

# THE IMPACT OF DIGITAL LEADERSHIP ON INNOVATIVE BEHAVIOUR OF ADMINISTRATIVE STAFF IN PRIVATE UNIVERSITIES IN CHINA: THE MEDIATING ROLE OF LEARNING GOAL ORIENTATION

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**Abstract:** *In the context of educational digital transformation, digital leadership serves as a crucial driver for management innovation in private higher education institutions. However, the causal pathways underlying its influence on managerial innovation behaviours remain unclear. Building upon Social Information Processing (SIP) theory, this study constructs a "digital leadership → learning goal orientation → managerial innovation" mediating model. Through empirical analysis of 432 samples from private university administrators using hierarchical regression and Bootstrap methods, the findings reveal: (1) Digital leadership significantly positively influences managerial innovation behaviours; (2) Learning goal orientation acts as a complete mediator between these two factors. The research expands the application scenarios of digital leadership in education, providing theoretical references and practical pathways to stimulate management innovation in private higher education institutions.*

**Keywords:** *Digital leadership, Private universities, Administrators, Innovative behaviors, learning goal orientation, Social information processing theory.*

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## Introduction

The "Overall Layout Plan for Digital China Construction" (2023) incorporates the digitalization of higher education into national strategy. As an important component of higher education, private universities face challenges such as fluctuating student enrolment, increasingly stringent quality assessments, and limited resources. The innovative behaviours of management personnel (such as optimizing smart campus processes and applying educational big data) constitute the micro-core of digital transformation.

Digital leadership has been proven to drive innovation in corporate settings (Borah et al., 2022), yet its essence and mechanisms remain unclear in private higher education institutions. These institutions' dual nature of "market orientation + educational mission" demands administrators to balance efficiency with pedagogical principles. However, existing research predominantly focuses on enterprises or public universities (López-Figueroa et al., 2025 studying faculty creativity in public institutions), with limited attention given to private university administrators. Moreover, most studies emphasize organizational-level innovation performance (Ding, 2026) while lacking a micro-level decomposition of the "leadership → individual cognition → innovative behaviour" process.

Based on this, based on the SIP theory, this study explores the core questions: How does digital leadership affect the innovation behaviour of managers in private colleges and universities? Does learning goal orientation play a mediating role? This paper fills the gap of the micro mechanism of digital leadership in private colleges and universities.

## Literature Review

### Definition of core concepts

#### Digital leadership in private universities

This refers to the capability of leaders in private higher education institutions (including university-level and mid-level administrators) to utilise digital resources such as smart campuses and educational big data to drive management innovation and disseminate digital transformation. Core dimensions include: (1) Strategic Awareness -interpreting "Smart Education" policies and aligning with institutional positioning; (2) Resource Integration-coordinating the establishment of intelligent management platforms; (3) Cultivating an Innovation-Friendly Environment (supporting trial-and-error innovation, e.g., through digital innovation funds).

#### Innovative behaviour of administrators in private universities

It refers to the management innovation proposed and implemented by administrative and academic affairs managers, including:(1) process innovation such as online textbook application; (2) service innovation such as remote internship management system; (3) decision-making innovation such as student data prediction model, which is different from teachers' teaching innovation.

#### Learning goal orientation

It refers to the internal tendency of individuals to actively learn with the goal of improving their abilities (VandeWalle et al., 2001), which is manifested in this scenario as learning digital tools, such as data analysis software, and exploring new management methods.

## Derivation of research hypotheses

### Digital leadership and managerial innovation behaviour

Based on SIP theory and relevant empirical research, prior studies have shown that digital leadership can reduce the technological and material costs of innovation for management personnel in private universities by providing resource support such as smart campus platforms and innovation special funds, laying the foundation for innovative behavior (Yu & Long, 2026). In the moderated mediation model, it is further confirmed that digital leadership can actively convey innovation expectations, such as emphasising the correlation between digitalisation and school market competitive advantages, sharing cross-school digital innovation cases, and directly stimulating the innovation willingness of management personnel. In the context of digital transformation, the positive evaluation and guidance of leadership on innovation challenges can adapt to the core needs of private university managers in responding to market competition. Considering the high dependence of management personnel in private universities on digital support. Therefore, it is proposed that:

H1: Digital leadership significantly positively influences the innovative behavior of management personnel.

### Digital leadership and learning goal orientation

Based on the SIP theory, the impact of external situational signals on individual goal setting and motivation can be achieved through the multiple mechanisms of digital leadership: digital leadership can transmit clear digital learning value signals, allowing private university managers to clarify the relationship between "digital ability improvement" and management efficiency optimisation, thereby generating an inherent tendency for active learning. This signal transmission mechanism has been empirically supported in activating individual learning motivation (Wang et al., 2025). At the same time, digital leadership can create a supportive learning atmosphere by reducing uncertainty in the learning process such as clarifying learning paths and providing channels for problem-solving, reducing management's learning concerns, and this supportive atmosphere is an important situational condition for the formation of individual learning goal orientation (Wei et al., 2025). In addition, from the perspective of cognitive-emotional processing, digital leadership can also provide managers with tailored learning resources and targeted guidance, helping them establish cognitive expectations of "improving abilities through learning", enhance learning efficacy, and ultimately reinforce learning goal orientation (Gao & Gao, 2024). Management personnel at private universities are facing the practical needs of digital management, and the above mechanism is more likely to stimulate their willingness to learn. Therefore, it is proposed that:

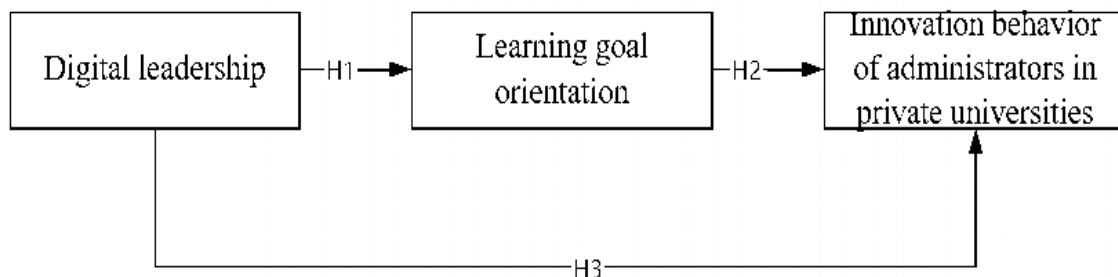
H2: Digital leadership has a significant positive impact on the learning goal orientation of management personnel in private universities in China.

### The mediating role of learning objectives

Based on the theory of social information processing, the impact of digital leadership on the innovative behavior of management personnel in private universities in China needs to be transmitted through learning goal orientation, that is, learning goal orientation plays a fully mediating role. Digital leadership will guide managers to form a learning cognition centered on enhancing their abilities, prompting them to transform digital management challenges into learning goals (Tigre et al., 2024); And this learning goal orientation can promote managers to actively accumulate the necessary abilities for digital tool application, educational management

innovation, etc., laying the foundation for innovative behaviour. After all, individual ability accumulation is a key prerequisite for innovation in the digital context (Bilal et al., 2024). At the same time, the role of digital leadership in innovative behaviour cannot be directly realized, and transformation needs to rely on the intermediate variable of learning goal orientation. Without this orientation, digital support at the leadership level is difficult to translate into actual innovative actions of management personnel (Zia et al., 2024). Based on this, it is proposed that

H3: Learning goal orientation plays a fully mediating role between digital leadership and innovative behaviour of management personnel in private universities in China.



**Figure 1. Research Model**

### Research Methodology

This study investigates administrative personnel in China's private higher education institutions, selecting 15 institutions across three regions (eastern Zhejiang/Guangdong/Jiangsu, central Henan/Hubei/Hunan, and western Sichuan/Shaanxi/Yunnan) to ensure geographical and institutional diversity. The research covers demographic variables (gender, age, teaching experience, educational background, and management position level), digital leadership, innovative behaviors, and learning goal orientation. A total of 500 questionnaires were distributed, with 432 valid responses collected after excluding samples with completion times under 5 minutes, incorrect answers to quality check questions ("Please select 'Strongly Agree'"), or data missingness exceeding 10%. The overall valid response rate reached 86.4%.

**Table 2. Sample structure distribution (N=432)**

Variable	Class	Number of people	Proportion (%)
Sex	Male	229	53.0
	Female	203	47.0
Age	Under 30	89	20.6
	31-40 years	201	46.5
	41 years and above	142	32.9
Years of Work Experience	5 years and below	156	36.1
	6-10 years	183	42.4
	11 years and above	93	21.5
Record of Formal Schooling	Undergraduate and below	124	28.7
	Master	276	63.9
	Doctor	32	7.4
Management Hierarchy	Grassroots administrator	207	47.9
	Middle-level cadres	225	52.1

### Instrument

The scale was adapted from a mature tool (5-point Likert scoring), and the reliability and validity met the standards:

According to Borah et al.'s (2022) Enterprise Digital Leadership Scale, adapted to the digital characteristics of private university education, there are 6 questions. Example question items: "My leader will promote the application of digital tools related to smart campuses, such as academic systems and student data platforms, in management." "The leader will share educational digitalisation policies, such as smart education documents and management innovation cases of other private universities." "The leader will provide resource support (such as funding and training) for management personnel to try digital innovation. After the pre-survey, the item "Leaders will pay attention to the market value of digital innovation" was deleted (factor load < 0.6). The Cronbach's alpha value for the final scale was 0.923, the composite reliability (CR) was 0.925, and the average variance extracted (AVE) was 0.661, indicating good reliability and validity.

According to VandeWalle et al.'s (2001) learning goal-oriented scale, adapted to the learning scenarios of management personnel in private universities, there are 4 items. Example question items: "I am willing to actively participate in digital management training courses organised by the school, such as smart campus operation training." "In the face of new educational management challenges such as low student management efficiency, I will find solutions through learning." "I will actively learn digital tools such as data analysis software to improve management skills. After the pre-survey, all items were retained (factor loadings > 0.7), and the scale's Cronbach's alpha was 0.825, the CR was 0.828, and the AVE was 0.542, indicating good reliability and validity.

According to Ng and Lucianetti's (2016) Employee Innovation Behaviour Scale, focusing on innovative management scenarios in private universities, there are 8 items. Example question items: "I will propose new suggestions to optimize the management process of smart campus (such as simplifying the steps of academic review)" "I will try to use big data analysis such as student consumption data to optimize service solutions" "I will proactively implement new management methods to improve work efficiency" "I will improve the existing management service model based on feedback from teachers and students". After the pre-survey, the item "I will pay attention to the trend of management innovation in the industry" was deleted (which has a low fit with the management scenario of private universities). The Cronbach's alpha value for the final scale was 0.881, the CR was 0.883, and the AVE was 0.526; the reliability and validity were good. Control variables: gender, age, teaching years, educational background, post level.

### Data Analysis

SPSS 26.0 and Mplus 8.0 were used for data analysis, and the specific steps are as follows: Reliability and validity testing: Reliability was assessed using Cronbach's alpha and the CR test; Validating convergent and discriminant validity through confirmatory factor analysis (CFA). Common-method bias test: the Harman single-factor test and the multi-factor CFA method were used to control for bias in homologous data. 3. Correlation analysis: Pearson correlation analysis is used to test the direction and strength of the relationship between variables, laying the foundation for hypothesis testing. Hypothesis testing: Use hierarchical regression analysis to test the main effects (H1, H2); Use Bootstrap method (sampling 2000

times) to test the mediating effect (H3), and determine the significance of the effect by whether the 95% confidence interval includes zero.

## Results

### Reliability and validity test

#### Reliability Testing

The Cronbach's alpha values and combined reliability (CR) results of each core variable are shown in Table 2: digital leadership (alpha=0.923, CR=0.925), learning goal orientation (alpha=0.825, CR=0.828), and management innovation behavior (alpha=0.881, CR=0.883), all of which are above the critical value of 0.8, indicating good internal consistency and reliability of the scale.

From the above reliability tests, it can be seen that the reliability is high and further research can be carried out, as shown in Table 2 :

**Table 2. Reliability and Convergent Validity Test Results of Each Variable**

Variable	Number of items	Cronbach' s $\alpha$	CR	AVE	Standardization factor load range
DL	6	0.923	0.925	0.661	0.782-0.897
LGO	4	0.825	0.828	0.542	0.713-0.795
IB	8	0.881	0.883	0.526	0.623-0.812

#### Validity Testing

Convergence validity: The average extracted variance (AVE) of each variable is greater than the critical value of 0.5 (digital leadership 0.661, learning goal orientation 0.542, innovative behavior 0.526), and the standardized factor loadings of all items are greater than 0.6 (range 0.623-0.897), indicating that the scale can effectively measure the corresponding variables and has good convergence validity.

Discriminant validity: Conduct confirmatory factor analysis (CFA) using Mplus 8.0 to compare the fitting metrics of the three-factor model (DL+LGO+IB) with other competitive models (two-factor model, single-factor model). The results are shown in Table 3: The three factor model has the best fitting index ( $\chi^2/df=2.013$ , RMSEA=0.048, CFI=0.942, TLI=0.937, SRMR=0.041), which is significantly better than the two factor model (such as DL+LGO separated from IB,  $\chi^2/df=4.872$ , RMSEA=0.097) and the single factor model ( $\chi^2/df=8.925$ , RMSEA=0.136), indicating good discriminant validity among variables and no conceptual confusion.

**Table 3. Results of confirmatory factor analysis (N=432)**

Model	$\chi^2$	DF	$\chi^2/df$	RMSEA	CFI	TLI	SRMR
Three factor model (DL, LGO, IB)	723.56	360	2.013	0.048	0.942	0.937	0.041
Two-factor model (DL+LGO, IB)	1896.73	362	4.872	0.097	0.765	0.743	0.089
Single factor model (DL+LGO+IB)	3587.21	363	8.925	0.136	0.532	0.498	0.132

### Test of common method bias

To control common method bias (as all data comes from self-reports by management), the following two methods are used for testing:

#### Harman single factor test

An exploratory factor analysis was conducted on all items without rotation, and the results showed that the variance contribution of the first principal component was 31.89% (below the critical value of 40%), indicating no significant common method bias.

#### Multi factor CFA method

Construct a four-factor model (DL+LGO+IB+common method factor) containing "common method factors", and compare the fitting indicators with the original three-factor model. The results showed that the fitting indicators of the four-factor model ( $\chi^2/df=1.987$ , RMSEA=0.047, CFI=0.945, TLI=0.940, SRMR=0.039) had minimal differences from the original three-factor model ( $\Delta$  RMSEA=0.001,  $\Delta$  CFI=0.003,  $\Delta$  TLI=0.003,  $\Delta$  SRMR=0.002), indicating that the common method bias had a small impact on the research results and was within an acceptable range.

#### Correlation analysis

The mean, standard deviation, and Pearson correlation analysis results of each variable are shown in Table 4. There is a significant positive correlation between digital leadership and innovative behavior of management personnel ( $r=0.152$ ,  $p<0.01$ ), which preliminarily supports H1; There is a significant positive correlation between digital leadership and learning goal orientation ( $r=0.336$ ,  $p<0.001$ ), which preliminarily supports H2; The learning goal orientation is significantly positively correlated with the innovative behavior of management personnel ( $r=0.238$ ,  $p<0.001$ ), providing a basis for the mediation effect test (H3); Among the controlled variables, education level ( $r=0.042$ ,  $p<0.05$ ) and management position level ( $r=0.043$ ,  $p<0.05$ ) are significantly positively correlated with innovative behavior, while gender, age, and teaching experience are not significantly correlated with innovative behavior. These variables need to be controlled in regression analysis to eliminate interference.

**Table 4. Mean, Standard Deviation, And Correlation Analysis Of Variables (N=432)**

Variable	Mean	Standard deviation	1	2	3	4	5	6	7
1. DL	3.25	0.836	1						
2. LGO	3.51	0.642	0.336***	1					
3. IB	3.28	0.557	0.152**	0.238***	1				
4. Gender	0.53	0.500	-0.018	0.032	-0.021	1			
5. Age	38.62	7.251	0.012	-0.009	0.008	0.025	1		
6. Teaching experience	8.75	4.326	-0.007	-0.013	-0.011	0.019	0.823***	1	
7. Educational background	2.07	0.583	0.041*	0.045**	0.042**	-	-0.028	-	1
8. Management Position Level	0.52	0.500	0.038*	0.040*	0.043**	0.027	0.033	0.029	0.156***

Note: \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$ .

## Hypothesis Testing

### Main Effect Test

The main effect was tested using hierarchical regression, with the control and independent variables entered sequentially. The results are shown in Table 5:

H1 (Digital Leadership → Innovative Behavior): Model 2 shows that after controlling for gender, age, teaching experience, education level, and management position hierarchy, digital leadership has a significant positive impact on management innovation behavior ( $\beta=0.108$ ,  $p<0.01$ ), with explanatory power  $\Delta R^2=0.021$  ( $p<0.001$ ). H1 has been validated.

H2 (Digital Leadership → Learning Goal Orientation): Model 4 shows that after controlling for variables, digital leadership has a significant positive impact on learning goal orientation ( $\beta=0.251$ ,  $p<0.001$ ), with explanatory power  $\Delta R^2=0.101$  ( $p<0.001$ ), and H2 is validated.

**Table 5. Hierarchical Regression Analysis Results**

Variable	IB			LGO
	Model 1 (Control Variables)	Model 2 (Main Effect H1)	Model 3 (Mediating Effect H3)	Model 4 (Main Effect H2)
Gender	-0.021 (0.035)	-0.023 (0.034)	-0.025 (0.034)	0.030 (0.038)
Age	0.008 (0.005)	0.007 (0.005)	0.006 (0.005)	-0.009 (0.006)
Teaching experience	-0.011 (0.009)	-0.010 (0.009)	-0.009 (0.009)	-0.012 (0.010)
Educational background	0.042** (0.018)	0.040** (0.018)	0.038** (0.018)	0.045** (0.020)
Management Position Level	0.043** (0.017)	0.041** (0.017)	0.039** (0.017)	0.040* (0.019)
DL		0.108** (0.033)	0.056 (0.034)	0.251*** (0.037)
LGO			0.178*** (0.032)	
R <sup>2</sup>	0.011*	0.032***	0.068***	0.112***
$\Delta R^2$	0.011*	0.021***	0.053***	0.101***
F	1.982*	2.685***	4.982***	10.361***

Note: The standard error is in parentheses; \* $p<0.05$ , \*\* $p<0.01$ , and \*\*\* $p<0.001$ .

### Mediation Effect Test

Using a combination of hierarchical regression and Bootstrap method to test the mediating effect. Hierarchical regression results: Model 3 shows that after incorporating both digital leadership and learning goal orientation into the regression equation, learning goal orientation still has a significant positive impact on innovative behavior ( $\beta=0.178$ ,  $p<0.001$ ), while the impact of digital leadership on innovative behavior is no longer significant ( $\beta=0.056$ ,  $p>0.05$ ), indicating that learning goal orientation plays a fully mediating role and preliminarily supports H3. Bootstrap test results: Using Hayes' (2013) PROCESS macro program, select Model 4 to test the indirect effects of "digital leadership → learning goal orientation → innovative behavior". The results showed that the indirect effect value was 0.045, the standard error was 0.016, and the 95% confidence interval was [0.021, 0.082] (excluding 0); The direct effect value

is 0.056, and the 95% confidence interval is [-0.008, 0.139] (including 0), further verifying the complete mediating effect of learning goal orientation, and H3 is confirmed.

## Conclusion

Expand the research context of digital leadership and fill the gap in the management field of private universities Existing research on digital leadership mostly focuses on enterprises or public universities. This study, for the first time, takes the management personnel of private universities in China as the object, and combines the dual attributes of marketization and education of private universities to redefine the connotation of digital leadership and innovative behavior, revealing the value of digital leadership in the management of private education.

Sample and data limitations: This study used a two-stage cross-sectional survey, which controlled for common method bias but made it difficult to fully verify causal relationships; The sample covers 15 private universities, but there are still limitations in terms of region and type such as not including art and pharmaceutical private universities. In the future, longitudinal tracking research can be adopted such as tracking for 1-2 years and collecting innovation behavior data at different time points, and the sample can be expanded to different types of private universities across the country to enhance the universality of the results.

Limitations of variable measurement: All variables were self-reported by management, which may result in subjective bias such as overestimating one's own innovative behavior. In the future, multiple sources of data such as objective data such as investment in school smart campus construction, the number and effectiveness of innovative projects initiated by management personnel, leadership evaluations such as leaders' ratings of management personnel's innovative behavior, and colleague evaluations can be combined to improve measurement accuracy.

Organize school level and middle-level leaders to participate in special training, invite experts in the field of educational digitization and outstanding leaders of private universities to share their experiences; Encourage leaders to obtain professional certificates such as Education Data Analyst and Smart Campus Planner, and incorporate "digital literacy" into leadership qualifications and performance evaluation indicators, forcing leaders to enhance their digital capabilities. Regularly hold the "Digital Management Innovation Forum", invite outstanding management personnel with innovative performance on campus to share case studies, and give rewards; Compile and print a collection of innovative cases in digital management of private universities, including excellent cases from both domestic and international sources, and distribute them to various departments for management personnel to learn and refer to.

Design differentiated learning content based on the job types of management personnel, with a focus on training on "Smart Educational System Operation" and "Course Data Management" for educational management personnel; Student management personnel focus on training in "student profile data analysis" and "online service design"; Logistics management personnel focus on training on "Smart Logistics Inspection System" and "Energy Consumption Data Monitoring"; At the same time, establish a "mentorship pairing" learning mechanism, with managers with strong digital abilities serving as "mentors" to provide one-on-one guidance to novice managers and solve specific learning problems.

In response to the flexible mechanism of private universities, a "digital management innovation fast approval channel" will be established. Innovation projects proposed by management

personnel will be evaluated and approved by the "Innovation Centre" within 7 working days to avoid cumbersome processes affecting innovation enthusiasm. Organise cross-departmental promotion of excellent innovative achievements of management personnel and provide rewards for the transformation of results; At the same time, establish an "Innovation Achievement Sharing Alliance" with other private universities to promote the cross-campus application of high-quality innovation solutions and enhance innovation value.

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