

TRANSFORMATIONAL LEADERSHIP MODEL FOR ADMINISTRATORS OF HIGHER VOCATIONAL COLLEGES IN HEBEI PROVINCE*

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Abstract

This study aims to: (1) empirically delineate and validate core dimensions of transformational leadership for administrators in Hebei's higher vocational colleges, integrating regional industrial and policy contexts; (2) construct a context-adapted, psychometrically sound model via mixed-methods; (3) provide evidence-based recommendations to enhance leadership capabilities and align vocational education with Hebei's industrial upgrading. Research Methodology: A mixed-methods design was adopted: 9 semi-structured expert interviews informed a 115-item 5-point Likert questionnaire. Quantitative data were collected via stratified random sampling of 500 responders from 68 Hebei higher vocational colleges. Analyses included descriptive statistics, KMO/Bartlett's tests, and exploratory factor analysis (EFA) with principal component analysis (PCA) and Varimax rotation.

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Research Results: The questionnaire exhibited excellent psychometric properties (KMO=0.974, Bartlett's $\chi^2 = 39010.394$, $df=5356$, $p<.001$). EFA extracted 6 stable dimensions with 73 valid indicators (cumulative variance explained=61.38%), with "Vision and Support" as the core factor (34.031% variance contribution). Initial items had means of 3.64–4.03 (SD=0.630–0.996), indicating high perceived importance; "Vision and Support" ranked first ($M=3.89$, $SD=0.837$). The six dimensions are: Vision and Support, Industry-University-Research Collaboration Capacity, Organizational Culture, Distributed Leadership, Professional Development, and Information and Communication Technology Competence. A context-adapted model was constructed, reflecting the complementarity of formal institutional mechanisms and informal relational behaviors.

Keywords: Transformational leadership, Higher vocational college administrators, Hebei Province, Six-factor model, Mixed-methods, Industry-education integration

Introduction

Against China's drive for high-quality vocational education and Hebei Province's restructuring of 14 key industrial clusters, higher vocational colleges are pivotal to cultivating technical talents for regional economic transformation. As of 2024, Hebei hosts 68 such colleges with over 1.73 million full-time students, delivering 580,000+ skilled graduates annually (Hebei Provincial Department of Education, 2024; Baoding Daily, 2025). These institutions are tasked with advancing industry-education integration, modernizing vocational education systems, and aligning talent cultivation with regional priorities.

Transformational leadership, conceptualized by Bass (1985) as encompassing idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, is widely recognized as a driver of organizational innovation and sustainability. It serves as a targeted solution to

Hebei's vocational education-industry misalignment, grounded in two theoretical pillars: Fiedler's (1967) contingency theory, enabling it to break the rigidity of traditional centralized governance and adapt to industrial restructuring; and its emphasis on collective goal alignment, bridging the gap between talent cultivation and enterprise skill demands. However, Hebei's vocational education faces persistent challenges: misalignment between administrative leadership and regional industrial imperatives, insufficient integration of leadership models with policies like the Double High Plan, and tensions between hierarchical management and the need for distributed, participatory governance.

Despite growing scholarship on transformational leadership in higher education, three critical gaps persist in Hebei's context: existing studies focus on national frameworks or coastal regions, lacking models tailored to the province's industrial restructuring and vocational education policies; few adopt rigorous mixed-methods to validate leadership models, leaving a dearth of evidence for evidence-based leadership development; and research rarely translates theory into actionable strategies for industry-education integration and digital transformation. Against this backdrop, the study holds significant value: it addresses misaligned leadership practices to better support regional industrial upgrading and talent cultivation, expands transformational leadership theory by constructing a context-adapted model for non-Western vocational education to deepen its localized application in China, and provides empirical evidence for Hebei's vocational education governance—including leadership training and Double High Plan implementation (Journal of Hebei Vocational Education, 2023) (policy utility).

1. Theoretical Foundation

The study is grounded in Bass's (1985) transformational leadership theory (inspiring collective goal pursuit), Fiedler's (1967) contingency theory (justifying context-specific models), and Gronn's (2002) distributed leadership theory.

2. Related Research

International studies link transformational leadership in vocational education to improved teacher motivation, student outcomes, and institutional innovation (Leithwood et al., 2020). Domestic research explores transformational leadership in Chinese higher education but lacks context-specific models (Zhang et al., 2022). Hebei-specific studies emphasize industry-university-research (IUR) collaboration and digital transformation (Hebei Chemical and Pharmaceutical Vocational College, 2025) but fail to systematically examine transformational leadership's mediating role. These gaps underscore the need for this study.

The study focuses on senior and middle-level administrators across Hebei's 68 higher vocational colleges, with stratified sampling across 11 prefecture-level cities to ensure industrial and educational representativeness. The two tiers have distinct, complementary demands: Senior administrators, Middle-level administrators, Administrators of non-vocational higher education institutions are excluded to maintain focus.

Theoretical contribution: Expands transformational leadership theory by validating a context-specific model for non-Western vocational education, offering a replicable framework for regional leadership studies.

Practical contribution: Equips Hebei's vocational colleges with actionable strategies to optimize leadership, enhance IUR collaboration, and drive digital transformation; informs policy formulation (targeted leadership training, Double High Plan implementation), ultimately improving vocational education quality and supporting regional economic transformation.

Literature review

1. Theoretical Foundation of Transformational Leadership

Transformational leadership was formally proposed by Bass (1985) in *Leadership and Performance Beyond Expectations*, delineating four core

dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. This theory has since become a dominant framework, with subsequent expansions across organizational contexts.

Gronn (2002) extended it by integrating distributed leadership, arguing that effective modern leadership is distributed across stakeholders—particularly relevant for vocational colleges relying on collaborative governance. In China’s institutional context, Bass’s transformational leadership and Gronn’s distributed leadership form a complementary “core leadership-multiple participation” mechanism: individual administrators provide strategic vision, while multi-stakeholder participation translates vision into practice. Fiedler’s (1967) contingency theory further complements this, emphasizing style-situation fit and justifying context-specific models over universal Western frameworks.

Digital leadership theory, a contemporary extension of transformational leadership, emphasizes integrating ICT competence into leadership behaviors (Zhang, 2023), enabling educational institutions to adapt to digital transformation and industrial demands. It fills gaps in classic transformational leadership research and underpins the ICT Competence dimension of this study’s model.

Meta-analyses have validated transformational leadership’s effectiveness in education (Leithwood et al., 2020), but these developments are rooted in Western contexts, raising applicability questions for non-Western systems like Hebei’s. Additionally, existing research lacks systematic integration of digital, distributed, and transformational leadership theories, limiting explanations of modern vocational college leadership demands.

2. Transformational Leadership in Vocational Education

International research links transformational leadership in vocational education to coordinated school-enterprise resource allocation, optimized practical teaching, and responsiveness to industrial upgrading (Leithwood et al., 2020). For example, European studies show that transformational leaders foster

industry partnerships, enhancing curriculum relevance and graduate employability.

Domestically, Zhang et al. (2022) confirmed transformational leadership's positive correlation with faculty satisfaction, curriculum innovation, and institutional development, but noted fragmented vocational education research with limited attention to industry ties and practical skill focus. Li et al. (2021) identified inspirational motivation and intellectual stimulation as key drivers of IUR collaboration, while Wang et al. (2023) highlighted individualized consideration and idealized influence in promoting faculty acceptance of digital tools. Despite these advances, research remains general, lacking region-specific models.

3. Localized Research on Transformational Leadership in Chinese Higher Vocational Colleges

With deepening vocational education reform, scholars emphasize localized leadership models aligned with national policies and regional industrial characteristics. However, most studies adopt universal frameworks with limited provincial adaptation.

Zhang et al. (2022) noted three limitations of Chinese vocational education research: overemphasis on national policies over regional practices, reliance on qualitative/small-scale surveys, and failure to integrate regional industrial demands. These are particularly evident in Hebei, where vocational education is tied to 14 key industrial clusters but lacks targeted research. Hebei-specific studies have two critical shortcomings: focus on descriptive analyses of IUR collaboration and digital transformation, and a lack of psychometric validation.

Hebei-focused research prioritizes industry-education integration and digital transformation but neglects transformational leadership: Journal of Hebei Vocational Education (2023) explored IUR collaboration without addressing

leadership mediation; Hebei Chemical and Pharmaceutical Vocational College (2025) surveyed digital transformation but ignored administrative leadership; Hebei Provincial Department of Education (2024) highlighted leadership capacity gaps without empirical solutions.

Methodology

The study adopted a mixed-methods design, combining qualitative expert interviews with quantitative empirical analysis and exploratory factor analysis (EFA), ensuring both theoretical rationality and empirical rigor of the constructed transformational leadership model.

1. Population and Samples

Probability sampling was adopted to support generalizability to Hebei’s higher vocational colleges, which is appropriate for quantitative research with high generalization requirements (Liu et al., 2020). The study population comprised over 1,200 stakeholders from Hebei’s 68 higher vocational colleges, spanning all 11 prefecture-level cities and key industrial clusters.

Stratified random sampling was used to select 500 respondents from 62 colleges, ensuring sample representativeness. All 500 distributed questionnaires were valid (100% response rate), attributed to targeted sampling of governance-related stakeholders and active cooperation from surveyed colleges and local educational authorities.

Table 1 Sample Demographic Characteristics

General Basic information	Subgroup	Frequency Percentage (%)	
1. Gender	Male	275	55.00
	Female	225	45.00
2. Age	under 25 years	54	10.80
	old		

	25 - 29 years old	143	28.60
	30 - 39 years old	235	47.00
	40-49 years old	41	8.20
	Above 49 years old	27	5.40
	under 5 years	49	9.80
	5 – 10 years	90	18.00
3. Working Experiences	11 – 15 years	135	27.00
	16 – 20 years	201	40.20
	Above 20 years	25	5.00
	Bachelor	164	32.80
4. The Highest Education Level	Master	220	44.00
	Doctor	88	17.60
	Other	28	5.60
	Assistant Lecturer	151	30.20
	Lecturer	164	32.80
5. Professional Title	Associate Professor	155	31.00
	Professor	30	6.00

2. Research Tools

A 115-item 5-point Likert questionnaire was developed to measure transformational leadership of Hebei's higher vocational college administrators, based on core connotations and measurement dimensions defined via 9 expert interviews; its validity and reliability were rigorously verified through expert validation and pre-survey. The validation panel comprised 9 experts with

diverse backgrounds aligned to industry-education integration: 5 doctoral supervisors/professors in vocational education management (academic expertise in leadership, IUR collaboration, and digital transformation) and 4 senior managers responsible for university-enterprise cooperation/human resources in leading enterprises of Hebei's 14 key industrial clusters. Each item was evaluated using the Item-Objective Congruence (IOC) index (dimensions: aim alignment, clarity, comprehensiveness, practical significance), with all IOC values ranging from 0.80 to 1.00. A pre-survey with 30 non-formal survey participants yielded an overall Cronbach's alpha coefficient of 0.962, indicating excellent internal consistency. For formal data collection, official letters were sent to 62 selected higher vocational colleges in Hebei Province to secure permission; upon approval, respondents were randomly selected and invited to complete an online questionnaire distributed through colleges' official social media. Data analysis was performed using SPSS 26.0, encompassing descriptive statistics (percentage, mean, standard deviation) to reflect data distribution, KMO and Bartlett's Test of Sphericity, exploratory factor analysis (EFA) with principal component analysis (PCA) for factor extraction and Varimax orthogonal rotation, and qualitative content analysis of 9 expert interview transcripts to define factor connotations and validate factor naming and model rationality.

Results

1. Suitability Test for Factor Analysis

Table 2 shows the results of the KMO and Bartlett's Test of Sphericity for the 115 questionnaire items. The KMO Measure of Sampling Adequacy was 0.974, which is classified as "excellent" (Kaiser, 1974), indicating that the correlation between the observed variables is high and the data is highly suitable for factor analysis. Bartlett's Test of Sphericity was significant ($\chi^2=39010.394$, $df=5356$, $p<.001$), rejecting the null hypothesis that the correlation

matrix is an identity matrix, which further confirms that the variables are correlated and suitable for factor analysis.

Table 2 KMO and Bartlett Test

KMO and Bartlett's Test		
KMO		0.974
	Chi-Square	39010.394
Bartlett's Test of Sphericity	df	5356
	Sig	0.000

2. Factor Extraction and Rotation

PCA was used for factor extraction, and Varimax orthogonal rotation was used for factor rotation to clarify the factor structure. Following the Kaiser criterion (eigenvalue ≥ 1), 6 valid factors were extracted from the 115 initial items; after deleting items that did not meet the criteria (factor loading < 0.5 , significant cross-loadings), 73 valid indicators were retained. Table 3 shows the total variance explained by the 6 factors: the cumulative percentage of variance explained was 61.380%, which is an acceptable level for social science research (Hair et al., 2019). Vision and Support (Factor 1) was the most influential factor, with an initial eigenvalue of 35.393 and a variance contribution rate of 34.031%—far higher than the other five factors, indicating its core position in the transformational leadership model. The variance contribution rates of the other five factors were 7.508% (Industry-University-Research Collaboration Capacity), 5.742% (Organizational Culture), 5.147% (Distributed Leadership), 4.706% (Professional Development), and 4.245% (Information and Communication Technology Competence), respectively.

Table 3 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	35.393	34.031	34.031	35.393	34.031	34.031	15.926	15.314	15.314
2	7.809	7.508	41.540	7.809	7.508	41.540	11.744	11.294	26.607
3	5.972	5.742	47.282	5.972	5.742	47.282	10.311	9.919	36.526
4	5.353	5.147	52.429	5.353	5.147	52.429	9.632	9.261	45.787
5	4.894	4.706	57.135	4.894	4.706	57.135	8.223	7.907	53.694
6	4.415	4.245	61.380	4.415	4.245	61.380	7.993	7.686	61.380

Extraction Method: Principal Factor Analysis.

The scree plot (Figure 1) further validated the 6-factor solution: the slope of the scree plot was steep for the first 6 factors and became significantly gentler after the 6th factor, indicating that the information explained by the subsequent factors decreased sharply. A 7-factor solution was rejected for three statistical reasons, beyond the steepness of the slope: (1) the eigenvalues of

Factor 7 and all subsequent factors were less than 1, failing to meet the Kaiser criterion for factor extraction; (2) the variance contribution rate of Factor 7 was less than 4%, with a marginal effect on the total variance explanation, and adding it could not significantly improve the model's explanatory power; (3) the number of valid items for the potential 7th factor was less than 3, failing to meet the basic requirement for forming a valid factor (Kaiser method). These results confirm that the 6-factor solution is the most optimal and parsimonious for the study.

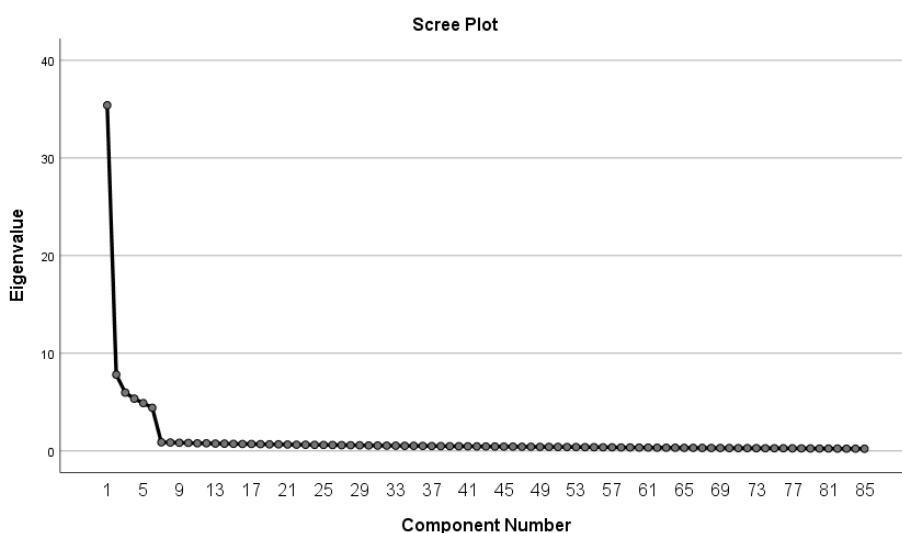


Figure 1 Scree Plot

(Note: The plot displays eigenvalues on the Y-axis and factor numbers on the X-axis; the eigenvalue of Factor 7 is 0.89, and all subsequent factors have eigenvalues <0.85.)

Table 4 shows the factor loading range of each of the 6 extracted factors: the factor loadings ranged from 0.614 to 0.748, all of which were above 0.6, indicating good convergent validity of the model (Hair et al., 2019). The factor structure was determined through content analysis of expert interviews and the

connotations of the retained items, ensuring consistency with theoretical research and the practical characteristics of Hebei's vocational education.

Table 4 Factor Loading Ranges of the Six Core Dimensions

Factor	Dimension Name	Lowest Factor Loading	Highest Factor Loading
1	Vision and Support	0.690	0.748
2	Industry-University- Research Collaboration Capacity	0.614	0.740
3	Organizational Culture	0.621	0.706
4	Distributed Leadership	0.664	0.740
5	Professional Development Information and	0.663	0.717
6	Communication Technology Competence	0.671	0.699

3. Descriptive Statistics of the Six Core Dimensions

Table 5 presents the mean, standard deviation, perceptual importance ranking (based on mean values), and statistical contribution ranking (based on variance contribution rate) of the six core dimensions, clearly distinguishing between respondents' perceived importance and the statistical impact identified by EFA. The results showed that the mean values across all six dimensions ranged from 3.58 to 3.89 (SD = 0.807–0.837), all exceeding the midpoint of the 5-point Likert scale (3), indicating that respondents generally perceived the six dimensions as highly important for transformational leadership. Vision and Support ranked first in both perceptual importance (M=3.89, SD=0.837) and

statistical contribution (34.031% variance), which means this dimension is both recognized as the most important by practitioners and statistically the core of the transformational leadership model. The other five dimensions had small differences in perceptual importance rankings, consistent with their relatively close statistical variance contribution rates, indicating a high degree of consistency between practical perception and statistical analysis.

Table 5 Means, Standard Deviations, and Opinion Ranking

Factor	Dimension Name	Mean	S.D.	Ranking (Perceptual Importance)	Variance Contribution (%)	Ranking (Statistical Contribution)
1	Vision and Support Industry- University-	3.89	0.837	1 (Highest)	34.031	1 (Highest)
2	Research Collaboration Capacity	3.73	0.812	2 (High)	7.508	2
3	Organizational Culture	3.70	0.822	3 (High)	5.742	3
4	Distributed Leadership	3.65	0.813	4 (High)	5.147	4
5	Professional Development Information	3.64	0.809	5 (High)	4.706	5
6	and Communication Technology	3.58	0.807	6 (High)	4.245	6

Competence

4. Model Construction

Based on the quantitative EFA results and qualitative content analysis of 9 expert interviews, a Hebei-specific six-factor transformational leadership model for administrators of higher vocational colleges was constructed (Figure 2). The model takes Vision and Support as the core dimensions, with Industry-University-Research Collaboration Capacity and Organizational Culture as the two core support dimensions, and Distributed Leadership, Professional Development, and Information and Communication Technology Competence as the basic guarantee dimensions. The six dimensions interact with and complement each other, and the model fully reflects the complementary effects of formal institutional mechanisms and informal relational behaviors in Hebei’s vocational college leadership practice, as well as the integration of transformational leadership, distributed leadership, and digital leadership theories.

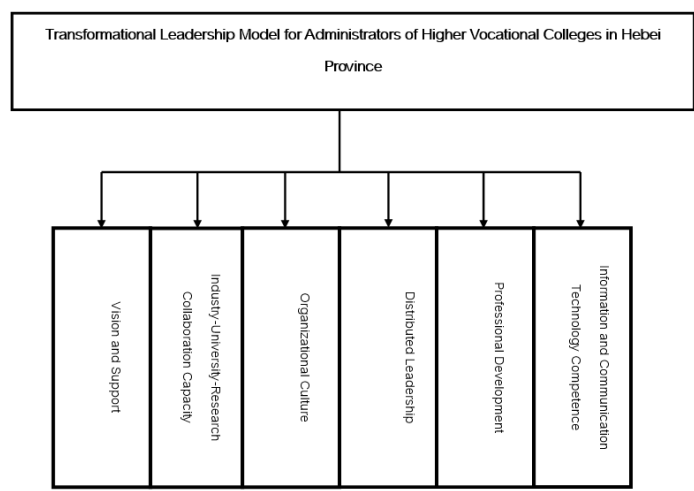


Figure 2 Transformational Leadership Model for Administrators of Higher Vocational Colleges in Hebei Province

Conclusion and Discussion

1. Conclusion

This study adopted a mixed-methods design (qualitative expert interviews + quantitative empirical analysis) to examine transformational leadership among administrators in Hebei's higher vocational colleges, drawing three core conclusions:

Transformational leadership was perceived as highly important: the 115 initial measurement items had means of 3.64–4.03 (SD=0.630–0.996), and the six extracted core dimensions all exceeded 3.58 (SD=0.807–0.837), indicating broad respondent consensus on its governance value.

It presented a stable six-dimensional structure with 73 valid indicators. EFA identified six dimensions—Vision and Support, Industry-University-Research Collaboration Capacity, Organizational Culture, Distributed Leadership, Professional Development, and ICT Competence—collectively explaining 61.380% of total variance. All factor loadings exceeded 0.614, the questionnaire had excellent psychometric properties (KMO=0.974, Bartlett's $\chi^2=39010.394$, $p<.001$), and Vision and Support served as the core factor (34.031% variance contribution), ranking first in perceptual importance.

A contextually adapted Hebei-specific six-factor transformational leadership model was developed and validated. Centered on Vision and Support with five supporting dimensions, the model integrates transformational, distributed, and digital leadership theories, aligns with Hebei's industrial restructuring and vocational education policies, reveals the complementary effects of formal institutional mechanisms and informal relational behaviors, and provides a practical framework for local administrators' leadership capacity building.

5.2 Discussion

Vision and Support acts as the foundational core of transformational leadership for Hebei's vocational college administrators, it enables the formulation of industry-aligned strategic orientations, unification of organizational values, and targeted institutional/resource support for faculty, students, and industry-education integration, aligning talent cultivation with regional industrial upgrading and enhancing organizational cohesion (Bass & Riggio, 2006; Leithwood & Jantzi, 2005). Industry-University-Research Collaboration Capacity serving as the practical-oriented core, it bridges institutional governance and industrial development, determining the effectiveness of industry-education integration and talent cultivation practicality by facilitating stable school-enterprise partnerships, optimizing practical teaching systems, and enhancing local industrial service capacity (Chen, 2024; Liu, 2023). Organizational Culture Providing soft cultural support for transformational leadership, it shapes innovative and collaborative values to stimulate institutional vitality, break internal management barriers, improve operational efficiency, and consolidate the implementation foundation of transformational and distributed leadership (Guo, 2024; Yang, 2023). Distributed Leadership Acting as an important governance complement, it realizes multi-stakeholder participation and decentralized decision-making, reducing reform resistance, improving policy rationality, and strengthening the sense of ownership among faculty, students, and enterprise partners (Gronn, 2002; Ma, 2024). Professional Development Serving as the internal driver for enhancing transformational leadership, it supports lifelong learning, policy adaptation, and the renewal of industrial/management knowledge aligned with Hebei's vocational education development, enhancing administrators' professional identity and ensuring the sustainability of leadership practice (Ding, 2024; Yu, 2023). Information and Communication Technology Competence, as the modern enabling dimension, supports digital governance, smart campus construction, and data-driven

decision-making to adapt to digital transformation and industrial upgrading, optimizing management/teaching efficiency and promoting the integration of digital tools into practical education (Xu, 2024; Zhang, 2023).

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