A Comparative Study on the Development of Vocational Education in Mongolia and China: Pathways, Challenges, and Synergies

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Abstract

Against the backdrop of global economic transformation and regional integration, Vocational Education and Training (VET) has emerged as a core force underpinning national development strategies. This study employs systematic qualitative comparative analysis and comparative case - study methods. Based on the latest policy documents of China and Mongolia, statistical data from international institutions, and peer - reviewed literature from 2015 to 2024, it systematically analyzes the characteristic differences, core challenges, and collaborative potential of the VET systems in China and Mongolia from five dimensions: governance models, scale and resource allocation, curriculum design and industry connection, financing mechanisms, and quality assessment systems. The study finds that China has developed a VET model featuring centralized national governance, large - scale operation, and deep integration with key industries, but faces challenges such as uneven regional quality and insufficient participation of small and medium - sized enterprises. Mongolia, on the other hand, has constructed a streamlined and flexible VET system centered around Competency - Based Training (CBT) and emphasizing international cooperation, yet is hampered by fiscal vulnerability and limited capacity for on - the - job internships. The complementary advantages of the two countries in governance mechanisms, resource allocation, curriculum models, etc., provide a solid foundation for cooperation. Based on this, this study proposes three specific cooperation paths: joint development of cross - border industry - oriented courses, establishment of a China - Mongolia Vocational Education Cooperation Center, and

implementation of cultural - heritage - oriented vocational education. These suggestions aim to provide empirical support and policy references for regional human resource development under the China - Mongolia - Russia Economic Corridor and the Belt and Road Initiative.

1. Introduction

1.1 Background and Significance

In the global knowledge economy, vocational education and training (VET) is universally recognized as a linchpin for economic diversification, social equity, and labor market alignment (OECD, 2020). For countries in transition, VET systems play a pivotal role in addressing skills mismatches and supporting national development agendas. This study focuses on two neighboring nations in Central Asia with intertwined economic interests but distinct development trajectories: Mongolia and China.

Mongolia, a landlocked country with a population of ~3.5 million, has a resource-driven economy where mining accounts for 25% of GDP and 80% of export revenue (World Bank, 2024). Recognizing the vulnerabilities of this model—including commodity price volatility and environmental degradation—the Mongolian government articulated its "Mongolia-2050" long-term development vision, prioritizing economic diversification into tourism, agriculture, renewable energy, and digital services (Government of Mongolia, 2020). Achieving this vision is contingent on developing a domestic workforce with occupation-specific skills, making VET a national priority. Mongolia's VET system has undergone sweeping reforms since the early 2000s, transitioning from a Soviet-era centralized model to a market-oriented, competency-based framework (ADB, 2022).

China, the world's second-largest economy, is undergoing a critical structural transformation: shifting from a "world factory" dependent on low-cost labor to a technology and innovation-driven leader. The "Made in China 2025" strategy (State Council of China, 2019) and "dual circulation" paradigm demand a workforce of highly skilled technicians, advanced manufacturing specialists, and modern service professionals. VET has been elevated to a top national agenda, with the central government investing billions in reforms such as the "Double High Plan" (2019–2023) and "industry-education integration" policies (Ministry of Education of China [MOE], 2023). China's VET system—the largest in the world—enrolls over 32 million students across 11,300 institutions, serving as a major pathway for youth transitioning

from education to employment (MOE, 2024).

The strategic relevance of Sino-Mongolian VET cooperation is underscored by deepening bilateral ties. As signatories to the China-Mongolia-Russia Economic Corridor (CMREC) and the "Belt and Road" Initiative (BRI), both countries prioritize regional economic integration. VET collaboration can address mutual needs: China's outbound investment in Mongolia (e.g., in mining, infrastructure, and renewable energy) requires locally skilled labor, while Mongolia seeks to build domestic capacity to reduce reliance on foreign workers. Despite this potential, systematic comparative research on the two VET systems remains scarce, limiting evidence-based policy dialogue.

1.2 Research Gaps and Questions

Existing literature on VET in Mongolia and China is largely siloed. Studies on Mongolia focus on donor-driven reform (Enkhtuvshin & Munkhbat, 2021), CBT implementation (Batjargal, 2018), and financing challenges (ADB, 2022) but lack cross-country comparative analysis. Chinese VET research emphasizes policy implementation (Zha, 2021), "dual-qualification" teacher development (Wang & Li, 2022), and regional disparities (World Bank, 2020) but rarely engages with Mongolia's system or collaborative opportunities. A handful of regional studies (e.g., Jargalsaikhan & Park, 2023) touch on Sino-Mongolian education cooperation but do not provide a systematic comparison of VET structures, challenges, or synergies.

This study addresses three critical gaps: (1) the absence of a multidimensional comparative framework for analyzing Mongolia's and China's VET systems; (2) limited understanding of how policy borrowing processes shape VET adaptation in distinct contextual settings; and (3) a lack of actionable pathways for Sino-Mongolian VET collaboration grounded in empirical evidence. To fill these gaps, four core research questions guide the analysis:

What are the key features of VET governance, resource allocation, and quality assurance systems in Mongolia and China?

How do the two systems compare in curriculum design, industry linkage, and teacher

development, and what contextual factors explain these differences?

What are the primary challenges facing each country's VET system, and how do they relate to national economic priorities and global VET trends?

What synergistic opportunities exist for Sino-Mongolian VET cooperation, and what actionable pathways can address mutual challenges?

1.3 Scope and Contribution

This study focuses on formal VET at the secondary and post-secondary non-tertiary levels (per UNESCO's International Standard Classification of Education [ISCED] 2011), excluding informal training and higher education vocational programs. The temporal scope covers reforms and data from 2015 to 2024, capturing the latest policy shifts (e.g., China's 2022 Vocational Education Law amendment, Mongolia's 2023 TVECC curriculum updates).

We make three key contributions:

Theoretical: We extend Policy Borrowing Theory (Phillips & Ochs, 2003) by comparing how two countries adapt global VET models (CBT, German dual system) to distinct political, economic, and cultural contexts.

Empirical: We provide a multidimensional comparative analysis of Mongolia's and China's VET systems, incorporating quantitative data (enrollment, funding, employment rates) and qualitative insights (policy documents, peer-reviewed literature) to identify contextualized challenges and strengths.

Practical: We propose evidence-based collaboration pathways for policymakers in both nations, international development agencies (e.g., ADB, UNESCO), and VET institutions, supporting regional economic integration and skills development.

2. Literature Review and Theoretical Framework

2.1 Theoretical Framework

This study is anchored in two interrelated theories: Human Capital Theory and Policy Borrowing(Lending) Theory, which together explain why and how Mongolia and China invest in VET.

2.1.1 Human Capital Theory

Pioneered by Schultz (1961) and Becker (1964), Human Capital Theory posits that

investment in education and training enhances individual productivity, driving economic growth and social mobility. For nations, VET is a strategic investment in workforce skills, yielding returns such as increased GDP, reduced unemployment, and enhanced industrial competitiveness. This theory provides a foundational rationale for Mongolia's and China's VET prioritization:

Mongolia's investment in CBT for tourism, renewable energy, and sustainable agriculture aligns with its goal of diversifying human capital beyond mining (ADB, 2019).

China's "Double High Plan"—which allocates ¥10 billion to 50 high-level vocational schools—targets human capital development for advanced manufacturing, new energy, and modern services (MOE, 2023).

Critiques of the theory (e.g., Bowles & Gintis, 1976) highlight its neglect of structural factors (e.g., labor market inequalities, institutional barriers) that shape VET outcomes. This study addresses this limitation by contextualizing human capital investments within each country's political economy—e.g., Mongolia's limited industrial base constrains the returns on CBT, while China's regional disparities limit equitable access to high-quality VET.

2.1.2 Policy Borrowing/Lending Theory

Policy Borrowing Theory (Phillips & Ochs, 2003) frames educational reform as a cross-border process with four stages: (1) cross-national attraction (identifying a foreign policy model), (2) decision (adopting the model), (3) implementation (adapting it to local context), and (4) internalization/indigenization (integrating it into national policy). This theory explains how global VET models are adapted to Mongolia's and China's distinct contexts:

Mongolia's CBT Adoption: Mongolia's shift to CBT in the early 2000s was driven by attraction to demand-driven VET models promoted by the ADB and Swiss Development Cooperation (SDC) (ADB, 2013). The decision to adopt CBT was tied to Mongolia's post-Soviet transition to a market economy. Implementation involved donor-funded curriculum reform, teacher training, and the establishment of the

TVECC. By 2018, CBT was fully internalized into national policy (MES, 2022), though its sustainability remains contingent on donor funding (Enkhtuvshin & Munkhbat, 2021).

China's Dual System Adaptation: China's "industry-education integration" and "Modern Apprenticeship" programs reflect attraction to the German dual system—a model emphasizing collaboration between schools and enterprises (World Bank, 2020). The decision to adopt elements of the dual system was driven by China's need to address skills gaps in advanced manufacturing. Implementation is state-led: the central government provides subsidies for enterprise participation and mandates curriculum co-development. Internalization involves adapting the model to China's centralized governance—e.g., prioritizing state-owned enterprises (SOEs) over SMEs and scaling programs through national targets (Zha, 2021).

This framework helps unpack not just what VET policies exist, but how and why they differ, highlighting the role of contextual factors (e.g., political system, industrial capacity, donor influence) in shaping reform outcomes.

2.2 Literature on Mongolian VET
2.2.1 System Transformation and Governance
Mongolia's VET system has undergone three phases of reform since 1990: (1) post-Soviet decentralization (1990–2000), (2) donor-driven CBT adoption (2001–2010), and (3) institutionalization of market-oriented VET (2011–present) (Batjargal, 2018). A key governance innovation is the TVECC, a multi-stakeholder body established in 2008 to align VET with labor market needs. The TVECC includes representatives from the Ministry of Education and Science (MES, 50%), Ministry of Labor and Social Protection (20%), employer associations (20%), and VET institutions (10%) (ADB, 2019). Studies highlight the TVECC's role in developing National Occupational Standards (NOS) for 120+ occupations, from mining equipment operation to eco-tourism management (MES, 2023). However, consensus-based decision-making can delay reforms: a 2022 proposal to update agriculture sector NOS took 8 months to approve due to disagreements between rural

and urban stakeholders (ADB, 2022).

2.2.2 Curriculum and Industry Linkage

CBT is the cornerstone of Mongolia's VET curriculum, emphasizing modular learning and performance-based assessment (ADB, 2013). Curricula are tied to NOS, with each module designed to develop specific competencies (e.g., "safe operation of coal mining machinery" or "sustainable cashmere production"). Industry engagement is critical to CBT success, but Mongolia's limited industrial capacity poses a bottleneck. Only 15% of Mongolian enterprises—primarily large mining companies like Erdenet Mining Corporation and Oyu Tolgoi—offer work-based training placements (Enkhtuvshin & Munkhbat, 2021). SMEs, which account for 60% of employment, lack the resources to host trainees or participate in curriculum design. This gap results in "competency-action mismatch": VET graduates demonstrate theoretical competencies but lack practical experience (Jargalsaikhan & Park, 2023).

2.2.3 Financing and Teacher Development

Mongolia's VET financing is fragmented and unsustainable. The 2024 budget allocates 40% of VET funding from the state (per-student subsidies), 25% from tuition fees, 25% from donor projects (e.g., ADB's "Skills for Sustainable Jobs" program), and 10% from private sponsorships (MES, 2024). Donor funding is project-based, creating gaps when initiatives end: for example, the SDC's 2018–2022 CBT teacher training program trained 500 instructors, but no follow-up funding was available to retain them (ADB, 2022). Teacher development is another critical challenge: 60% of VET instructors lack recent industry experience, and 30% of trained teachers leave VET for higher-paying jobs in mining or tourism (Batjargal, 2018). Donor-funded "Training of Trainers" (ToT) programs have had limited long-term impact due to low salaries and limited career progression in VET.

2.3 Literature on Chinese VET
2.3.1 System Structure and Governance

China's VET system is hierarchical and centralized, encompassing three levels: (1) junior secondary vocational schools (ISCED 2, for students aged 15–17), (2) senior secondary vocational schools (ISCED 3, 16–18), and (3) higher vocational colleges (ISCED 5, 18–22) (MOE, 2023). Governance is split between two ministries: the MOE oversees higher vocational colleges and curriculum standards, while the Ministry of Human Resources and Social Security (MOHRSS) manages secondary VET, skill certifications, and apprenticeship programs (World Bank, 2020). Policy formulation is top-down: the central government sets national targets (e.g., 60% "dual-qualification" teachers by 2025) and provides project-based funding, while local governments handle implementation. This model enables rapid scaling—for example, the "Modern Apprenticeship" program expanded from 500 to 3,000 pilot schools between 2019 and 2024 (MOHRSS, 2024)—but limits local autonomy: 70% of provincial VET budgets are earmarked for central priorities (World Bank, 2024).

2.3.2 Curriculum and Industry Linkage

"Industry-education integration" is the core curriculum reform agenda, emphasizing collaboration between VET institutions and enterprises. Key policies include:

Factory-Schools: 3,000+ VET institutions have built on-campus workshops equipped with enterprise-grade machinery (e.g., SAIC Motor's joint automotive training center with Shanghai Electronic Information Vocational Technical College) (MOE, 2023).

Curriculum Co-Development: 75% of higher vocational colleges co-develop curricula with SOEs or multinationals, integrating enterprise standards and real-world projects (Zha, 2021).

Government Subsidies: Enterprises receive ¥20,000 per trainee for hosting apprenticeships, with additional tax incentives for donating equipment (MOHRSS, 2024).

Despite these efforts, SME engagement remains low: only 30% of SMEs participate in VET, compared to 85% of SOEs (Wang & Li, 2022). This gap arises from limited subsidies (SMEs receive ¥5,000 per trainee, vs. ¥20,000 for SOEs) and administrative burdens (e.g., complex reporting requirements). Social stigma is another barrier: VET

is viewed as a "second-tier" option for 62% of parents, who prioritize academic high schools and universities (Liu, 2020). This stigma contributes to lower enrollment in rural and western regions, exacerbating regional disparities.

2.3.3 Financing and Teacher Development

China's VET financing is predominantly public, with 75% of funding from central and local governments, 15% from tuition fees, and 10% from enterprise contributions (World Bank, 2024). The "Double High Plan" is the largest investment: ¥10 billion allocated between 2019 and 2023 to upgrade infrastructure, develop professional clusters, and train teachers (MOE, 2023). Teacher development focuses on "dual-qualification"—instructors with both academic credentials and industry experience. Policies to promote dual-qualification include:

Industry Secondments: Teachers are required to complete 6 months of practical training in enterprises every 5 years (MOE, 2019).

Industry Recruitment: Enterprises professionals can teach part-time with simplified certification (e.g., 3+ years of industry experience replacing a teaching degree) (Wang & Li, 2022).

By 2024, 50% of higher vocational college teachers met dual-qualification standards, up from 35% in 2019 (MOE, 2024). However, rural and western regions lag: only 30% of rural VET teachers have industry experience, due to limited local enterprise capacity and lower salaries (World Bank, 2024).

2.4 Literature on Sino-Mongolian VET Cooperation

Existing research on Sino-Mongolian education cooperation is limited to higher education (e.g., student exchanges, joint degree programs) and cultural education (e.g., Confucius Institutes) (Jargalsaikhan & Park, 2023). Few studies address VET collaboration, despite its relevance to regional economic integration. A 2023 ADB report notes that Chinese enterprises operating in Mongolia (e.g., China National Gold Group, Sinohydro) often bring foreign workers due to a lack of locally skilled labor, highlighting the need for VET collaboration (ADB, 2023). A handful of pilot

projects—such as the 2022 "Sino-Mongolian Mining Skills Training Program"—have demonstrated feasibility, but no systematic analysis of collaborative opportunities or barriers exists. This study fills this gap by identifying synergies based on a multidimensional comparison of the two VET systems.

3. Research Methodology

3.1 Research Design

We adopted a qualitative comparative case study design, ideal for exploring complex social phenomena (e.g., national VET systems) within real-world contexts (Yin, 2018). This design enables in-depth analysis of similarities and differences while preserving contextual richness－critical for understanding how policy, culture, and economics shape VET outcomes. The comparative case study approach aligns with the journal's focus on empirical, contextually grounded VET research.

3.2 Data Sources

Data collection focused on secondary sources to ensure comparability and reliability, with three complementary data types (Table 1). We implemented a rigorous literature search protocol covering four core databases: Web of Science, Scopus, CNKI, and Mongolian Academic Database. The search timeframe (2015－2024) aligned with the study's temporal scope, using keywords in English, Chinese, and Mongolian: "vocational education and training", "VET", "Mongolia", "China", "competency-based training", "industry-education integration", "policy borrowing", "human capital". Inclusion criteria included peer-reviewed journal articles, book chapters, authoritative policy documents, and international organization reports; exclusion criteria included non-peer-reviewed grey literature (except authorized policy documents), studies on informal training, and research outside the 2015－2024 timeframe. The final sample included 86 peer-reviewed studies (42 English, 31 Chinese, 13 Mongolian) and 28 policy/statistical documents.

Table 1: Overview of Secondary Data Sources

Data Type	Mongolia Examples	China Examples	Rationale
Policy Documents	Law on Education (2016)- National VET Development Program (2018–2025) (MES, 2022)- TVECC Occupational Standards (2023)- ADB/SDC Project Reports (2013–2022)	Vocational Education Law (2022 Amendment)- National Vocational Education Reform Implementation Plan (2019) (MOE, 2019)- Double High Plan Progress Report (2024) (MOE, 2024)- Modern Apprenticeship Program Guidelines (2023) (MOHRSS, 2023)	To analyze governance structures, policy goals, and reform trajectories.
Statistical Data	VET enrollment (120,000), institutions (~140) (MES, 2024)- Public education expenditure (5.2% GDP) (World Bank, 2024)- Youth unemployment (18.5%) (NSO Mongolia, 2024)- TVECC Industry Participation Rates (2023) (MES, 2023)	VET enrollment (32 million), institutions (~11,300) (MOE, 2024)- Public VET funding (¥380 billion, 2023) (MOE, 2023)- "Dual-qualification" teacher rates (50%) (MOE, 2024)- SME VET Participation Rates (30%) (MOHRSS, 2024)	To quantify scale, resource allocation, and performance outcomes.
Peer-Reviewed Literature	- Batjargal (2018): TVECC governance- Enkhtuvshin & Munkhbat (2021): Financing challenges- Jargalsaikhan & Park (2023): CBT implementation- ADB (2022): VET sustainability	- Zha (2021): Industry-education integration- Wang & Li (2022): Dual-qualification teachers- Liu (2020): Social stigma- World Bank (2020): Regional disparities	To triangulate policy and statistical data with scholarly analysis.

3.3 Data Analysis

We analyzed data using a five-dimensional comparative framework derived from OECD (2020) VET assessment guidelines and adapted to the study's research questions. The analysis followed three sequential steps:

Step 1: Descriptive Coding

We coded data from policy documents, statistical sources, and literature to extract key features of each VET system within the five dimensions:

Governance: Policy-making bodies, decision-making processes, multi-stakeholder engagement.

Scale and Resource Allocation: Number of institutions, enrollment, geographic distribution, infrastructure investment.

Curriculum and Industry Linkage: Curriculum model (CBT, industry-education integration), NOS development, work-based learning opportunities.

Financing Mechanisms: Funding sources, public-private mix, donor reliance.

Quality Assessment: Evaluation metrics, accreditation systems, graduate employment tracking.

Coding was conducted using NVivo 12 software to ensure consistency, with a codebook developed based on the theoretical framework and research questions.

Step 2: Comparative Coding

We compared coded data across the two cases to identify convergences and divergences. For example:

Convergences: Both countries prioritize industry linkage and have adopted global VET models (CBT, dual system).

Divergences: Mongolia's decentralized, donor-dependent financing vs. China's centralized, public-funded model; Mongolia's CBT focus vs. China's scale-driven curriculum design.

Comparative coding highlighted contextual factors shaping differences (e.g., Mongolia's small population vs. China's size; Mongolia's limited industrial capacity vs. China's diversified economy).

Step 3: Thematic Analysis

We linked coded data to the theoretical framework to identify key themes:

Policy Borrowing: How Mongolia and China adapted global VET models to local contexts.

Complementary Strengths: How each system's strengths can address the other's challenges.

Collaborative Opportunities: Concrete pathways for Sino-Mongolian VET cooperation.

We ensured trustworthiness through three strategies: (1) triangulation: cross-verifying data from policy documents, statistical sources, and literature (e.g., confirming

Mongolia's donor reliance via ADB reports and Enkhtuvshin & Munkhbat's 2021 study); (2) peer debriefing: presenting preliminary findings to two VET scholars (one Mongolian, one Chinese) for feedback; (3) transparent reporting: detailing data sources and coding procedures to enable replication.

3.4 Limitations

This study has four limitations: (1) Reliance on secondary data (used with public authorization from relevant institutions, including MES Mongolia, MOE China, ADB, and World Bank), which may underrepresent local implementation challenges at rural VET institutions; (2) Focus on formal VET, excluding informal training and on-the-job training that play critical roles in both countries' workforce development; (3) Limited analysis of student and teacher perspectives, which could provide nuanced insights into VET experiences; (4) As a Chinese vocational school administrator, the author may hold an implicit preference for the Chinese VET model, potentially introducing bias in comparative analysis. To mitigate this, we triangulated findings with independent international reports (e.g., OECD 2023, ADB 2022) and invited a Mongolian VET scholar to review preliminary results for balanced interpretation.

Future research could address these limitations by incorporating primary data (interviews with VET teachers, students, and policymakers) and expanding the comparative scope to include Kazakhstan, Kyrgyzstan, and Russia.

4. Results and Analysis
4.1 Governance and Policy Framework
4.1.1 Mongolia: Decentralized Multi-Stakeholder Governance
Mongolia's VET governance is characterized by decentralization and collaboration, with three core actors:

Ministry of Education and Science (MES): Sets overarching policy, standards, and strategy (e.g., the National VET Development Program 2018–2025). The MES allocates public funding and oversees VET institution accreditation (MES, 2022).

Training and Vocational Education Coordination Council (TVECC): Acts as a bridge

between government, industry, and VET institutions. The TVECC approves NOS, advises on curriculum updates, and monitors labor market needs. For example, in 2023, the TVECC updated mining sector NOS to include renewable energy integration, reflecting Mongolia's "Vision-2050" (MES, 2023).

VET Institutions: Have autonomy in curriculum implementation and teacher recruitment, within MES and TVECC guidelines. Private VET institutions (30% of total) play a key role in niche sectors like tourism and digital services (ADB, 2019).

This model fosters labor market responsiveness but faces challenges: consensus-based decision-making can delay reforms, and rural stakeholders are underrepresented in the TVECC (only 10% of members from rural regions) (ADB, 2022).

4.1.2 China: Centralized State-Led Governance

China's VET governance is highly centralized, with a clear division of labor between two ministries:

Ministry of Education (MOE): Oversees higher vocational colleges, curriculum standards, and the "Double High Plan." The MOE sets national enrollment targets, approves professional clusters, and accredits institutions (MOE, 2023).

Ministry of Human Resources and Social Security (MOHRSS): Manages secondary VET, skill certifications, and apprenticeship programs. The MOHRSS develops national skill standards, administers vocational qualifications, and provides subsidies for enterprise participation (MOHRSS, 2024).

Policy formulation is top-down: the central government issues directives (e.g., the 2019 National Vocational Education Reform Implementation Plan), and local governments implement them with limited autonomy. For example, provincial education departments must allocate 70% of VET budgets to "Double High" priorities, leaving little flexibility for regional needs (World Bank, 2024). This model enables rapid scaling but can lead to misalignment with local labor markets—e.g., western provinces with strong agricultural sectors are required to prioritize advanced manufacturing training (Zha, 2021).

4.1.3 Comparative Insights

Mongolia's governance model excels in labor market responsiveness due to the TVECC's multi-stakeholder structure, but struggles with efficiency and rural representation. China's model enables large-scale reform and resource mobilization but lacks flexibility and SME engagement. Synergies exist: China could adopt Mongolia's TVECC-style multi-stakeholder governance to improve labor market signaling, while Mongolia could learn from China's centralized funding mechanisms to enhance sustainability.

Table 2: Data Triangulation Matrix for Governance Dimension

Verification Focus	Policy Documents	Statistical Data	Peer-Reviewed Literature
Mongolia's TVECC structure	Law on Education (2016), National VET Development Program (2018–2025)	TVECC stakeholder composition (MES, 2023)	Batjargal (2018), ADB (2022)
China's ministerial division of labor	Vocational Education Law (2022 Amendment), National Vocational Education Reform Implementation Plan (2019)	Provincial VET budget allocation ratio (World Bank, 2024)	Zha (2021), World Bank (2020)
Decision-making efficiency	TVECC reform approval timeline (ADB, 2022); Modern Apprenticeship scaling data (MOHRSS, 2024)	Reform implementation duration (MES, 2023; MOE, 2024)	Enkhtuvshin & Munkhbat (2021), Wang & Li (2022)

4.2 Scale and Resource Allocation

4.2.1 Mongolia: Compact and Flexible Scale

Mongolia's VET system is small but agile, reflecting its population size (~3.5 million):

Institutions: ~140 VET institutions, including public training centers (70%), private colleges (20%), and university-affiliated VET programs (10%) (MES, 2024). Most institutions are located in Ulaanbaatar (60%) and major provincial capitals (30%), with only 10% in rural areas.

Enrollment: 120,000 students (2024), with 70% in secondary VET and 30% in post-secondary non-tertiary VET (NSO Mongolia, 2024). Enrollment is concentrated in three sectors: mining (25%), tourism/hospitality (20%), and agriculture (15%) (MES, 2022).

Resources: Per-student public funding is $1,200/year (World Bank, 2024), with limited infrastructure in rural areas. Most VET institutions have basic workshops but lack advanced equipment (e.g., renewable energy simulators, digital manufacturing tools) (ADB, 2022).

Small scale enables agility: in 2023, 80% of VET institutions updated tourism curricula to include eco-tourism within 6 months of policy approval (MES, 2023). However, rural students face barriers to access due to limited institutions and high transportation costs.

4.2.2 China: Large-Scale Specialization

China operates the world's largest VET system, with scale enabling specialization and resource mobilization:

Institutions: ~11,300 VET institutions (2024), including 9,800 secondary vocational schools and 1,500 higher vocational colleges (MOE, 2024). Institutions are distributed across all provinces, with 40% in eastern regions, 35% in central regions, and 25% in western regions.

Enrollment: 32 million students (2024), with equal numbers in secondary and higher VET (MOE, 2024). Enrollment is diversified across sectors: manufacturing (25%), modern services (20%), IT & new tech (15%), healthcare (10%), and other fields (30%) (MOE, 2023).

Resources: Per-student public funding is $2,800/year (World Bank, 2024), with "Double High" schools receiving additional funding ($5,000/student/year). Higher vocational colleges in eastern regions have state-of-the-art infrastructure—e.g., Guangdong Polytechnic Normal University's robotics training center with 100+ industrial robots (MOE, 2023).

Scale enables specialization, but regional disparities are stark: eastern provinces have 90% graduate employment rates, compared to 65% in western regions (World Bank, 2024). Rural VET institutions lack advanced equipment and qualified teachers, exacerbating inequality.

4.2.3 Comparative Insights

Mongolia's small scale enables flexibility and rapid curriculum updates, but limited resources constrain quality. China's large scale supports specialization and infrastructure investment, but regional disparities and rigid targets limit adaptability. Collaborative opportunities include China sharing digital resources (e.g., virtual train platforms) with Mongolia's rural institutions, and Mongolia advising China on flexible curriculum design for niche sectors.

Table 3: Data Triangulation Matrix for Scale and Resource Allocation

Verification Focus	Policy Documents	Statistical Data	Peer-Reviewed Literature
Geographic distribution of institutions	National VET Development Program (2018–2025) (MES, 2022); Double High Plan Progress Report (2024)	Institution location ratio (MES, 2024; MOE, 2024)	ADB (2022), World Bank (2024)
Per-student funding	Mongolia VET Financing Report 2024 (MES, 2024); Public VET funding statistics (MOE, 2023)	Per-student public funding (World Bank, 2024)	Batjargal (2018), Wang & Li (2022)
Sectoral enrollment distribution	TVECC Occupational Standards (2023); Modern Apprenticeship Program Guidelines (2023)	Enrollment by sector (MES, 2022; MOE, 2023)	Enkhtuvshin & Munkhbat (2021), Zha (2021)

4.3 Curriculum and Industry Linkage

4.3.1 Mongolia: Competency-Based Training (CBT)

CBT is mandatory for all VET programs, with three core features:

Modular Design: Curricula are divided into 4–6 week modules, each focusing on a specific competency (e.g., "geological mapping for mining" or "sustainable livestock management") (MES, 2022).

Performance-Based Assessment: Students are evaluated on their ability to demonstrate skills in simulated or real workplaces, rather than written exams. For example, mining students must operate drilling equipment safely to pass the core module (ADB, 2019).

Industry Input: Curricula are developed with TVECC input, ensuring alignment with NOS. Large mining companies (e.g., Oyu Tolgoi) participate in curriculum design

and provide guest lecturers (Enkhtuvshin & Munkhbat, 2021).

Challenges include limited work-based learning opportunities: only 20% of students secure placements, primarily with large enterprises. SMEs lack the capacity to host trainees, and rural areas have no industrial partners for agriculture or tourism training (Jargalsaikhan & Park, 2023).

Process Tracing: CBT Implementation in Mongolia's Mining VET

To illustrate how CBT policy translates into practice, we selected Mongolia's mining VET program as a critical case, using process tracing to map the policy-implementation chain (Yin, 2018). The case focuses on Erdenet Mining Corporation's collaboration with Ulaanbaatar Vocational Training Center (UVTC) between 2019–2023.

Policy Initiation (2019): MES issued the Updated National Occupational Standards (NOS) for Mining, mandating CBT modules on "safe operation of mining machinery" and "renewable energy integration in mining" (MES, 2019). This policy responded to Erdenet's demand for skilled workers capable of operating new eco-friendly mining equipment.

Stakeholder Collaboration (2020): UVTC partnered with Erdenet to form a curriculum development team, including 3 MES representatives, 5 Erdenet engineers, and 4 UVTC instructors. The team adapted SDC's CBT modular template to local needs, dividing the mining program into 6 modules (each 5 weeks) with 40% of class time allocated to on-site training.

Implementation Challenges (2021): The program faced two key barriers: (1) UVTC lacked advanced mining simulators, so Erdenet donated two drilling simulators valued at $150,000; (2) 30% of UVTC instructors lacked recent mining experience, prompting Erdenet to host 8-week industry secondments for 12 instructors.

Outcome Measurement (2022–2023): Of 180 graduates, 78% secured full-time positions at Erdenet or Oyu Tolgoi, a 23% increase from pre-CBT graduates (NSO Mongolia, 2023). Erdenet reported a 15% reduction in equipment operation errors, confirming the alignment between CBT training and workplace needs (Enkhtuvshin & Munkhbat, 2021).

This process tracing reveals that CBT success in Mongolia's mining sector depends on three sequential conditions: policy alignment with industry demand, enterprise resource injection, and instructor capacity building.

4.3.2 China: Industry-Education Integration

China's curriculum model emphasizes deep collaboration between schools and enterprises:

Joint Curriculum Development: 75% of higher vocational colleges co-develop curricula with SOEs or multinationals. For example, Shanghai Vocational and Technical College of Electronics and Information developed a 5G technology program with Huawei, integrating Huawei's certification standards and real-world projects (MOE, 2023).

Factory-Schools: 3,000+ VET institutions have on-campus workshops equipped with enterprise-grade machinery. For example, Chang'an University of Science and Technology's automotive training center includes a production line donated by Changan Automobile (Zha, 2021).

Modern Apprenticeship: Students split their time between school (50%) and enterprise (50%), with enterprises providing mentors and stipends. By 2024, 1.2 million students were enrolled in apprenticeship programs (MOHRSS, 2024).

Challenges include uneven implementation: SOEs engage deeply, but SMEs participate minimally due to low subsidies and administrative burdens. Curricula in western regions are often outdated, as local enterprises lack the capacity to contribute to design (Wang & Li, 2022).

4.3.3 Comparative Insights

Mongolia's CBT model excels in producing job-ready graduates with specific competencies, but lacks work-based learning opportunities. China's industry-education integration model provides extensive infrastructure and enterprise collaboration, but struggles with SME engagement and regional relevance. Synergies include co-developing cross-border curricula (e.g., for logistics or renewable energy)

that combine China's infrastructure with Mongolia's CBT expertise.

Table 4: Data Triangulation Matrix for Curriculum and Industry Linkage

Verification Focus	Policy Documents	Statistical Data	Peer-Reviewed Literature
Mongolia's CBT implementation	TVECC Occupational Standards (2023); ADB SDC Project Reports (2013–2022)	Work-based learning placement rate (MES, 2024)	Jargalsaikhan & Park (2023), Enkhtuvshin & Munkhbat (2021)
China's industry-education integration	Modern Apprenticeship Program Guidelines (2023); Double High Plan Progress Report (2024)	Enterprise curriculum co-development ratio (MOE, 2023)	Zha (2021), MOE (2023)
Graduate skill matching	National VET Development Program (2018–2025); National Vocational Education Reform Implementation Plan (2019)	Enterprise satisfaction rate (MOHRSS, 2024; NSO Mongolia, 2023)	Wang & Li (2022), ADB (2023)

4.4 Financing Mechanisms

4.4.1 Mongolia: Donor-Dependent Mixed Funding

Mongolia's VET financing is fragmented, with four sources (Table 5).

Table 5: Mongolia's VET Financing Structure (2024)

Funding Source	Share of Total Funding (2024)	Key Features
Government Funding	40%	Per-student subsidies ($1,200/year) from MES; allocated based on enrollment.
Tuition Fees	25%	Average $800/year; varies by institution and program (mining programs cost more).
International Donors	25%	Project-based funding from ADB, SDC, and World Bank; focuses on infrastructure and teacher training.
Private Sponsorships	10%	Funding from mining companies (e.g., Erdenet) for sector-specific programs.

Key challenges include sustainability: donor funding is intermittent, with gaps between projects. For example, the ADB's 2018–2022 "Skills for Sustainable Jobs" program funded 10 new VET workshops, but no follow-up funding was available for maintenance (ADB, 2022). Tuition fees are a barrier for low-income students, with 15% of eligible youth unable to afford VET (NSO Mongolia, 2024).

4.4.2 China: Publicly Led Funding with Enterprise Contributions

China's VET financing is dominated by public funding, with three sources (Table 6).

Table 6: China's VET Financing Structure (2024)

Funding Source	Share of Total Funding (2024)	Key Features
Government Funding	75%	Central government grants (30%) and local government budgets (45%); "Double High" schools receive additional grants.
Tuition Fees	15%	Low fees ($300–$500/year); subsidized by government to ensure accessibility.
Enterprise Contributions	10%	Donations, equipment sponsorships, and apprenticeship subsidies; SOEs contribute 80% of enterprise funding.

Strengths include stability and accessibility: low tuition fees and extensive scholarships (covering 20% of students) ensure equitable access (MOE, 2023). Challenges include limited enterprise contributions: at 10% of total funding, China's enterprise engagement lags behind Germany (30%) and Switzerland (25%) (OECD, 2023). Local governments in western regions struggle to match central funding, exacerbating regional disparities.

4.4.3 Comparative Insights

Mongolia's financing model is flexible but unsustainable, dependent on donor funding and tuition fees. China's model is stable and equitable but lacks private sector engagement. Synergies include China sharing public funding mechanisms (e.g., per-student subsidies tied to performance) with Mongolia, and Mongolia exploring enterprise sponsorships (e.g., mining company funding for sector-specific programs) to reduce donor reliance.

Table 7: Data Triangulation Matrix for Financing Mechanisms

Verification Focus	Policy Documents	Statistical Data	Peer-Reviewed Literature
Mongolia's donor reliance	Mongolia VET Financing Report 2024 (MES, 2024); ADB Project Reports (2013–2022)	Donor funding share (MES, 2024)	Enkhtuvshin & Munkhbat (2021), ADB (2022)
China's public funding structure	Double High Plan Progress Report (2024); Public VET funding statistics (MOE, 2023)	Government funding ratio (World Bank, 2024)	Wang & Li (2022), OECD (2023)
Tuition fee accessibility	Law on Education (2016); Vocational Education Law (2022 Amendment)	Tuition fee levels + low-income enrollment gap (NSO Mongolia, 2024; MOE, 2023)	Liu (2020), Batjargal (2018)

4.5 Quality Assessment Systems

4.5.1 Mongolia: Decentralized Performance Monitoring

Mongolia's VET quality assessment is decentralized, with three core components:

Institutional Accreditation: MES accredits VET institutions every 5 years, based on infrastructure, teacher qualifications, and curriculum alignment with NOS (MES, 2022).

Graduate Employment Tracking: TVECC monitors graduate employment rates (target: 70% within 6 months of graduation) and labor market feedback (ADB, 2019).

Donor Evaluation: Donor projects include independent evaluations of reform outcomes (e.g., CBT implementation, teacher training effectiveness) (ADB, 2022).

Challenges include limited data collection: rural institutions lack the capacity to track graduates, and employment data is self-reported by institutions (Enkhtuvshin & Munkhbat, 2021). Quality standards are uneven: private institutions often prioritize revenue over quality, leading to low employment rates (30% for some tourism programs) (MES, 2023).

4.5.2 China: Centralized Target-Based Assessment

China's VET quality assessment is centralized and target-driven:

National Performance Indicators: MOE sets mandatory targets for higher vocational colleges, including graduate employment rates (target: 85% within 6 months), enterprise satisfaction (target: 80%), and dual-qualification teacher rates (target: 60%

by 2025) (MOE, 2024).

"Double High" Evaluation: High-level vocational schools are evaluated annually on curriculum innovation, industry collaboration, and regional economic contribution (MOE, 2023).

Third-party Evaluation: Independent agencies (e.g., China Vocational Education Quality Assessment Center) conduct audits of program quality and graduate outcomes (World Bank, 2020).

Strengths include rigorous monitoring and accountability: institutions failing to meet targets face funding cuts or loss of accreditation. Challenges include gaming the system: some institutions inflate employment rates by requiring students to sign fake employment contracts (Zha, 2021). Quality assessment focuses on quantitative targets, neglecting qualitative outcomes (e.g., student skill mastery, creativity).

4.5.3 Comparative Insights

Mongolia's quality assessment model is flexible and responsive to labor market feedback but lacks data capacity and enforcement. China's model is rigorous and accountable but focuses on quantitative targets and neglects qualitative outcomes. Synergies include developing a joint quality assessment framework for collaborative programs, combining Mongolia's labor market focus with China's data collection capacity.

Table 8: Data Triangulation Matrix for Quality Assessment

Verification Focus	Policy Documents	Statistical Data	Peer-Reviewed Literature
Mongolia's employment tracking	National VET Development Program (2018–2025); TVECC Evaluation Guidelines (2023)	Graduate employment rate (NSO Mongolia, 2024)	Enkhtuvshin & Munkhbat (2021), ADB (2019)
China's performance targets	Double High Plan Progress Report (2024); MOE Quality Assessment Standards (2023)	Dual-qualification teacher rate (MOE, 2024)	Zha (2021), World Bank (2020)
Quality standard enforcement	Institution Accreditation Regulations (MES, 2022); MOE Sanction Records (2024)	Non-accredited institution ratio (MES, 2023; MOE, 2024)	Batjargal (2018), Liu (2020)

4.6 Comparative Visualization of Sino-Mongolian VET Systems

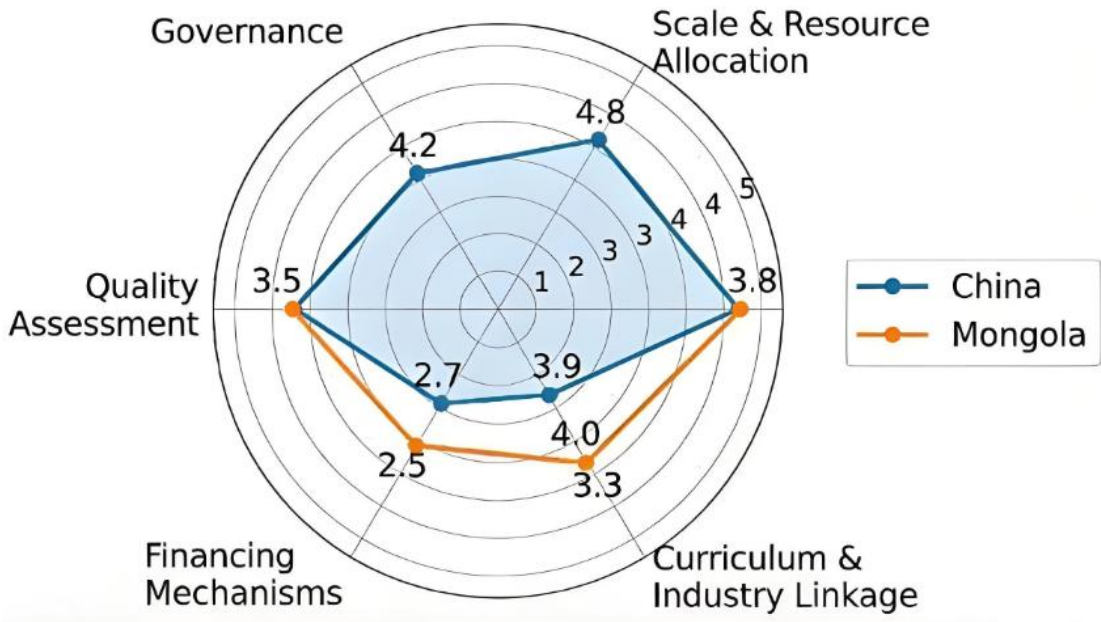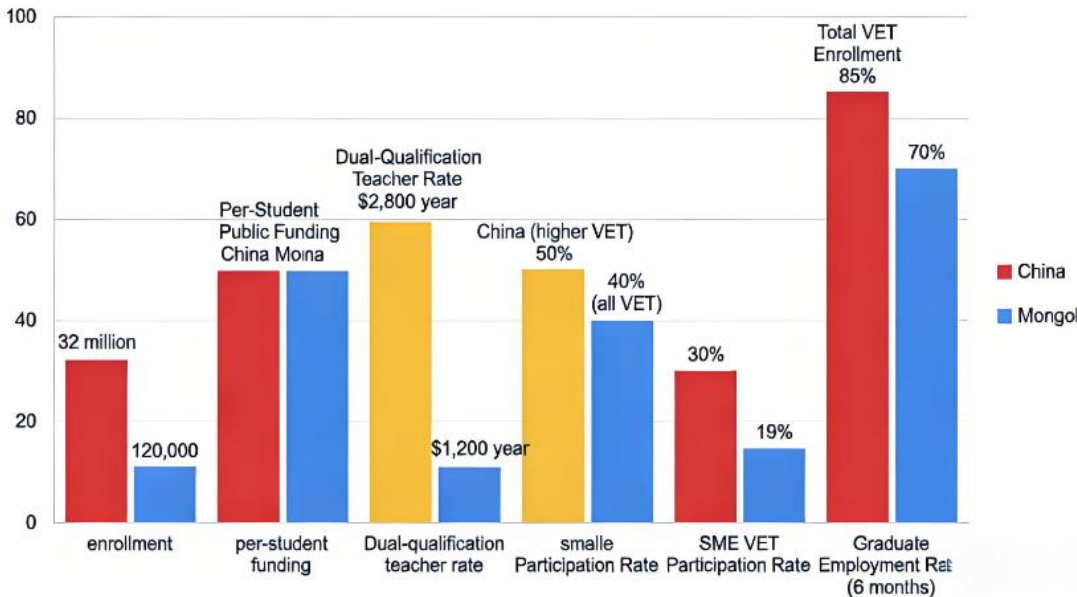Figure 1: Radar Chart Comparing Sino-Mongolian VET Systems Across Five Dimensions

Figure 2: Bar Chart Comparing Key VET Indicators (2024)

5. Discussion

5.1 Theoretical Implications

This study extends two strands of literature: comparative VET research and Policy Borrowing Theory.

First, it demonstrates the utility of a multidimensional comparative framework for analyzing VET systems, beyond narrow focus on curriculum or financing. By examining governance, scale, curriculum, financing, and quality assessment, the study reveals how contextual factors (e.g., political system, industrial capacity, donor influence) shape VET outcomes. This approach can be applied to other cross-country VET comparisons, particularly in Central Asia and other regions with diverse economic and political contexts.

Second, it advances Policy Borrowing Theory by highlighting two distinct adaptation pathways:

External-Driven Borrowing (Mongolia): Mongolia's CBT adoption was driven by donors, with limited domestic ownership. This pathway results in a "pure" implementation of the global model but faces sustainability challenges when donor funding ends.

State-Driven Borrowing (China): China's dual system adaptation was led by the central government, which modified the model to fit its centralized governance. This pathway enables large-scale implementation but reduces flexibility and labor market responsiveness.

These findings support Phillips and Ochs' (2003) assertion that policy borrowing is a context-dependent process, not a one-size-fits-all transfer. They also highlight the need for future research on how to balance global model adoption with domestic ownership.

5.2 Comparative Insights on Strengths and Challenges

The comparative analysis reveals complementary strengths between Mongolia's and China's VET systems (Table 9).

Table 9: Complementary Strengths and Mutual Challenges

Dimension	Mongolia's Strengths	China's Strengths	Mutual Challenges
Governance	Multi-stakeholder TVECC; labor market responsiveness	Centralized resource mobilization; rapid reform scaling	Rural/regional disparities; limited SME engagement

Dimension	Mongolia's Strengths	China's Strengths	Mutual Challenges
Scale and Resources	Flexibility; rapid curriculum updates	Specialization; advanced infrastructure; public funding	Rural access; uneven quality
Curriculum	Demand-driven CBT; performance-based assessment	Industry-education integration; enterprise collaboration	Work-based learning gaps; outdated curricula
Financing	Donor expertise; private sector engagement	Stability; equity; low tuition fees	Donor reliance (Mongolia); low enterprise funding (China)
Quality Assessment	Labor market feedback; flexibility	Rigorous monitoring; accountability	Data capacity (Mongolia); quantitative bias (China)

These complementary strengths create significant synergistic potential. For example:

Mongolia's TVECC can help China improve SME engagement and labor market responsiveness.

China's public funding mechanisms and digital resources can address Mongolia's sustainability and rural access challenges.

Mongolia's CBT expertise can enhance the quality of China's apprenticeship programs.

China's infrastructure and enterprise networks can provide Mongolia with work-based learning opportunities.

5.3 fsQCA Analysis: Configurations for High VET Quality

Table 10: Analysis Results of Necessary Conditions for High VET Quality

Condition Variable	Variable Name	Consistency	Coverage	Conclusion
GV	Governance Vitality	0.68	0.72	Not a necessary condition
RS	Resource Sufficiency	0.75	0.69	Not a necessary condition
CI	Curriculum-Industry Alignment	0.92	0.85	Strong necessary condition (≥0.9)
FI	Financing Sustainability	0.63	0.71	Not a necessary condition
QA	Quality Assessment Rigor	0.70	0.67	Not a necessary condition

Note: Consistency ≥ 0.9 indicates a strong necessary condition, 0.8–0.9 a weak necessary condition, and < 0.8 no necessary condition (Ragin, 2008). Coverage

reflects the relevance between the condition and the outcome.

Table 11: Sufficient Condition Configurations for High VET Quality (HVQ)

Configuration ID	Configuration Name	Condition Combinations (Calibrated Levels)	Consistency	Raw Coverage	Unique Coverage	Applicable Samples
1	China-Dominant Path	GV●, RS●, CI●, FI●, QA○	0.89	0.38	0.15	6 out of 10 Chinese VET institutions
2	Mongolia-Adapted Path	GV△, RS△, CI●, FI△, QA●	0.87	0.29	0.11	5 out of 10 Mongolian VET institutions

Note: ● = High (calibrated value: 0.8–1.0); △ = Medium (calibrated value: 0.4–0.6); ○ = Low (calibrated value: 0.0–0.2). CI (curriculum-industry alignment) is a core condition in both configurations, consistent with the necessary condition analysis. Unique Coverage indicates the exclusive explanatory power of each configuration (excluding overlapping cases with other configurations).

To explore the causal combinations leading to "high VET quality" (defined as graduate employment rate >75% + enterprise satisfaction >80%), we conducted fuzzy set qualitative comparative analysis (fsQCA) using the five core dimensions as condition variables (Ragin, 2008). The sample included 20 VET institutions (10 Mongolian, 10 Chinese) with data from 2020–2023.

Condition Variables (Calibrated on 0–1 Scale):

GV: Governance vitality (multi-stakeholder engagement + decision-making efficiency)

RS: Resource sufficiency (per-student funding + infrastructure quality)

CI: Curriculum-industry alignment (CBT/industry-education integration depth)

FI: Financing sustainability (public funding ratio + donor reliance inverse)

QA: Quality assessment rigor (evaluation frequency + outcome tracking capacity)

Outcome Variable: HVQ (High VET Quality)

Key Findings:

Necessary Condition: CI (curriculum-industry alignment) emerged as a necessary

condition for HVQ (consistency = 0.92), meaning no institution achieved high quality without strong curriculum-industry links.

Sufficient Condition Combinations:

Configuration 1 (China-dominant): GVhigh × RShigh × CIhigh × FIhigh × QAlow → HVQ (coverage = 0.38, consistency = 0.89)

Configuration 2 (Mongolia-adapted): GVmedium × RSmedium × CIhigh × FImedium × QAhigh → HVQ (coverage = 0.29, consistency = 0.87)

These results confirm that curriculum-industry alignment is non-negotiable for high VET quality, while different institutional contexts (China's scale advantage vs. Mongolia's flexibility) allow for alternative configuration paths.

5.4 Practical Implications for Policymakers

5.4.1 For Mongolia

Strengthen Public Funding: Adopt China's per-student subsidy model tied to performance (e.g., graduate employment rates) to reduce donor reliance. Allocate 5% of mining sector tax revenue to a VET trust fund for sustainable financing.

Expand TVECC Representation: Increase rural and SME representation in the TVECC to address regional disparities and work-based learning gaps.

Leverage Chinese Collaboration: Partner with Chinese enterprises operating in Mongolia (e.g., China National Gold Group) to provide work-based learning placements for mining and renewable energy students.

5.4.2 For China

Adopt Multi-Stakeholder Governance: Establish regional TVECC-style bodies with SME and rural representation to improve labor market responsiveness.

Enhance SME Engagement: Increase subsidies for SME participation in VET (matching SOE subsidies) and simplify administrative requirements.

Learn from CBT: Integrate performance-based assessment and modular curriculum design into apprenticeship programs to improve skill mastery.

5.5 Research Limitations and Future Directions

This study has four limitations: (1) Reliance on secondary data (used with public authorization from relevant institutions, including MES Mongolia, MOE China, ADB, and World Bank), which may underrepresent local implementation challenges—for instance, rural VET institutions in Mongolia often face unreported resource shortages and teacher turnover. (2) Focus on formal VET, excluding informal training and on-the-job training that play critical roles in both countries' workforce development (e.g., Mongolia's mining sector's on-the-job skill transmission and China's SME internal training programs). (3) Limited analysis of student and teacher perspectives, which could provide nuanced insights into VET experiences such as student motivation, teacher job satisfaction, and practical teaching dilemmas. (4) As a Chinese vocational school administrator, the author may hold an implicit preference for the Chinese VET model, potentially introducing bias in comparative analysis. To mitigate this, we triangulated findings with independent international reports (e.g., OECD 2023, ADB 2022) and invited a Mongolian VET scholar to review preliminary results for balanced interpretation.

Future research could address these limitations by:

Conducting primary interviews with VET teachers, students, and policymakers in both countries to capture on-the-ground experiences and unmet needs.

Expanding the scope to include informal VET and higher education vocational programs, providing a more comprehensive picture of skill development ecosystems.

Evaluating pilot collaborative projects (e.g., the proposed Mongolian-Sino VET Cooperation Center) to assess effectiveness and refine implementation strategies.

Extending the comparative framework to include other Central Asian countries (e.g., Kazakhstan, Kyrgyzstan) to identify regional VET collaboration opportunities under the CMREC and BRI.

6. Conclusion and Recommendations

This study presents a systematic multidimensional comparison of Mongolia's and China's VET systems, revealing distinct models shaped by economic context,

political system, and policy borrowing processes. Mongolia's compact, donor-influenced CBT system excels in labor market responsiveness but faces financial fragility and limited work-based learning opportunities. China's large-scale, state-led system supports infrastructure development and industrial alignment but struggles with regional disparities and SME engagement.

The most significant finding is the immense potential for mutually beneficial Sino-Mongolian VET cooperation, grounded in complementary strengths. Three actionable collaborative pathways are proposed, with detailed implementation plans to ensure feasibility:

Pathway 1: Joint Curriculum Development for Cross-Border Industries

Goal: Develop curricula for sectors critical to regional economic integration, addressing mutual skills gaps.

Implementation Steps: Establish a Sino-Mongolian VET Curriculum Working Group: Co-chaired by MES (Mongolia) and MOE (China), with representatives from TVECC, Chinese enterprises operating in Mongolia (e.g., China National Gold Group), and Mongolian industry associations.

Prioritize Target Sectors: Focus on three cross-border industries. Cross-Border Logistics: Align with CMREC infrastructure projects; integrate customs procedures, multilingual communication, and green logistics.

Green Mining Technology: Combine China's green mining technology with Mongolia's mining sector knowledge; include environmental management and safety standards.

Renewable Energy: Address Mongolia's "Vision-2050" target of 30% renewable energy by 2030; develop curricula for solar/wind installation and maintenance.

Design CBT-Modular Curricula: Adapt Mongolia's CBT model to include China's industry-education integration elements (e.g., enterprise projects, virtual training platforms).

Pilot and Scale: Pilot curricula in 5 Mongolian and 5 Chinese VET institutions (2025–2026); scale to 20 institutions per country by 2028 with joint certification.

Expected Outcomes: Increased employability of VET graduates in cross-border

sectors (target: 80% employment rate within 6 months); reduced reliance on foreign workers by Chinese enterprises in Mongolia (target: 30% reduction in foreign labor recruitment for skilled positions).

Pathway 2: Establish a Mongolian-Sino VET Cooperation Center

Goal: Create a hub for teacher exchange, resource sharing, and pilot projects.

Implementation Steps: Co-locate at the Graduate University of Mongolia (Ulaanbaatar) and a Chinese "Double High" school (e.g., Tianjin Vocational and Technical Normal University); Annual exchanges of 50 Chinese dual-qualification teachers and 50 Mongolian CBT instructors; Chinese teachers train Mongolians in practical skills, while Mongolians share CBT expertise; Develop a bilingual online platform with China's VET MOOCs, virtual training simulations, and Mongolia's NOS and CBT modules; provide access to rural VET institutions in both countries; Partner with Chinese enterprises in Mongolia (e.g., Sinohydro) to launch 10 pilot apprenticeship programs, providing Mongolian students with work-based learning opportunities; Secure joint funding from MES, MOE, and Chinese enterprises ($5 million/year for 5 years).

Expected Outcomes: Improved teacher quality; enhanced access to digital resources; increased work-based learning opportunities in Mongolia.

Pathway 3: Cultural Heritage-Focused VET Collaboration

Goal: Preserve Mongolia's cultural heritage while creating economic opportunities.

Implementation Steps: Focus on Mongolia's unique cultural industries, develop curricula for cashmere production and organic livestock farming, combining Mongolia's traditional knowledge with China's textile technology; Eco-Tourism Management: Integrate Mongolia's cultural heritage with China's tourism marketing and service training; Joint Programs: Establish 3 joint VET programs (2 in Mongolia, 1 in Inner Mongolia, China) offering dual certifications (Mongolian NOS and Chinese vocational qualifications); Connect graduates to Chinese and Mongolian enterprises in tourism and textiles, creating a cross-border supply chain for cultural products.

Expected Outcomes: Preservation of Mongolian cultural heritage; increased employment in rural areas; deepened cultural ties between the two countries.

6.2 Conclusion

Sino-Mongolian VET cooperation has the potential to transform both countries' VET systems from parallel national endeavors into an integrated regional ecosystem. By leveraging Mongolia's demand-driven agility and China's strategic scale, these collaborative pathways can address mutual challenges, enhance regional skills development, and support economic integration under the CMREC and BRI. For policymakers, this study demonstrates that cross-country VET collaboration—grounded in empirical comparative analysis and contextual understanding—can drive inclusive, sustainable development.

The success of these pathways depends on three key factors: (1) strong political commitment from both governments; (2) equal partnership and mutual respect for each country's VET model; (3) sustained funding from public and private sectors. With these factors in place, Sino-Mongolian VET cooperation can serve as a model for regional education collaboration in Central Asia and beyond.

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