Validity Matrix

Construct	DTC	OA	SIP	ED
DTC	.796			
OA	.486	.761		
SIP	.423	.489	.781	
ED	.233	.316	.297	.803

Note: Diagonal entries (bold) are square roots of AVE; off-diagonal entries are inter-construct correlations.

Table 4 presents the HTMT matrix. All HTMT ratios were below .85, confirming adequate discriminant validity.

Table 4: Heterotrait-Monotrait (HTMT) Ratio Matrix

Construct	DTC	OA	SIP	ED
DTC	1.000			
OA	.560	1.000		
SIP	.475	.567	1.000	
ED	.261	.365	.335	1.000

The measurement model was therefore satisfactory for structural model analysis.

4.2.Descriptive Statistics and Correlation Matrix

Table 5 presents the means, standard deviations, and Pearson correlation coefficients among the study variables. All focal variables exhibited mean values between 4.52 and 5.14 on the seven-point scale, indicating moderate to moderately high levels across the sample. The correlation coefficients among the main constructs were positive and statistically significant, providing preliminary support for the hypothesized relationships.

Table 5: Descriptive Statistics and Correlation Matrix

Variable	Mean	SD	1	2	3	4	5	6
1. DTC	4.809	0.922	—					
2. OA	4.622	0.904	.486	—				
3. SIP	4.516	0.896	.423	.489	—			
4. ED	5.138	0.915	.233	.316	.297	—		
5. Firm Size (ln)	5.792	1.380	.017	.005	.105	.108	—	
6. Firm Age	15.426	9.860	.091	.126	.025	.086	-.059	—

$N = 326$.

4.3.CFA Model Comparison

To further assess the distinctiveness of the four focal constructs, the hypothesized four-factor CFA model was compared with a single-factor model in which all 18 items loaded on one common factor. Table 6 reports the comparison results.

Table 6: CFA Model Fit Comparison

Model	χ^2	df	*p*	RMSEA	CFI	TLI	SRMR
Four-factor model	137.978	129	.278	.015	.997	.997	.033
Single-factor model	1538.316	135	<.001	.179	.554	.494	.140

The four-factor model demonstrated substantially superior fit across all indices, confirming that the four constructs are empirically distinct.

4.4.Structural Model and Hypothesis Tests

The structural model was estimated using multiple regression with heteroskedasticity-robust standard errors. Table 7 presents the complete structural path results. The organizational agility equation included digital transformation capability, environmental dynamism, their interaction term, firm size, firm age, and five industry dummy variables. The service innovation performance equation included digital transformation capability, organizational agility, environmental dynamism, and all control

variables. The model explained 32.3 percent of the variance in organizational agility ($R^2 = .323$) and 32.4 percent of the variance in service innovation performance ($R^2 = .324$).

Table 7: Complete Structural Path Results

DV	Predictor	β	Robust SE	*t*	*p*	95% CI	VIF
OA	DTC	.428	.042	10.146	<.001	[.345, .511]	1.077
OA	ED	.246	.052	4.762	<.001	[.145, .348]	1.131
OA	DTC $\times$ ED	.186	.047	3.979	<.001	[.094, .278]	1.076
OA	Firm Size	-.011	.046	-0.233	.816	[-.101, .079]	1.057
OA	Firm Age	.070	.046	1.499	.135	[-.022, .161]	1.047
OA	IT Services	.052	.149	0.348	.728	[-.241, .345]	1.542
OA	Tourism	.108	.146	0.744	.457	[-.178, .395]	1.512
OA	Education	-.057	.143	-0.402	.688	[-.338, .223]	1.458
OA	Logistics	.141	.171	0.826	.409	[-.196, .478]	1.383
OA	Other Services	.098	.169	0.582	.561	[-.234, .431]	1.289
SIP	DTC	.219	.055	4.001	<.001	[.112, .327]	1.333
SIP	OA	.345	.057	6.084	<.001	[.233, .457]	1.413
SIP	ED	.132	.047	2.794	.006	[.039, .225]	1.141
SIP	Firm Size	.084	.048	1.773	.077	[-.009, .178]	1.057
SIP	Firm Age	-.036	.051	-0.700	.484	[-.136, .064]	1.051
SIP	IT Services	.159	.136	1.166	.245	[-.109, .426]	1.535
SIP	Tourism	-.054	.153	-0.349	.727	[-.355, .248]	1.506
SIP	Education	.172	.134	1.279	.202	[-.093, .436]	1.458
SIP	Logistics	.067	.165	0.404	.687	[-.258, .392]	1.380
SIP	Other Services	.348	.204	1.705	.089	[-.054, .750]	1.290

$N = 326$. Continuous predictors are standardized. Industry variables are dummy-coded with financial services as the reference category. OA model $R^2 = .323$, adjusted $R^2 = .302$. SIP model $R^2 = .324$, adjusted $R^2 = .303$.

The results supported all five hypotheses. H1 was supported: digital transformation capability had a significant positive association with service innovation performance ($\beta = .219$, $SE = .055$, $t = 4.001$, $p < .001$). H2 was supported: digital transformation capability was positively associated with organizational agility ($\beta = .428$, $SE = .042$, $t = 10.146$, $p < .001$). H3 was supported: organizational agility was positively associated with service innovation performance ($\beta = .345$, $SE = .057$, $t = 6.084$, $p < .001$). Notably, environmental dynamism also had a significant positive main effect on organizational agility ($\beta = .246$, $SE = .052$, $t = 4.762$, $p < .001$) and on service innovation performance ($\beta = .132$, $SE = .047$, $t = 2.794$, $p = .006$). Among the control variables, none reached statistical significance at the .05 level, and none of the industry dummy variables were significant, suggesting that the hypothesized relationships are robust across service sub-sectors.

4.5. Mediation and Moderated Mediation Analysis

The mediation effect of organizational agility was tested using the bootstrap procedure with 5,000 resamples. Table 8 reports the mediation analysis results with bias-corrected confidence intervals.

Table 8: Mediation Analysis Results

Effect	Estimate	Bootstrap SE	95% BC CI Lower	95% BC CI Upper
Direct effect (DTC → SIP)	.219	.054	.114	.328
Indirect effect (DTC → OA → SIP)	.147	.029	.096	.211
Total effect (DTC → SIP)	.366	.053	.264	.477

$N = 326$. BC CI = bias-corrected bootstrap confidence interval based on 5,000 resamples.

The indirect effect of digital transformation capability on service innovation performance through organizational agility was .147 (Bootstrap SE = .029, 95% BC CI [.096, .211]). The confidence interval did not include zero, confirming that the mediation effect was statistically significant. Because the direct effect remained significant ($\beta = .219$, $p < .001$) after accounting for the mediator, the result indicated partial mediation. H4 was thus supported: organizational agility partially mediated the relationship between digital transformation capability and service innovation performance. The indirect effect accounted for approximately 40 percent of the total effect (.147/.366).

For H5, the interaction term between digital transformation capability and environmental dynamism was significant in predicting organizational agility ($\beta = .186$, SE = .047, $t = 3.979$, $p < .001$). To further examine this moderation effect, simple slope analysis was conducted. Table 9 presents the simple slopes at different levels of environmental dynamism.

Table 9: Simple Slope Analysis of the Moderation Effect

ED Level	Std. Value	DTC → OA Slope	Robust SE	*t*	*p*	95% CI
Low (−1 SD)	−1	.242	.065	3.743	<.001	[.115, .369]
Mean	0	.428	.042	10.146	<.001	[.345, .511]
High (+1 SD)	+1	.614	.061	10.014	<.001	[.494, .735]

At high levels of environmental dynamism (one standard deviation above the mean), the effect of digital transformation capability on organizational agility was .614 ($t = 10.014$, $p < .001$). At low levels of environmental dynamism (one standard deviation below the mean), this effect was .242 ($t = 3.743$, $p < .001$). Both slopes were significant, but the effect was substantially stronger under high environmental dynamism, supporting H5. Figure 2 illustrates the simple slopes graphically.

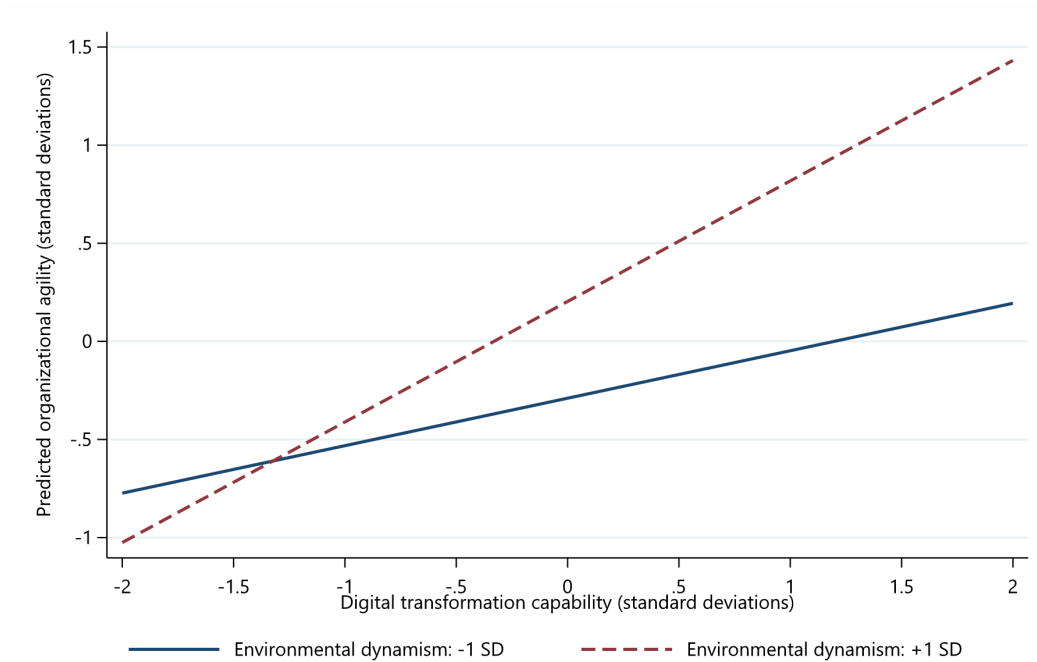


Fig.2: Simple Slopes of Digital Transformation Capability on Organizational Agility at High (+1 SD) and Low (-1 SD) Levels of Environmental Dynamism

The moderated mediation index was .064 (Bootstrap SE = .020, 95% BC CI [.030, .110]). Because the confidence interval did not include zero, the conditional indirect effect of digital transformation capability on service innovation performance through organizational agility was significantly moderated by environmental dynamism. Table 10 presents the conditional indirect effects at different levels of environmental dynamism.

Table 10: Moderated Mediation Analysis Results

Effect	ED Value	Estimate	Bootstrap SE	95% BC CI
Moderated mediation index	—	.064	.020	[.030, .110]
Conditional indirect (Low ED)	-1	.083	.027	[.039, .144]
Conditional indirect (Mean ED)	0	.148	.029	[.094, .208]
Conditional indirect (High ED)	+1	.212	.042	[.135, .301]

$N = 326$. 5,000 bootstrap resamples. BC CI = bias-corrected confidence interval.

The indirect effect was stronger when environmental dynamism was high (.212, 95% BC CI [.135, .301]) than when it was low (.083, 95% BC CI [.039, .144]). These results confirm that environmental dynamism strengthens the indirect effect of digital transformation capability on service innovation performance through organizational agility. Figure 3 displays the conditional indirect effects with their bias-corrected confidence intervals.

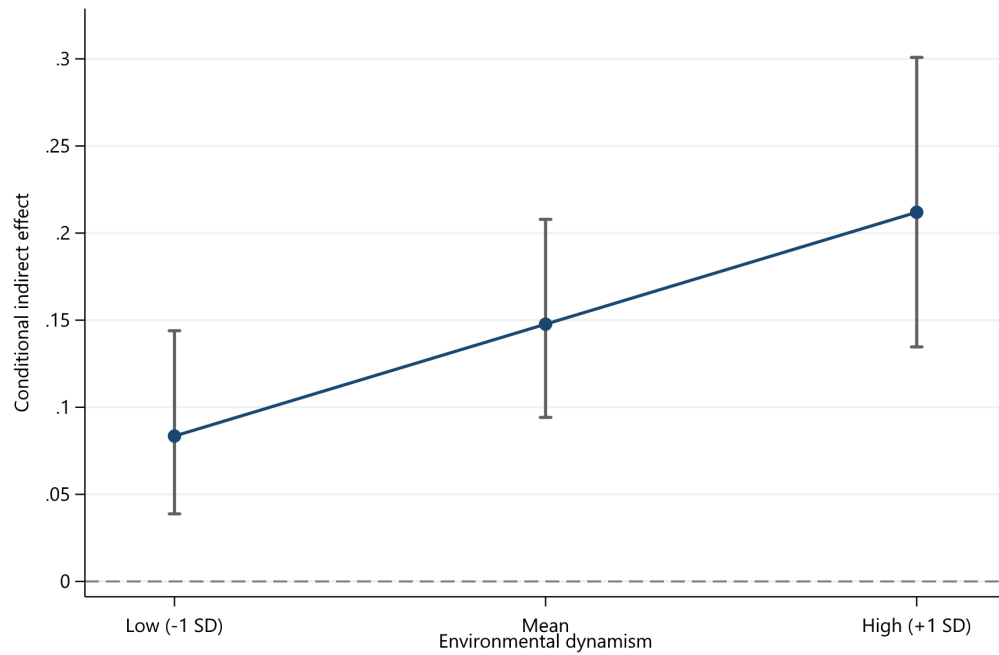


Fig.3: Conditional Indirect Effects of Digital Transformation Capability on Service Innovation Performance through Organizational Agility at Different Levels of Environmental Dynamism

5. Discussion

5.1. Interpretation of Findings

This study examined the impact mechanism of digital transformation capability on service innovation performance in service enterprises, focusing on organizational agility as a mediator and environmental dynamism as a moderator. The empirical results supported all five hypotheses.

The positive association between digital transformation capability and service innovation performance (H1, $\beta = .219$, $p < .001$) is consistent with prior research on the innovation-enabling effects of digital transformation (Li et al., 2023; Sarbu, 2022; Xie et al., 2021). The present study extends this evidence to the Chinese service sector, showing that an integrated capability to apply digital technologies for sensing, resource integration, and process redesign is associated with higher levels of service innovation output. Digital transformation, in other words, matters more as an organizational capability than as a technology investment (Yang et al., 2025; Tang et al., 2026).

The confirmed partial mediation through organizational agility (H2, H3, H4) is the central finding. The indirect effect (.147) was substantial relative to the direct effect (.219), with the agility pathway transmitting approximately 40 percent of the total influence. This pattern is consistent with the dynamic capabilities framework, which holds that capabilities generate performance outcomes through intermediate organizational processes (Teece, 2007). The finding also parallels Fan and Yang (2026), who reported that digital capability promotes service innovation behavior through cognitive flexibility, and Garrido-Moreno et al. (2024), who identified organizational resilience as a mediating mechanism in a related context. What the present study adds is the specific identification of organizational agility as the transmitting process within service enterprises, extending the conceptual argument of Sambamurthy et al. (2003) that information technology creates value through organizational agility as an intermediate outcome.

The moderating effect of environmental dynamism (H5, $\beta = .186$, $p < .001$) indicates that the translation of digital transformation capability into organizational agility depends on external conditions. When the environment changes rapidly, the agility-building potential of digital transformation capability is amplified, because rapid change creates greater demand for the sensing

and responding functions that digital technologies enable (Zhang, Y. and Hao, 2025). The simple slope analysis revealed that the effect of digital transformation capability on organizational agility more than doubled from low-dynamism (.242) to high-dynamism (.614) conditions. This finding is consistent with the contingency logic of dynamic capabilities theory and provides empirical evidence that the value of digital transformation capability varies across market conditions (Du et al., 2025; Huikkola et al., 2022; Eisenhardt and Martin, 2000). The moderated mediation analysis further confirmed that this contingency extends to the full indirect pathway, with the conditional indirect effect increasing from .083 under low dynamism to .212 under high dynamism.

Environmental dynamism also exerted significant main effects on both organizational agility ($\beta = .246, p < .001$) and service innovation performance ($\beta = .132, p = .006$), suggesting that dynamic environments not only amplify the capability-agility relationship but also independently promote organizational responsiveness and innovation activity.

5.2.Theoretical Implications

The study makes three theoretical contributions. It enriches the digital transformation and service innovation literature by identifying organizational agility as a mediating mechanism. Prior studies have examined mediators such as knowledge co-creation (Zhang, L. and Yi, 2024), absorptive capacity (Chang et al., 2024), and cognitive flexibility (Fan and Yang, 2026). The present study demonstrates that organizational agility is a distinct and significant intermediate process, specifying the agility pathway as an important transmission channel within service enterprises. This extends the foundational framework of Overby et al. (2006) by providing empirical evidence that enterprise agility serves as a critical link between digital capabilities and innovation outcomes in the service sector.

The study also contributes to dynamic capabilities theory by empirically testing the contingent nature of dynamic capabilities in the service sector. Environmental dynamism strengthens the capability-agility relationship, supporting the theoretical proposition that dynamic capabilities are particularly valuable under conditions of environmental turbulence (Teece, 2007). This evidence speaks to the ongoing debate about whether dynamic capabilities matter more in stable or dynamic environments (Eisenhardt and Martin, 2000), providing sector-specific support for the latter position.

The analysis extends the empirical scope of the digital transformation and service innovation literature to the Chinese service sector, where digital transformation is proceeding rapidly but academic evidence on its innovation implications remains limited relative to manufacturing contexts (Liu et al., 2026; Khan et al., 2025; Liu et al., 2025). The multi-industry sample design, with controls for industry effects, strengthens external validity across different service sub-sectors. The non-significance of all five industry dummy variables in both equations suggests that the hypothesized mechanisms operate consistently across the financial services, IT services, tourism, education, and logistics sectors included in this study.

5.3.Practical Implications

The findings carry several implications for service enterprise managers. Investments in digital transformation should focus on building integrated organizational capabilities rather than simply acquiring digital tools. The significant paths from digital transformation capability to both organizational agility and service innovation performance suggest that firms benefit most when digital technologies are embedded in organizational sensing, decision-making, and service delivery processes (Lu et al., 2025; Tran and Do, 2025).

Managers should also recognize that organizational agility is a key mechanism through which digital transformation investments generate service innovation returns. Digital technology adoption should be complemented with organizational design changes that enhance response speed and resource flexibility, such as flattening hierarchical structures, empowering front-line service teams, and establishing rapid service prototyping processes (Do et al., 2025; Tian et al., 2026).

The moderating role of environmental dynamism has a practical implication as well. Firms operating in rapidly changing markets should prioritize digital transformation capability development, as the returns to organizational agility from digital capabilities are amplified in such environments. The simple slope analysis showed that the effect of digital transformation capability on organizational agility was .614 under high dynamism compared to .242 under low dynamism. Firms in more stable environments need not neglect digital transformation but may benefit from a more incremental approach to capability building.

6. Conclusion

6.1. Main Conclusion

This study examined how digital transformation capability relates to service innovation performance in Chinese service enterprises, and whether organisational agility transmits that relationship under varying environmental conditions. Using survey data from 326 managers and a moderated mediation model estimated through confirmatory factor analysis and multiple regression with heteroskedasticity-robust standard errors, three conclusions follow.

First, digital transformation capability is positively associated with service innovation performance ($\beta = .219, p < .001$), and organisational agility partially transmits this association (indirect effect = .147, 95% bias-corrected CI [.096, .211]), carrying approximately 40 percent of the total effect. Digital capability is therefore not converted into service innovation directly; a substantial share of the relationship operates through the firm's capacity to sense change and reconfigure service resources in response.

Second, environmental dynamism positively moderates the capability–agility path ($\beta = .186, p < .001$), and the index of moderated mediation (.064, 95% CI [.030, .110]) indicates that the entire transmission pathway is contingent on market turbulence. Agility-building returns to digital investment are concentrated in unstable environments rather than distributed evenly across them.

Third, these results position digital transformation capability as a dynamic capability operating within service delivery systems. For service enterprises, digital information infrastructure generates innovation returns chiefly where it is paired with organisational arrangements that permit rapid service reconfiguration — a finding with direct implications for how digital investment is sequenced and governed rather than simply scaled.

These conclusions apply to the surveyed population of service enterprises in eastern China and should be read within the cross-sectional design and single-informant measurement discussed below

6.2. Limitations and Future Research

This study has several limitations. The cross-sectional design limits the ability to establish causal relationships among the variables. Although the hypotheses are grounded in theoretical reasoning and the results are consistent with the proposed causal logic, future studies should employ longitudinal or panel data designs to capture the temporal dynamics of digital transformation capability development and its effects on organizational agility and service innovation performance.

The study relied on single-informant self-report data from managers, which may introduce common method bias. Although Harman's single-factor test and a single-factor CFA comparison provided evidence against serious common method contamination, these diagnostic approaches have known limitations. The survey instrument did not include a marker variable, precluding the application of the marker variable technique. Future research could strengthen the findings by collecting data from multiple respondents within each firm or by combining survey data with archival performance measures.

The questionnaire was distributed through industry association and personal network channels, which likely contributed to the relatively high response rate (78.0 percent) and the high proportion of

senior managers in the sample (37.1 percent general manager or above). While this distribution approach enhanced data quality by reaching knowledgeable informants, it may limit generalizability to firms outside these professional networks. Future studies should assess potential non-response bias through wave analysis or comparison with population parameters.

Digital transformation capability was treated as a unidimensional construct. Future research could decompose it into sub-dimensions, such as digital sensing capability, digital integration capability, and digital reconfiguration capability, to examine whether different capability components have differential effects on organizational agility and service innovation performance.

The sample was drawn from eastern Chinese cities, which may limit generalizability to firms in other regions or countries with different institutional and technological environments. Cross-national comparative studies would help establish the boundary conditions of the proposed model across diverse economic and cultural contexts.

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