An Empirical Study on the Relationship Between Vocational Education Internationalization and Talent International Competitiveness in Jilin Province's Higher Vocational Colleges

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Abstract **-In the context of globalization and industrial transformation, the internationalization of vocational education has become a critical pathway for enhancing regional talent competitiveness. However, higher vocational colleges in Jilin Province, a cold-border region in Northeast China, face structural challenges in integrating international curricula, faculty resources, and industry certification systems. To clarify the intrinsic relationship among internationalization input, certification transformation, and talent international competitiveness, and to explore the mechanisms through which policy support and cross-cultural differences moderate these effects, this study conducted an empirical investigation using a mixed-method approach combining questionnaire surveys and semi-structured interviews. Through correlation analysis, regression analysis, and moderation effect tests, the results indicate that internationalization input has a significant positive predictive effect on talent international competitiveness, and certification transformation shows an even stronger positive influence. Furthermore, policy support positively moderates the above relationships, while cross-cultural differences exert a negative moderating effect. The study confirms that effective internationalization strategies and certification integration can directly enhance students' knowledge transfer ability, cultural adaptability, and technical competitiveness, and that policy support and cultural adaptation mechanisms can optimize these effects. The findings provide empirical evidence and practical guidance for vocational colleges in cold-border regions to promote internationalization and improve talent competitiveness.**

Keywords **: Vocational Education Internationalization, Talent International Competitiveness, Certification Transformation, Higher Vocational Colleges, Moderation Effect**

I. INTRODUCTION

We are at present witnessing a rapid increase in the internationalization of vocational education as a response to global economic integration and industrial restructuring. The ability of vocational education systems to produce internationally competitive graduates has become a strategic priority for many countries, particularly in emerging economies seeking to upgrade their industrial many parts of the world, vocational education still operates within national or regional boundaries, limiting the international adaptability of technical talent (Li & Ding, 2023).

Fortunately, recent policy initiatives have promoted the internationalization of vocational education. The Chinese government has actively encouraged vocational colleges to "go global" through initiatives such as the Luban Workshop and the China-Russia Vocational Education Alliance. These programs have provided valuable models for international cooperation and curriculum development (UNESCO, 2024). In recent days, for instance, many vocational colleges have established international exchange programs, introduced foreign certification systems, and recruited international faculty members.

Among various regions, cold-border areas face unique challenges in vocational education internationalization. Jilin Province, a typical cold-border region in Northeast China, has made some progress in introducing international courses, developing international faculty, and integrating industry certifications. However, the overall level of internationalization remains lower than that of more advanced regions in China. This creates a chain contradiction of insufficient course supply, mismatched standards, and lagging enterprise adaptation, which severely constrains the international competitiveness of regional vocational talent.

In fact, as reported by Zhao (2023), many studies support the positive relationship between education internationalization and talent competitiveness. The present study builds on this literature by focusing on the specific context of cold-border regions and examining the mechanisms through which internationalization input and certification transformation influence talent international competitiveness.

II. PROBLEM STATEMENT

Broadly speaking, higher vocational colleges in Jilin Province have very limited opportunities to integrate international standards into their curricula and certification systems. There are some studies which have discussed the difficulties encountered by vocational colleges in cold-border regions in achieving internationalization (Knight, 2020). In Jilin Province, for instance, administrators have reported that international cooperation curricula lack cold-border industrial features, making standard alignment difficult (Li & Ding, 2023).

The reluctance or inability to fully implement international standards is also found in several other cold-border regions. For example, in Inner Mongolia, vocational colleges face challenges in adapting Russian certification standards to local contexts. Likewise, in Heilongjiang Province, teachers report that limited language proficiency and international experience restrict the implementation of international courses and certification standards.

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Consequently, many graduates of vocational colleges in cold-border regions lack the knowledge transfer ability, cultural adaptability, and technical competitiveness needed to succeed in international job markets.

The present study addresses this gap by investigating three key research questions:

1. What is the current level of internationalization input and certification transformation in Jilin Province‘s higher vocational colleges?

2. How do internationalization input and certification transformation affect talent international competitiveness?

3. Do policy support and cross-cultural differences moderate these relationships?

III. LITERATURE REVIEW

Internationalization of Vocational Education

Internationalization in vocational education encompasses cross-border collaboration, curriculum alignment with global standards, faculty exchange programs, and the integration of international certification systems. Knight (2020) defined internationalization as “the process of integrating an international, intercultural, or global dimension into the purpose, functions, or delivery of education.” UNESCO (2024) reported a steady annual increase of approximately 8% in international exchange programs in vocational education over the past decade.

Research has consistently demonstrated that internationalization enhances the quality of vocational education. Engaged international programs achieve better graduate outcomes, report greater employer satisfaction, and are more likely to produce graduates who can work in cross-cultural environments (Ewell, 2022). In cold-border regions, internationalization has been shown to be particularly important, as local industries increasingly require workers who understand both domestic and international standards (Pulido-López & López-Salazar, 2024).

Talent International Competitiveness

Talent international competitiveness refers to the ability of individuals to perform effectively in cross-cultural and globalized work environments. According to Chychun and Maksymiuk (2022), this construct encompasses three dimensions: knowledge transfer ability (the capacity to apply knowledge across different contexts), cultural adaptability (the ability to work effectively in diverse cultural settings), and technical competitiveness (mastery of internationally recognized technical skills and standards).

Research has shown that talent international competitiveness is a powerful predictor of career success in globalized industries. Graduates with high levels of international competitiveness achieve better employment outcomes, command higher salaries, and are more likely to be recruited by multinational corporations (Levitt, 2024). Moreover, international competitiveness is particularly important for graduates in cold-border regions, where local industries are increasingly integrated with international supply chains.

Certification Transformation

Certification transformation refers to the process of adapting international industry certification standards to local educational contexts. This involves three key activities: standard adaptation (modifying international standards to fit local conditions), competency certification (assessing whether students have achieved the required competencies), and follow-up feedback (using assessment results to improve instruction) (Li & Ding, 2023).

Integrating international certification systems into vocational education faces several challenges. First, international certification standards often assume a level of student preparation that may not exist in cold-border regions. Second, language barriers can make it difficult for students to access certification materials and pass examinations. Third, certification examinations are often expensive, limiting access for students from disadvantaged backgrounds (Ewell, 2022). Successful certification transformation requires curriculum restructuring, student-centered teaching methods, and diversified assessment approaches.

Policy Support and Cross-Cultural Differences

Policy support refers to government actions that facilitate internationalization, including funding for international exchange programs, teacher training initiatives, and curriculum development grants. Research indicates that policy support positively moderates the relationship between internationalization efforts and educational outcomes (Pulido-López & López-Salazar, 2024).

Cross-cultural differences refer to the perceived distance between local and international cultural norms, values, and practices. In cold-border regions, cross-cultural differences with neighboring countries (such as Russia and Mongolia) can create barriers to internationalization. When cultural distance exceeds a certain threshold, the returns on internationalization investment may diminish significantly (Knight, 2020).

Theoretical Framework and Hypotheses

Drawing on human capital theory and competitive advantage theory, this study proposes the following hypotheses:

H1: Internationalization input has a significant positive predictive effect on talent international competitiveness.

H2: Certification transformation has a significant positive predictive effect on talent international competitiveness.

H3: Policy support positively moderates the relationship between internationalization input / certification transformation and talent international competitiveness.

H4: Cross-cultural differences negatively moderate the relationship between internationalization input / certification transformation and talent international competitiveness.

IV. METHOD

Research Design

This study employed a mixed-method research design, combining quantitative questionnaire surveys and qualitative semi-structured interviews. This design allowed for both statistical testing of hypothesized relationships and in-depth exploration of underlying mechanisms.

Participants

A stratified cluster sampling method was used to select five representative higher vocational colleges in Jilin Province, covering disciplines including medicine, engineering, and management. A total of 1,000 student questionnaires were distributed, with 973 valid responses (effective response rate of 97.3%). The sample included 523 male students (53.7%) and 450 female students (46.3%). Grade distribution was primarily second and third year, accounting for 82% of the sample. Over 68% of students had previously taken international courses or participated in certification training.

Additionally, purposive sampling was conducted to interview 15 participants, including teachers (n=6), administrators (n=5), and certification agency representatives (n=4).

Instruments

Four instruments were used to measure the key constructs. All items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Internationalization Input was measured using a 12-item scale adapted from Li and Ding (2023), covering curriculum coverage (e.g., "My program includes courses with international content") and teacher training duration (e.g., "My teachers have participated in international exchange programs"). Cronbach's alpha for the scale was 0.86.

Certification Transformation was measured using a 10-item scale developed for this study, covering standard localization (e.g., "International certification standards have been adapted to local conditions") and certification pass rate (e.g., "Many students in my program have passed international certification examinations"). Cronbach's alpha was 0.84.

Talent International Competitiveness was measured using a 15-item scale adapted from Chychun and Maksymiuk (2022), covering knowledge transfer ability (e.g., "I can apply what I have learned to different work contexts"), cultural adaptability (e.g., "I can work effectively with people from different cultures"), and technical competitiveness (e.g., "I have mastered internationally recognized technical skills"). Cronbach's alpha was 0.88.

Policy Support and Cross-Cultural Differences were measured using 8-item and 6-item scales respectively, with Cronbach's alphas of 0.82 and 0.79.

Procedure

After obtaining institutional ethics approval, the researchers distributed questionnaires to students during regular class sessions. Participation was voluntary and anonymous. Students were informed that they could withdraw at any time without penalty. Completed questionnaires were collected immediately. Semi-structured interviews were conducted with teachers, administrators, and certification representatives, each lasting approximately 30-45 minutes.

Data Analysis

Quantitative data were analyzed using SPSS version 26.0. First, descriptive statistics and correlation analyses were conducted to examine the relationships among the variables. Second, multiple regression analysis was used to test the direct effects (H1 and H2). Third, the PROCESS macro for SPSS (Model 1) was used to test moderation effects (H3 and H4) with 5,000 bootstrap resamples. Qualitative data were analyzed using NVivo for thematic coding.

V. FINDINGS

Descriptive Statistics and Correlations

Means, standard deviations, and correlation coefficients for all variables are presented in Table I.

TABLE I: DESCRIPTIVE STATISTICS AND CORRELATIONS

Variable	M	SD	1	2	3	4	5
1. Internationalization Input	3.26	0.74	1.00				
2. Certification Transformation	3.14	0.78	0.48	1.00			
3. Policy Support	3.42	0.69	0.35	0.32	1.00		
4. Cross-Cultural Differences	3.01	0.71	-0.22	-0.24	-0.18	1.00	
5. Talent Competitiveness	3.37	0.73	0.56	0.62	0.41	-0.29	1.00

Note. N = 973. $p < 0.01$; $p < 0.05$ (two-tailed).

As shown in Table I, all variables were significantly correlated in the expected directions. Internationalization input was moderately correlated with talent competitiveness ($r = 0.56$, $p < 0.01$). Certification transformation showed an even stronger correlation ($r = 0.62$, $p < 0.01$). Policy support was positively correlated, while cross-cultural differences were negatively correlated with talent competitiveness.

Direct Effects

Multiple linear regression was conducted to test the direct effects of internationalization input and certification transformation on talent international competitiveness, controlling for gender, grade level, and college type. The results are summarized in Table II.

TABLE II: DIRECT EFFECTS

Predictor	β	SE	t	p
Internationalization Input	0.361	0.043	8.47	< 0.001
Certification Transformation	0.422	0.047	9.02	< 0.001

Note. $R^2 = 0.436$, adjusted $R^2 = 0.432$.

Internationalization input had a significant positive predictive effect on talent international competitiveness ($\beta = 0.361$, $t = 8.47$, $p < 0.001$), supporting H1. Certification transformation also had a significant positive predictive effect, and this effect was stronger ($\beta = 0.422$, $t = 9.02$, $p < 0.001$), supporting H2. The model explained 43.6% of the variance in talent international competitiveness.

Moderation Effects

Using PROCESS macro-Model 1, moderation effects were tested. The results are presented in Table III and Figure 1.

TABLE III: MODERATION EFFECTS

Moderator	Interaction Effect (β)	SE
Policy Support × Input	0.135	0.047
Policy Support × Certification	0.128	0.046
Cross-Cultural Differences × Input	-0.118	0.054
Cross-Cultural Differences × Certification	-0.105	0.053

Note. CI = confidence interval.

Figure 1. Moderation Effect of Cross-Cultural Differences on the Relationship Between Internationalization Input and Talent Competitiveness

[Insert figure here: A line graph showing that when cross-cultural differences are low, the slope between internationalization input and talent competitiveness is steep; when cross-cultural differences are high, the slope is flat.]

As shown in Table III, policy support positively moderated the relationships between both internationalization input and certification transformation with talent international competitiveness ($\beta = 0.135$ and 0.128, both $p < 0.01$), supporting H3. Cross-cultural differences negatively moderated these relationships ($\beta = -0.118$ and -0.105, both $p < 0.05$), supporting H4. When cultural distance exceeded 3.1, the marginal effect of internationalization input decreased significantly.

Qualitative Interview Findings

Thematic analysis of interview data revealed three key themes:

1. Administrator perspective (n=5): International cooperation curricula lack cold-border industrial features, making standard alignment difficult. One administrator stated, "The international courses we import are designed for developed regions; they don't address our local industrial needs."

2. Teacher perspective (n=6): Limited language proficiency and international experience restrict the implementation of international courses and certification standards. A teacher commented, "I understand the importance of international certification, but my English is not strong enough to teach the course effectively."

3. Enterprise perspective (n=4): Students with international certifications still need improvement in cross-cultural communication and practical skills, particularly in cold-border new energy sectors and cross-border e-commerce with Russia. An HR manager noted, "Certificates look good on paper, but graduates struggle when they actually have to negotiate with Russian partners."

VI. DISCUSSION

The present study aimed to investigate the relationship among internationalization input, certification transformation, and talent international competitiveness in Jilin Province's higher vocational colleges, with a specific focus on the moderating roles of policy support and cross-cultural differences. The findings provide empirical support for all four hypotheses.

Direct Effects

Consistent with previous research (Chychun & Maksymiuk, 2022; UNESCO, 2024), the present study found that internationalization input had a significant positive direct effect on talent international competitiveness. Students who had access to international courses and teachers with international experience reported higher levels of knowledge transfer ability, cultural adaptability, and technical competitiveness. This finding underscores the importance of investing in international resources and faculty development.

Also consistent with Ewell (2022) and Li and Ding (2023), certification transformation significantly predicted talent international competitiveness, and this effect was stronger than that of general internationalization input. This finding suggests that while exposure to international resources is beneficial, the tangible validation of skills through recognized certifications plays a more critical role in enhancing graduate competitiveness in international job markets.

Moderation Effects

The positive moderation effect of policy support indicates that government funding, training programs, and policy incentives can amplify the benefits of internationalization and certification integration. This aligns with findings by Pulido-López and López-Salazar (2024) regarding the role of institutional support in human capital

development. When policy support is strong, the same level of internationalization input produces greater improvements in talent competitiveness.

The negative moderation effect of cross-cultural differences highlights the unique challenges faced by cold-border regions. When cultural distance between local and international contexts exceeds a certain threshold, the returns on internationalization investment diminish significantly. This finding supports Knight‘s (2020) call for context-sensitive internationalization strategies that take into account local cultural conditions.

Qualitative Insights

The interview findings complement the quantitative results by revealing the mechanisms underlying these effects. Administrators’ concerns about curriculum relevance suggest that simply importing international courses without adaptation is insufficient. Teachers‘language barriers indicate that faculty development must accompany curriculum internationalization. Enterprises’ concerns about practical skills suggest that certification must be supplemented with authentic cross-cultural experiences.

Practical Implications

The findings have several practical implications for vocational colleges and policymakers in cold-border regions. First, institutions should develop industry-needs-based curriculum evaluation systems aligned with cold-border regional technical standards. Second, a certification transformation funnel should be designed, integrating standard adaptation, competency certification, and follow-up feedback. Third, governments should increase funding and policy incentives to support teacher international training and bilingual course development. Fourth, cross-cultural adaptation modules for China-Russia and China-Mongolia contexts should be established to reduce the negative effects of cultural differences.

VII. CONCLUSION

This study examined the relationships among internationalization input, certification transformation, and talent international competitiveness in higher vocational colleges in Jilin Province. Using a sample of 973 students and 15 interviews, the study found that both internationalization input and certification transformation had significant positive predictive effects on talent international competitiveness, with certification transformation showing a stronger effect. Policy support positively moderated these relationships, while cross-cultural differences exerted negative moderating effects.

These findings contribute to the literature in several ways. Theoretically, they identify certification transformation as a stronger predictor of talent competitiveness than general internationalization input, and they reveal the moderating roles of policy support and cross-cultural differences. Practically, they suggest that interventions to enhance talent competitiveness in cold-border regions should focus on certification integration, policy support, and cross-cultural adaptation. Methodologically, the study demonstrates the utility of mixed-method designs for testing complex relationships in vocational education research.

Limitations and Suggestions for Further Studies

Several limitations should be acknowledged. First, the study focused on five colleges in Jilin Province, limiting generalizability to other cold-border regions. Future research should expand the sample to include multiple provinces such as Heilongjiang, Inner Mongolia, and Xinjiang. Second, the cross-sectional design prevents causal inference; longitudinal studies are needed to examine the dynamic effects of internationalization over time. Third, the study relied on self-reported data; future research should incorporate objective measures such as certification pass rates and employment outcomes. Fourth, the study did not examine disciplinary differences; future research should explore how the effects of internationalization vary across medical, engineering, and management programs. Finally, future research should test alternative models, such as moderated mediation models, to further clarify the complex relationships among internationalization, certification, and talent competitiveness.

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