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# Evaluating Vocational College-Enterprise Cooperation in Xinjiang: A Multi-Dimensional Model for Enhancing Effectiveness and Addressing Regional Challenges

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**Abstract**

**Background and Aim:** Vocational education plays a crucial role in developing a skilled workforce to meet industry demands, yet collaboration between vocational colleges and enterprises continues to face challenges such as skill mismatches, resource limitations, and curriculum misalignment with labor market needs. This study focuses on developing an evaluation model for measuring the effectiveness of vocational college-enterprise cooperation, with a specific emphasis on Xinjiang Vocational College of Science and Technology, China, aiming to provide a systematic framework for assessing and improving such partnerships.

**Materials and Methods**: This study utilized a mixed-methods research approach, combining qualitative and quantitative techniques to ensure a comprehensive analysis. Stakeholders were selected based on their roles in vocational college-enterprise cooperation, including college administrators responsible for curriculum design, enterprise representatives managing internships and training, and final-year students participating in cooperative programs. Qualitative data were collected through semi-structured interviews with 19 participants and focus group discussions involving 30 stakeholders, providing insights into their experiences and challenges. Quantitative data were obtained via surveys distributed to 550 participants, including 153 college staff, 147 enterprise representatives, and 250 students. The survey assessed factors such as collaboration models, resource investment, project management, communication, and external environment. Data were analyzed using Content Analysis for qualitative insights and Multiple Regression Analysis for quantitative evaluation, ensuring a robust exploration of the factors influencing cooperation effectiveness.

**Result**: The findings indicate that collaboration models and content, investment and resource management, project management, communication, and external environment significantly impact the effectiveness of vocational college-enterprise cooperation at a 0.05 significance level. Furthermore, the developed evaluation model identified three key assessment criteria—Student Employment Rates, Improving Enterprise Technology Levels, and Strengthening Practical Operational Capabilities—each supported by three key performance indicators, providing measurable outcomes for assessing partnership success.

**Conclusion**: This study establishes a practical evaluation model to enhance vocational college-enterprise cooperation, highlighting critical success factors and offering actionable insights for improving vocational training efficiency and aligning educational programs with labor market demands. The results not only contribute to academic discourse but also provide a valuable tool for policymakers and institutional leaders to optimize collaboration strategies, with potential for future research to validate the model's applicability across diverse regional and industrial contexts.

**Keywords**: College-Enterprise Cooperation; Vocational Education; Evaluation Model; Key Performance Indicators (KPIs); Internship Quality; Vocational Training

## Introduction

Vocational education plays a pivotal role in cultivating a skilled workforce capable of meeting industry demands and addressing the socio-economic challenges of modern economies. In recent years, it has gained increased attention for its potential to reduce unemployment, foster economic growth, and promote social equity (Prabowo et al., 2023; Wei et al., 2024). However, the effectiveness of vocational education systems, particularly in regions like Xinjiang, China, remains hindered by persistent challenges,



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including skill mismatches, resource constraints, and a misalignment between curricula and labor market needs (Bhatt et al., 2024; Müller, 2024). These issues are particularly pronounced in Xinjiang, where socio-economic and regional disparities exacerbate the difficulties faced by vocational colleges in aligning their programs with industry requirements.

The socio-economic landscape of Xinjiang is unique due to its geographic, cultural, and industrial characteristics. As a strategically important region in China's Belt and Road Initiative, Xinjiang is undergoing rapid industrialization and economic transformation. However, this development has not been without its challenges. The region suffers from a significant skills gap, with industries frequently reporting shortages of appropriately trained workers to meet their operational needs (Wongmahesak, Karim, & Wongchestha, 2025). Resource limitations, especially in rural areas, further constrain the ability of vocational colleges to provide state-of-the-art facilities, training equipment, and qualified instructors. Furthermore, the curricula offered by many vocational colleges fail to keep pace with the fast-evolving needs of industries, particularly in emerging sectors such as digital technology and low-carbon manufacturing (Chung et al., 2024; Widaningsih et al., 2023).

Collaboration between vocational colleges and enterprises is widely regarded as a solution to many of these challenges. Effective partnerships have the potential to bridge gaps between education and industry by enabling the co-development of curricula, the integration of workplace training, and the sharing of expertise and resources (Mustafa et al., 2022). In Xinjiang, however, such collaborations often face unique obstacles, including communication barriers between stakeholders, policy misalignments, and the absence of robust mechanisms to evaluate and sustain partnerships. The lack of alignment between the educational objectives of vocational colleges and the operational demands of enterprises often results in graduates who are inadequately prepared for the workforce (Feng, 2023). High labor turnover further complicates these efforts, reducing the incentives for enterprises to invest in long-term collaborations with educational institutions (Zhu, 2024).

Existing evaluation models for vocational college-enterprise cooperation have proved insufficient in addressing the specific challenges faced in regions like Xinjiang. These models often fail to account for the region's socio-economic complexities, the rapidly changing industrial landscape, and the unique needs of both students and enterprises. For instance, traditional evaluation frameworks prioritize short-term metrics, such as employment rates, without adequately considering long-term outcomes like career progression, innovation capacity, and enterprise-level productivity improvements (Chen, 2024). This gap highlights the need for a comprehensive and context-sensitive evaluation model that can assess the effectiveness of vocational college-enterprise cooperation in addressing the unique challenges faced by Xinjiang's vocational education system.

This study seeks to fill this critical research gap by developing a tailored evaluation model for vocational college-enterprise cooperation in Xinjiang. Building on recent advancements in vocational education research and incorporating insights from studies on collaboration models, resource management, and technology integration (Wongmahesak, Karim, & Wongchestha, 2025), this research offers a systematic framework for evaluating and improving these partnerships. By addressing both short-term and long-term outcomes, the proposed model aims to provide actionable insights for policymakers, educators, and enterprise leaders working to enhance vocational education in Xinjiang. Furthermore, this study contributes to the broader discourse on vocational education by offering a model that can potentially be adapted for use in other regions with similar socio-economic and industrial challenges.

In summary, the introduction of this study establishes the critical need for an improved evaluation model to enhance vocational education in Xinjiang. By contextualizing the challenges within the region's socio-economic and industrial framework and articulating the limitations of existing models, this research sets the stage for a comprehensive exploration of how vocational college-enterprise partnerships can be optimized to meet the evolving needs of both students and industries.



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**Research Objective**

1. To explain the existing vocational college-enterprise cooperation of vocational colleges in China, focusing on Xinjiang Vocational College of Science and Technology.
2. To identify key effectiveness evaluation indicators for vocational college-enterprise cooperation at Xinjiang Vocational College of Science and Technology.
3. To analyze factors affecting the effectiveness of vocational college-enterprise cooperation at Xinjiang Vocational College of Science and Technology.
4. To construct the evaluation model for the effectiveness of vocational college-enterprise cooperation in Xinjiang Vocational College of Science and Technology.

**Research Methodology**

This study employed a mixed-methods approach, integrating both qualitative and quantitative research methods to effectively address the research objectives. The methodology for each research objective is detailed as follows:

**Objective 1: To explain the existing vocational college-enterprise cooperation of vocational colleges in China, focusing on Xinjiang Vocational College of Science and Technology.**

**Research Method and Sample Group**

This phase utilized a qualitative research approach, conducting in-depth interviews to explore insights into the cooperation between vocational colleges and enterprises. The interviews targeted 19 key stakeholders, including college administrators, enterprise leaders, and coordinators responsible for implementing collaboration initiatives. Additionally, focus group discussions were conducted with 30 participants, comprising college faculty, staff, and enterprise representatives, to gather diverse perspectives.

**Data Analysis Methods**

The data were analyzed using Content Analysis, which involves interpreting qualitative data to reflect real-world conditions based on interviewee responses. The findings were contextually evaluated and interpreted to ensure an accurate representation of the participants' viewpoints.

**Objective 2: To identify key effectiveness evaluation indicators for vocational college-enterprise cooperation at Xinjiang Vocational College of Science and Technology.**

**Research Method and Sample Group**

To assess the effectiveness of performance indicators for vocational college-enterprise cooperation, 22 experts in vocational education and industry representatives with experience in managing college-enterprise partnerships were interviewed. Additionally, a focus group discussion was conducted with 30 participants, including vocational college faculty, enterprise representatives, and students, making a total of 52 participants. The evaluation of performance indicators was conducted using a 5-point rating scale to determine the appropriateness of each indicator.

**Data Analysis Methods**

The data were analyzed using Content Analysis and Descriptive Statistics, including mean and standard deviation calculations. The interpretation of the mean values was categorized as follows:

4.21 – 5.00: Indicators are highly appropriate.
3.41 – 4.20: Indicators are very appropriate.
2.61 – 3.40: Indicators are moderately appropriate.
1.81 – 2.60: Indicators are slightly appropriate.
1.00 – 1.80: Indicators are least appropriate.

**Objective 3: To analyze factors affecting the effectiveness of vocational college-enterprise cooperation at Xinjiang Vocational College of Science and Technology.**

**Research Method and Sample Group**

This study employed a quantitative research approach, utilizing questionnaires as the primary data collection tool. The research focused on three key groups: 153 vocational college administrators and staff, 147 enterprise representatives, and 250 students, totaling 550 participants.



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**Data Analysis Methods**

The data were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation. To examine the factors affecting the effectiveness of vocational college-enterprise cooperation at Xinjiang Vocational College of Science and Technology, Multiple Regression Analysis was conducted. The Enter method was used to introduce independent variables into the regression equation, with the analysis performed at a 95% confidence level.

## Results

The findings of the study are summarized according to the research objectives, focusing on key points while preserving the original data and table.

1. Existing Vocational College-Enterprise Cooperation Models in China, Focusing on Xinjiang Vocational College of Science and Technology

The collaboration between Xinjiang Vocational College of Science and Technology and enterprises serves as a model for integrating education with industry. The partnership involves joint curriculum development, the establishment of internship bases, and specialized training programs in high-demand fields. These efforts have enhanced student employability and provided enterprises with a skilled workforce.

However, challenges persist, including delays in coordination, insufficient resources for internships, and the lack of effective long-term student tracking. Government support, through policies and resource allocation, has played a critical role in sustaining this partnership and contributing to regional workforce development.

2. Key Effectiveness Evaluation Indicators for Vocational College-Enterprise Cooperation

The study identified three key components with corresponding indicators for evaluating the effectiveness of vocational college-enterprise cooperation:

2.1 Student Employment Rates (Average Score: 3.89):

Curriculum Alignment with Market Needs (3.95): Aligns educational programs with labor market demands.

Support Systems & Soft Skills (3.92): Focuses on career support services and workplace competencies.

Management & Tracking (3.79): Highlights the need for improved post-graduation monitoring.

2.2 Improving Enterprise Technology Levels (Average Score: 3.88):

Knowledge Exchange & Resource Support (3.90): Reflects the importance of shared expertise and resources.

Collaborative Curriculum & Tech Infrastructure (3.89): Promotes the integration of advanced technologies into training.

Implementation & Innovation (3.87): Indicates the potential for further technological advancements.

2.3 Strengthening Practical Operational Capabilities (Average Score: 3.97):

Program Design & Implementation (4.01): Highlights the role of structured training programs.

Skills & Adaptability (3.97): Focuses on workplace readiness and practical skill application.

Mentorship & Monitoring (3.91): Emphasizes the importance of industry mentorship and performance tracking.

These indicators provide a comprehensive framework for evaluating the outcomes and processes of vocational college-enterprise cooperation.

3. Factors Affecting the Effectiveness of Cooperation

The study identified four key factors influencing the effectiveness of vocational college-enterprise cooperation through multiple regression analysis. The results are summarized in Table 1:



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**Table 1** Factors Affecting the Effectiveness of Cooperation

| Model | B | Std. Error | $\beta$ | t | Sig. |
|---|---|---|---|---|---|
| (Constant) | 0.683 | 0.062 | | 11.072 | 0.000 |
| Cooperation Models and Content ($X_1$) | 0.183 | 0.027 | 0.221 | 6.656 | 0.000* |
| Resource Investment and Management ($X_2$) | 0.231 | 0.035 | 0.257 | 6.637 | 0.000* |
| Communication ($X_3$) | 0.106 | 0.033 | 0.108 | 3.188 | 0.001* |
| External Environment ($X_4$) | 0.442 | 0.031 | 0.479 | 14.352 | 0.000* |

*Significant at the 0.05 level

From Table 1, it is evident that all four factors significantly influence cooperation effectiveness at a 0.05 significance level. Among these, the External Environment has the strongest impact (β = 0.479), followed by Resource Investment and Management (β = 0.257), Cooperation Models and Content (β = 0.221), and Communication (β = 0.108).

4. Development of an Evaluation Model for Effectiveness

The evaluation model developed in this study provides a comprehensive framework for assessing vocational college-enterprise cooperation across multiple dimensions. The key features include:

Outcome Metrics: Employment rates, skill readiness, and enterprise productivity improvements.

Process Metrics: Curriculum alignment, resource management, and stakeholder communication.

Adaptability: Flexibility to accommodate changes in labor markets, technology, and regional contexts.

This model enhances transparency and offers actionable insights for optimizing vocational education partnerships. It holds potential as a benchmark for evaluating similar frameworks in other regions and contexts.

## Conclusion

The evaluation model for vocational college-enterprise cooperation at Xinjiang Vocational College of Science and Technology provides a structured, multi-dimensional framework that aligns with the study's objectives and results. It integrates insights from experts, faculty, and enterprises to create a practical approach for assessing and improving partnerships. The model emphasizes both short-term and long-term outcomes to ensure sustainable collaboration.

Key Components of the Model:

Outcome Metrics: Measures key indicators such as increased employment rates (25% higher than traditional programs), graduate skill readiness, and reduced enterprise training costs.

Process Metrics: Focuses on curriculum alignment with industry needs, effective communication between stakeholders, and active participation from both colleges and enterprises.

Long-Term Indicators: Tracks graduate career progression, innovation outcomes, and enterprise operational efficiency to ensure lasting benefits.

Theoretical Foundations:

Collaborative Learning Theory: Encourages equal stakeholder involvement in curriculum development.

Innovation Ecosystem Theory: Promotes integration among colleges, enterprises, and regional stakeholders.

Systems Theory: Provides a holistic evaluation of interconnected partnership components.

Operational Requirements:

Standardized Tools: Uses performance indicators to assess technical skills, adaptability, and work readiness.

Continuous Feedback: Employs real-time monitoring systems for continuous improvement.



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Stakeholder Integration: Establishes joint committees for structured planning and review processes.

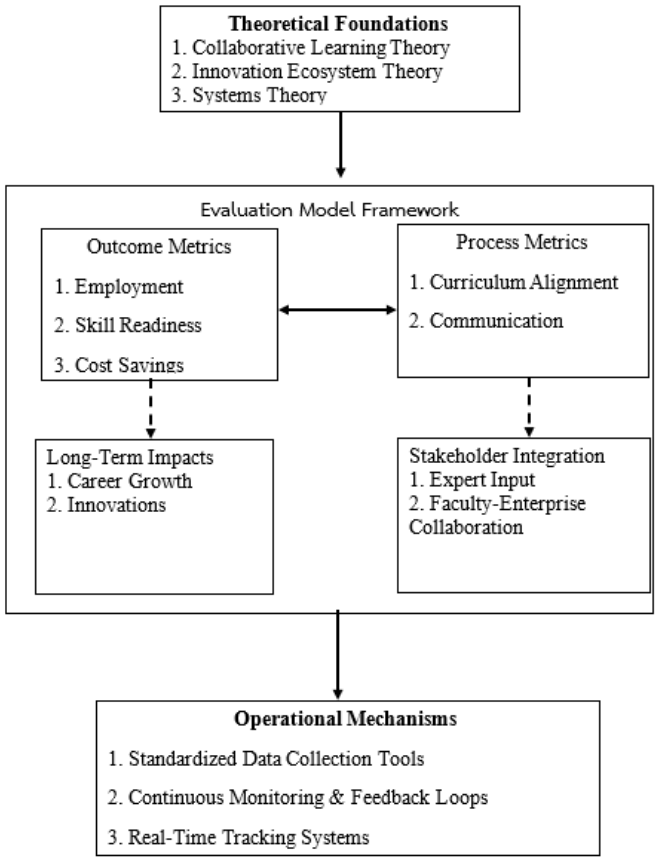
Identified Gaps:

Limited enterprise involvement in curriculum design affects skill alignment.

Insufficient focus on soft skills such as problem-solving and leadership.

Lack of mechanisms for tracking graduate career mobility and innovation outcomes.

This model offers a clear, actionable framework to evaluate and enhance vocational college-enterprise cooperation, ensuring alignment with labor market demands and fostering long-term success.




## Discussion

The discussion contextualizes the findings within broader theoretical and practical frameworks, addressing their implications and limitations while aligning with the study objectives.

*Objective 1: To explain the current cooperation between vocational colleges and enterprises in China, focusing on Xinjiang Vocational College of Science and Technology*

The findings demonstrate that the collaboration between Xinjiang Vocational College of Science and Technology and enterprises is pivotal to aligning education with industry needs. This partnership facilitates curriculum co-development, internship programs, and shared resources, fostering student employability and enterprise efficiency. These results expand on collaborative learning theory by showing how equal stakeholder involvement in curriculum design ensures mutual benefits for both students and enterprises



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(Peng & Zhang, 2021; Chen, 2024). For instance, enterprises gain a job-ready workforce while students acquire practical skills tailored to industry demands.

However, challenges such as inconsistent coordination, resource shortages, and insufficient long-term tracking of graduates highlight areas for further improvement. These findings align with Huang, Yang, & Xu (2021), who emphasized the importance of structured governance mechanisms to mitigate misalignment in expectations between academic and industry stakeholders. Furthermore, the implications for systems theory are significant, as the study underscores the necessity of evaluating interconnected components, such as resource management and communication channels, to achieve sustainable cooperation.

In practice, these results suggest that vocational colleges in China can enhance their partnerships by adopting structured evaluation frameworks and increasing stakeholder engagement through regular communication and feedback systems. This approach is particularly relevant in regions like Xinjiang, where socio-economic disparities often exacerbate implementation challenges.

*Objective 2: To identify key performance indicators for evaluating the effectiveness of vocational college-enterprise cooperation*

The study identified student employment rates, improving enterprise technology levels, and strengthening practical operational capabilities as critical performance indicators for evaluating cooperation effectiveness. These indicators provide a structured framework for assessing the tangible outcomes and operational processes of vocational education partnerships.

The findings reinforce the importance of aligning curricula with labor market demands, as students who participated in co-developed curricula and internships achieved significantly higher employment rates. This aligns with innovation ecosystem theory, which emphasizes the integration of educational institutions, enterprises, and regional stakeholders to foster innovation and workforce readiness (Wongmahesak, Karim, & Wongchestha, 2025). Additionally, the focus on enterprise technology levels highlights how knowledge exchange and resource sharing can drive technological advancements, enhancing operational efficiency and reducing training costs for businesses (Zhu, 2024).

The practical implications of these findings are far-reaching. By adopting multidimensional KPIs, vocational colleges can systematically monitor and improve their partnerships, ensuring that educational programs remain responsive to evolving industry demands. For example, colleges could use these indicators to refine internship programs, track graduate outcomes, and ensure continuous curriculum updates to address technological and industrial advancements.

*Objective 3: To analyze the factors affecting the effectiveness of vocational college-enterprise cooperation*

The study identified external environment, resource investment and management, cooperation models and content, and communication as key factors influencing the effectiveness of vocational college-enterprise cooperation. Among these, external factors such as government policies, economic conditions, and technological trends were found to have the most substantial impact, aligning with Liu (2022), who emphasized that vocational education must adapt to regional industrial structures and policy frameworks to remain effective.

The findings also highlight the practical importance of resource investment and management. Projects with adequate funding, equipment, and personnel yielded superior outcomes, reinforcing the need for sustained enterprise investment in vocational training programs (Huang, Yang, & Xu, 2021). Furthermore, the role of communication supports systems theory, as effective collaboration relies on clear and structured communication channels to ensure alignment between stakeholders (Mustafa et al., 2022).

These insights have practical implications for designing effective vocational education programs. Policymakers and institutional leaders can leverage these findings to prioritize government funding, incentivize enterprise participation, and establish formal communication frameworks to enhance collaboration. For instance, governments could introduce tax incentives for enterprises that invest in joint



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training programs, while colleges could facilitate regular forums to align goals and expectations among stakeholders.

*Objective 4: To develop an evaluation model for the effectiveness of vocational college-enterprise cooperation*

The evaluation model developed in this study integrates collaborative learning theory, innovation ecosystem theory, and systems theory to provide a comprehensive framework for assessing vocational college-enterprise partnerships. Key features of the model include outcome metrics (e.g., employment rates), process metrics (e.g., curriculum alignment), and long-term indicators (e.g., graduate career progression). By incorporating these dimensions, the model addresses both immediate and sustained impacts of cooperation.

The model's theoretical contribution lies in its ability to operationalize complex concepts into measurable indicators, providing a practical tool for stakeholders. For example, the inclusion of real-time monitoring systems and performance dashboards supports continuous feedback and iterative improvements, aligning with Chen (2024), who emphasized the importance of dynamic performance evaluation models in vocational education.

Practically, this model can be adapted for use in other vocational colleges across China and internationally. By tailoring the framework to regional and industrial contexts, institutions can ensure that their partnerships remain relevant and effective. Additionally, the model's adaptability to technological advancements and labor market changes makes it a valuable tool for long-term planning and policy development.

**Limitations and Future Research**

While the findings provide valuable insights, the study has several limitations.

First, as a single case study focused on Xinjiang, the results may not be fully generalizable to other regions with different socio-economic and industrial contexts. Future research should conduct comparative studies across multiple regions to validate the model's applicability.

Second, potential biases in the sample and data collection procedures, such as over-reliance on self-reported data from stakeholders, may have influenced the results. Future studies could incorporate more objective measures, such as longitudinal tracking of graduate outcomes or third-party assessments of enterprise productivity.

Finally, the study did not fully address the role of emerging technologies, such as artificial intelligence, in enhancing vocational education partnerships. Future research should explore how technologies like AI can improve curriculum design, resource allocation, and real-time performance evaluation, as suggested by Wongmahesak, Karim, & Wongchestha (2025).

In conclusion, this study contributes to the theoretical and practical understanding of vocational college-enterprise cooperation by developing a comprehensive evaluation model. It highlights the importance of integrating stakeholder perspectives, aligning curricula with industry needs, and addressing long-term impacts to ensure sustainable and effective partnerships. By addressing its limitations and building on its findings, future research can further refine the model and expand its applicability to diverse contexts.

**Recommendation**

Based on the study on developing an evaluation model for the effectiveness of vocational college-enterprise cooperation: A case study of Xinjiang Vocational College of Science and Technology, the following recommendations are proposed:

1 . Enhancing In-depth Evaluation Indicators: It is recommended to incorporate more in-depth indicators that reflect quality-based outcomes, such as the development of soft skills, including communication, teamwork, and problem-solving in real-world situations, which are highly valued by



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employers. Additionally, indicators should measure long-term impact, such as tracking students' career progress and assessing the impact on the competitiveness of the enterprises.

2. Developing a Centralized Data System: A centralized database should be established to compile and integrate information between the college and enterprises. This data should include student evaluation results, project outcomes, satisfaction levels from both sides, and performance indicators of the cooperation. Such a system will facilitate real-time monitoring and enhance transparency in the evaluation process.

3. Improving Communication Processes: It is suggested to establish formal and appropriately frequent communication channels, such as quarterly meetings between the college and enterprises to review operational results and plan future activities. Digital technologies like online meetings and project management platforms should also be utilized to enhance convenience and reduce delays.

4. Promoting Stakeholder Engagement: All stakeholders, including students, faculty, and enterprise representatives, should actively participate in developing the evaluation model. Organizing forums for exchanging views or conducting needs assessments will ensure that the evaluation model reflects the perspectives and requirements of all parties involved comprehensively.

5. Utilizing Technology for Evaluation Efficiency: Advanced tools such as data analytics and automated evaluation systems should be adopted to process and interpret data from indicators. These technologies will simplify the evaluation process and improve the accuracy of the analysis.

6. Developing Policy Frameworks to Support Collaboration: A long-term supportive policy framework should be developed, such as policies encouraging investment in educational and training infrastructure or providing tax benefits to enterprises participating in cooperative programs.

7. Conducting Further Research to Enhance the Evaluation Model: Additional research should be conducted to examine factors affecting the success of cooperation at the local and national levels. Comparative studies of evaluation models in other contexts are also recommended to develop a flexible and context-appropriate evaluation model for Xinjiang and other regions.

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