Sustainable Development Model of Mixed-Ownership School-Running in Higher Vocational Colleges in Shandong Province

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Abstract

Addressing practical dilemmas in mixed-ownership higher vocational colleges in Shandong Province—such as ambiguous property rights, imperfect governance mechanisms, and insufficient resource integration—this study identified a population of 8,906 individuals across five pilot institutions and aimed to examine the current status of mixed-ownership school-running, a population of 8,906 individuals across five pilot institutions. Based on the Krejci and Morgan sampling table, a sample of 586 participants was selected, comprising 365 students, 115 teachers, and 106 administrators. A mixed-methods design incorporating questionnaires, semi-structured interviews, focus group discussions, and expert evaluations was employed to examine the current status of mixed-ownership school-running, to construct a sustainable development model, and to verify its adaptability and feasibility. The results indicate that the overall level of mixed-ownership school-running is moderate (M = 3.272, SD = 1.045), with the educational environment scoring the highest (M = 3.389) and property rights attributes scoring the lowest (M = 3.197). The research instruments demonstrated high reliability and validity (Cronbach's α = 0.978; KMO = 0.990). A five-dimensional sustainable development model—comprising Property Rights Attributes, Educational Environment, Campus Environment, Management Environment, and Resource Environment—was constructed and validated at a high level. This study provides empirical evidence and a practical framework for standardizing and promoting the sustainable development of mixed-ownership vocational institutions in Shandong Province. It offers a regional reference for similar educational reforms nationwide.

Keywords: higher vocational colleges, mixed-ownership school-running, sustainable development model, empirical research, Shandong province

1. Introduction

1.1 Research Background

In 2022, UNESCO released the Strategy for Technical and Vocational Education and Training (2022-2029), explicitly stating that vocational education must align with employment demands and the Sustainable Development Agenda. Since the 2014 Decision of the State Council on Accelerating the Development of Modern Vocational Education first proposed exploring mixed-ownership vocational colleges, relevant policies have continued to deepen. Consequently, Mixed-ownership school-running has become a core pathway for revitalizing vocational education and deepening industry-education integration. As a central province for vocational education, Shandong became one of China's first pilot provinces for industry-education integration in 2015. It took the lead in issuing local policies for Mixed-ownership school-running and implementing linked incentive measures across "finance, fiscal support, land, and credit." To date, Shandong has established 47 mixed-ownership higher vocational colleges and 322 mixed-ownership secondary colleges, attracting over 12 billion RMB in social investment and providing 70% of the new labor force for regional industries.

However, prominent problems such as unclear property rights division, low enthusiasm for enterprise participation, and imperfect governance structures persist in practice, seriously restricting the sustainable development of this school-running model and urgently requiring systematic research.

1.2 Research Objectives and Significance

Theoretical Significance: It enriches the theoretical system of Mixed-ownership school-running in vocational education, clarifies the core dimensions and internal logic of the sustainable development model, and provides methodological references for similar studies.

Practical Significance: It targets key problems in the school-running process of higher vocational colleges in Shandong Province, optimizes resource allocation and governance mechanisms, improves the quality of talent cultivation and its alignment with industrial needs, and provides a regional sample for vocational education reform across the country.

1.3 Research Framework

This study follows the logical path of "Current Situation Investigation → Model Construction → Empirical Verification → Optimization Suggestions". The specific research framework is shown in Figure 1:

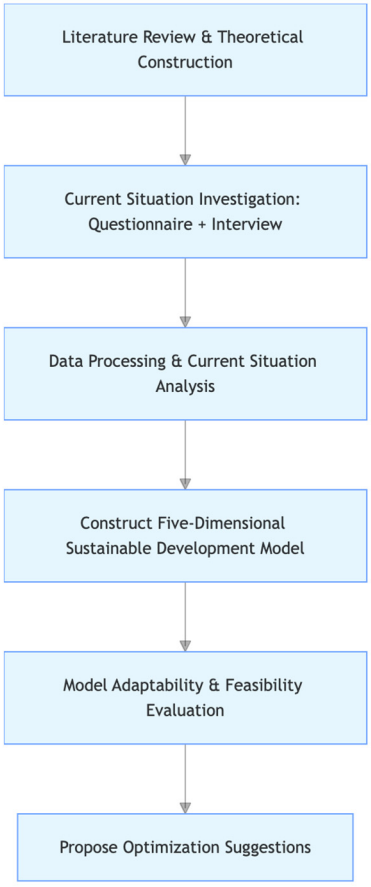

Figure 1. Research Technical Roadmap

2. Literature Review

Mixed-ownership school-running refers to an educational model in which diverse capital sources—including state-owned, collective, and non-public capital—co-invest and participate in governance. Its core characteristics are manifested through the diversification of property rights structures, the pluralization of governance subjects, and the marketization of operational mechanisms. Although the explicit concept of "Mixed-Ownership" does not exist abroad, models such as the German Dual System, American Community Colleges, British Collaborative Vocational Education, and the Australian TAFE model all achieve deep integration of industry and education through the synergy of government, corporate, and academic stakeholders. These international practices provide valuable reference frameworks for the development of mixed-ownership school-running in China.

Recent international studies have emphasized that governance mechanisms and industry–education integration

constitute the core determinants of sustainability in public–private vocational education partnerships (OECD, 2022; Smith & Brown, 2021). Compared with mature models such as the German dual system and the Australian TAFE system, China's mixed-ownership school-running model faces distinctive institutional challenges, particularly in clarifying property rights boundaries and balancing public welfare with capital participation. Although domestic studies have explored governance logic and property rights reform (Chen & Li, 2021; Wang & Li, 2023), systematic empirical models integrating governance, resource allocation, and educational quality remain limited. This study, therefore, seeks to fill this gap by constructing and empirically validating a comprehensive sustainable development model for mixed-ownership vocational institutions.

3. Research Methods

3.1 Research Subjects

3.1.1 Population and Sample

Table 1. Research Population and Questionnaire Sample Distribution

Institution	Time	students		teachers		administrators	
		Pop.	Sam.	Pop.	Sam.	Pop.	Sam.
Shandong Maritime Vocational College	2016	1000	48	92	18	90	22
Jinan Engineering Vocational and Technical College	2017	1400	68	140	23	113	23
Binzhou Vocational College	2018	2300	110	226	36	135	21
Shandong Vocational Animal Science and Veterinary College	2019	1380	67	140	21	135	21
Shandong Chemical Engineering Vocational College	2020	1500	72	130	17	125	19
Total		7580	365	728	115	598	106

3.1.2 Interview Participants and Experts

Interview Participants: The interview sample comprised 15 individuals with over 5 years of professional experience, including 5 teachers, 5 administrators, and 5 stakeholders.

Model Evaluation Experts: The final model was evaluated by a panel of five experts, including vocational education policy researchers, vocational college presidents, and corporate executives. This panel consisted of two strategy development experts, two academic administrators, and one senior institutional manager.

3.2 Research Instruments

3.2.1 Questionnaire on the Current Status of Mixed-Ownership School-Running

A 35-item questionnaire was developed based on a literature review and validated by five experts, achieving an Index of Item-Objective Congruence (IOC) of 0.97. The instrument encompasses five dimensions: Property Rights Attributes, Educational Environment, Campus Environment, Management Environment, and Resource Environment. Responses were measured on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Pilot testing demonstrated high reliability, with Cronbach's alpha coefficients of 0.92 for the student version, 0.91 for the teacher version, and 0.93 for the administrator version.

3.2.2 Semi-Structured Interview Outlines

Two types of interview outlines were designed: (1) an outline addressing current status issues (containing 35 questions), and (2) an outline focused on model construction (containing 6 and 9 core questions, respectively). These outlines covered topics such as existing problems, implementation paths, influencing factors, and current models.

3.2.3 Focus Group Discussion (FGD) Guide

Focus group discussions consisting of 15 and 5 participants, respectively, were organized to refine the draft model

framework. The discussions centered on eight key issues, including the model's core concepts, guiding principles, and dimensional content.

3.2.4 Evaluation of Draft Model Adaptability and Feasibility

The draft model was evaluated across two dimensions: adaptability (5 items) and feasibility (5 items). A 5-point scale was employed, ranging from 1 (Lowest Level) to 5 (Highest Level).

3.3 Data Processing and Reliability-Validity Test

SPSS 26.0 software was used for statistical analysis of the data, including descriptive statistics and reliability and validity testing. Reliability analysis showed that the questionnaire's overall Cronbach's α was 0.978, and the dimension-specific α coefficients ranged from 0.923 to 0.956, indicating good internal consistency. For validity analysis, the KMO value was 0.990, indicating that the data were suitable for factor analysis and that the scale had good content validity. In addition to descriptive statistics, exploratory factor analysis was employed to verify the dimensional structure of the proposed model. Reliability and validity testing ensured the internal consistency and construct validity of each dimension, thereby providing a statistical foundation for subsequent model construction and expert evaluation. Although the Cronbach's α and KMO values were relatively high, this result can be attributed to the large sample size and the high internal consistency among items within each dimension. Similar high coefficients have been reported in previous large-scale vocational education surveys (Zhang, 2021).

3.4 Ethical Considerations

This study was reviewed and approved by the institutional research ethics committee of the authors' affiliated university. All participants were informed of the research objectives, procedures, and their rights before participation. Written informed consent was obtained from all respondents. Participation was voluntary, and anonymity and confidentiality were strictly maintained throughout data collection and analysis.

4. Results and Analysis

4.1 Analysis of the Current Status of Mixed-Ownership School-Running

Descriptive statistical analysis was conducted on 586 valid questionnaires, and the results are shown in Table 2. Overall, the average score for Mixed-ownership school-running in higher vocational colleges in Shandong Province was 3.272 (SD=1.045), indicating a moderate level of development. In terms of the ranking of dimensions, the Educational Environment scored the highest ($\overline{X}$=3.389, SD=1.106), followed by the Resource Environment ($\overline{X}$=3.298, SD=1.022) and Campus Environment ($\overline{X}$=3.261, SD=1.021), while the Management Environment ($\overline{X}$=3.213, SD=0.990) and Property Rights Attributes ($\overline{X}$=3.197, SD=0.968) scored relatively lower.

Table 2. Descriptive Statistics of Each Dimension of Mixed-Ownership School-Running

Contents	$\overline{X}$	*SD*	Level	Rank
Property Rights Attributes	3.197	0.966	moderate	5
Educational Environment	3.389	1.106	moderate	1
Campus Environment	3.261	1.021	moderate	3
Management Environment	3.213	0.990	moderate	4
Resource Environment	3.298	1.022	moderate	2
Total	3.272	1.045	moderate	

4.2 Construction of the Sustainable Development Model

Five experts—including vocational education policy researchers, senior teachers, and experienced educational administrators—were invited to evaluate the Suitability and feasibility of the draft model using a 5-point Likert scale.

4.2.1 Adaptability Evaluation Expert evaluations indicate that the overall adaptability of the draft model is at a high level ($\overline{X}$=4.240, SD=0.733). Among the evaluated indicators, "effectively responding to current and future challenges" and "enhancing the quality of school-running" received the highest scores ($\overline{X}$ = 4.400), while "balancing the interests of multiple stakeholders" received the lowest score ($\overline{X}$ = 4.000). Detailed results are presented in Table 3.

Table 3. Adaptability Evaluation Results of the Model (n=5)

Contents		$\overline{X}$	*SD*	Level	Rank
1.	The model fully considers the current situation and development needs of Mixed-ownership school-running in higher vocational colleges in Shandong Province	4.200	0.837	high	3
Contents		$\overline{X}$	*SD*	Level	Rank
2.	The model content fully considers the characteristics and needs of students, teachers, and administrators in higher vocational colleges	4.200	0.837	high	3
3.	The model can effectively respond to the challenges faced by the sustainable development of Mixed-Ownership School-Running, currently and in the future	4.400	0.548	high	1
4.	The model fully considers the interests of stakeholders such as the government, schools, and enterprises	4.000	0.548	high	5
5.	The model helps improve the educational quality and school-running level of higher vocational colleges	4.400	0.894	high	1
Total		4.240	0.733	high	

4.2.2 Feasibility Evaluation

The results are shown in Table 4. The overall feasibility score for the draft model was $\overline{X}$ = 4.360 (SD = 0.508), indicating a high level of feasibility. Among specific items, "Management Environment Construction" scored the highest ($\overline{X}$=4.600, SD=0.548), while "Property Rights Attribute Scheme" and "Educational Environment Construction" had the same score ($\overline{X}$=4.200, SD=0.447). All dimensions reached a high level, indicating that the model has good practical operability.

Table 4. Feasibility Evaluation Results of the Model (n=5)

Contents		$\overline{X}$	*SD*	Level	Rank
1.	The property rights attribute plan in the model is feasible for implementation	4.200	0.447	high	4
2.	The construction of the educational environment in the model is feasible for implementation	4.200	0.447	high	4
3.	The construction of the campus environment in the model is feasible for implementation	4.400	0.548	high	2
4.	The construction of the management environment in the model is feasible for implementation	4.600	0.548	highest	1
5.	The construction of the resource environment in the model is feasible for implementation	4.400	0.548	high	2
Total		4.360	0.508	high	

4.3 Model Construction Process

4.3.1 Core Framework

Based on the status quo analysis, interview coding, and the SWOT-PEST and TOWS matrix analyses, a sustainable development model featuring a "Five-Dimensional Core Framework + Supporting Strategies" was constructed through focus group discussions. The SWOT–PEST and TOWS matrix analyses revealed that policy support and industry demand constituted significant external opportunities. At the same time, unclear property rights and weak enterprise incentives represented the primary internal weaknesses. These analytical results directly informed the selection of the five core dimensions and the formulation of supporting strategies. The core dimensions include Optimization of Property Rights Attributes, Refinement of the Educational Environment, Upgrading of the Campus Environment, Optimization of the Management Environment, and Guarantee of the Resource Environment. Each

dimension comprises five objectives, five Key Performance Indicators (KPIs), and five strategic questions.

Figure 2 illustrates the overall structure of the sustainable development model, showing the five core dimensions and their logical interrelationships.

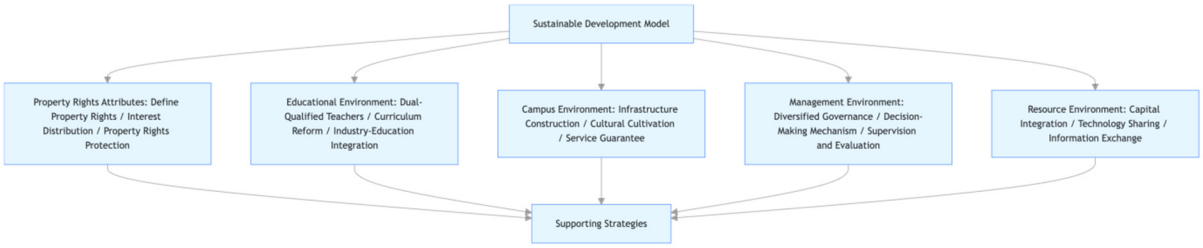

Figure 2. Structure of the Sustainable Development Model of Mixed-Ownership School-Running

4.3.2 Key Performance Indicators

(KPI of the Model)

Figure 3 presents the KPI framework corresponding to each dimension, highlighting the alignment between strategic objectives and operational indicators.

Figure 3. The Structure of the Sustainable Development Model for Mixed-Ownership Education

5. Discussion

5.1 Core Findings and Causal Analysis of the Current Status

This finding is consistent with previous studies indicating that property rights clarification remains the core bottleneck in China's mixed-ownership vocational reform (Wang & Li, 2023; Chen & Li, 2021). Similar governance

challenges have also been observed in public–private vocational partnerships in Australia and Germany (OECD, 2022). The overall level of mixed-ownership school-running in higher vocational colleges in Shandong Province is moderate, consistent with the assessment that China's vocational education mixed-ownership reform remains in an exploratory stage. The "Educational Environment" dimension received the highest score, thanks to continuous investment in "dual-qualified" teaching staff and curriculum reform over the past few years. Conversely, the "Property Rights Attributes" dimension scored the lowest. The core causes are twofold: first, the definition of property rights lacks a clear policy basis, and valuation standards for intangible assets are inconsistent; second, the profit distribution mechanism fails to balance the public welfare nature of education with the profit-seeking nature of capital, leading to insufficient motivation for social capital participation. The lower score in "Management Environment" indicates that collaborative governance mechanisms among multiple stakeholders are not yet robust, with transparency and decision-making efficiency requiring improvement. This aligns closely with the findings of domestic scholars that "property rights and governance are the core bottlenecks of mixed-ownership reform."

5.2 Rationality and Innovation of the Model Construction

The constructed five-dimensional model demonstrates distinct rationality and innovation: (1) Comprehensive Coverage, encompassing five core elements—property rights, education, campus, management, and resources—to address key practical issues fully; (2) Tight Logical Integration, with property rights as the foundation, educational environment as the core, campus environment as support, management environment as a guarantee, and resource environment as the driving force, forming a closed-loop system; (3) Strong Operability, as each dimension specifies objectives, KPIs, and strategic questions to provide clear practice guidance. In the model, the "Management Environment Construction" received the highest feasibility score, confirming the expert consensus that "scientific governance structure is key to sustainable development." Meanwhile, the relatively lower feasibility score for the property rights scheme suggests a need for more granular operational rules regarding property rights division and profit distribution.

5.3 Practical Implications

The results offer three key implications for the reform of mixed-ownership school-running in Shandong: First, property rights reform is the prerequisite. Policies must clarify property definitions, valuation standards, and transfer mechanisms to stimulate social capital. Second, deep integration of industry and education is the core. Enterprises should deeply participate in curriculum development, teacher training, and practical teaching. Third, multi-stakeholder collaborative governance is the guarantee. A board of directors' system involving schools, enterprises, and the government should be established to improve risk prevention and coordination.

6. Conclusions and Recommendations

6.1 Research Conclusions

The overall level of Mixed-ownership school-running in Shandong is moderate (M = 3.272), with unbalanced development across dimensions: Property Rights (M = 3.197) and Management Environment (M = 3.213) are the primary weaknesses, whereas Educational Environment (M = 3.389) is relatively well developed. A five-dimensional sustainable development model—comprising "Property Rights Optimization, Educational Environment Improvement, Campus Environment Upgrading, Management Environment Optimization, and Resource Environment Guarantee"—was constructed. It includes 25 objectives, 25 KPIs, and 25 strategic questions, forming a complete "Dimension-Objective-KPI-Strategy" framework.

The draft model's adaptability and feasibility both reached high levels (Adaptability, $\boldsymbol{X} = 4.240$; $Feasibility$, $\boldsymbol{X}$ = 4.360). The research tools showed good reliability and validity, indicating that the model is scientifically sound and highly operable. Beyond empirical findings, this study contributes theoretically by proposing a structured five-dimensional framework that integrates governance, resource allocation, and educational quality in mixed-ownership vocational institutions. At the policy level, the model provides a practical reference for provincial governments seeking to standardize public–private cooperation mechanisms and promote sustainable vocational education reform.

6.2 Practical Recommendations

6.2.1 Improving the Property Rights Protection System

Formulate the Administrative Measures for Property Rights in Mixed-ownership school-running in Shandong Province to clarify the boundaries between state-owned and social capital.

Establish professional appraisal agencies to scientifically value and register intangible assets (e.g., curriculum resources and R&D results).

Design differentiated equity structures, such as "Common Stock + Preferred Stock," to meet the diverse interests of investors.

6.2.2 Deepening the Industry-Education Integration Mechanism

Implement the "School-Enterprise Dual-Track Education" model, where enterprises participate in specialty setup and teaching, jointly building industry colleges.

Enhance the "dual-qualified" teacher mechanism by encouraging enterprise technical experts to teach part-time and establishing long-term enterprise practice programs for teachers.

Establish a dynamic curriculum adjustment mechanism to update content every 1 – 2 years, aligned with advances in industrial technology.

6.2.3 Optimizing the Multi-stakeholder Governance Structure

Establish a Board of Directors composed of representatives from government, schools, enterprises, and society to clarify decision-making authorities.

Set up a third-party oversight committee comprising teacher/student representatives and industry experts to ensure standardized activities.

Create cross-organizational coordination mechanisms, such as regular school-enterprise joint meetings, to promptly resolve cooperation issues.

6.2.4 Strengthening Resource Integration Capabilities

Build a school-enterprise resource-sharing platform to integrate equipment, R&D, and human resources, improving utilization rates.

Seek government policy support and establish special funds for mixed-ownership school-running to bridge funding gaps.

Implement a dynamic resource update mechanism to prioritize the elimination of obsolete resources.

6.3 Limitations and Future Prospects

This study focused on five pilot colleges in Shandong, which created regional limitations; the generalizability of the results needs further validation in other provinces. Future research could: (1) conduct longitudinal tracking to monitor and optimize the model's practical effects; (2) expand the sample size to compare regional and institutional differences; and (3) explore the application of digital technologies to improve governance efficiency and resource integration.

References

Chen, Y., & Li, M. H. (2021). Governance logic and practical exploration of mixed-ownership schooling in higher vocational colleges. *Research in Higher Education of Engineering*, (5), 165-170.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, *140*, 1-55.

Liu, X. M. (2022). Policy evolution and practical paths of mixed-ownership schooling in vocational education. *Chinese Vocational and Technical Education*, (12), 35-41.

Ministry of Education. (2019). *Implementation plan for national vocational education reform*.

Shandong Provincial Department of Education. (2021). *Implementation plan for the pilot work of mixed-ownership schooling in vocational education in Shandong Province*.

Wang, J., & Li, J. (2023). Realistic dilemmas and breakthrough paths of mixed-ownership schooling in higher vocational colleges. *Education and Vocation*, (8), 28-34.

Xie, Z. X., & Gong, L. F. (2022). Governance logic and pathways for industrial colleges within higher vocational institutions. *Higher Education Forum*, (9), 78-80.

Yuan, M. S., & Zhang, Z. K. (2021). Research on financial and asset management of mixed-ownership in vocational colleges. *Economic Research Guide*, (9), 89-91.

Zhang, B. Q. (2022). Research on the innovation of the property rights system in mixed-ownership vocational colleges. *Vocational and Technical Education*, *43*(9), 45-50.

Zhu, H. X. (2021). The interest concerns of social capital participating in mixed-ownership reform of higher vocational colleges. *Mechanical Vocational Education*, (2), 18-21, 28.

Appendix

Appendix A: List of Specialists and Letters of Specialists Invitation for IOC Verification

Appendix B: Official Letter

Appendix C: Research Instruments

Appendix D: The Results of the Quality Analysis of the Research Instrument

Appendix E:

Appendix F:

Note: Figures and detailed appendices are available upon request from the corresponding author.

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Authors contributions

Qi Shuzhan and Dr. Chollada Pongpattanayothin was responsible for study design and revising. Qi Shuzhan was responsible for data collection. Dr. Patchareephorn Bangkheow[1] drafted the manuscript and Dr. Sunate Thaveethavornsawat[1]revised it. All authors read and approved the final manuscript. In this paragraph, also explain any special agreements concerning authorship, such as if authors contributed equally to the study.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.