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Research on the Current Status and Countermeasures of Supply-Demand Matching in Vocational Skills Training for the Construction Industry

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Abstract

This paper aims to conduct an in-depth analysis of the supply-demand alignment in vocational skills training for the construction sector. Research findings reveal imbalances in skill requirements, time availability, and geographical distribution, attributable to inadequate information communication, outdated training content, and insufficient policy support. Corresponding recommendations include enhancing information exchange, optimizing training programs, and strengthening policy frameworks. The study identifies three primary causes of these disparities: ineffective information flow, delayed curriculum updates, and insufficient governmental backing. To address these issues, the paper proposes concrete measures, including improved communication channels, updated training curricula, and enhanced policy incentives—to improve the alignment between training demands and supply, thereby providing actionable insights for talent development in the construction industry.

Keywords

Architecture; Vocational skills training; Supply-demand matching; Training strategies BIM; prefabricated construction

1. Introduction

1.1. Research Background

As a vital pillar of the national economy, the construction industry plays an irreplaceable role in driving economic growth, promoting social employment, and enhancing infrastructure development. In recent years, the rapid advancement of the sector, particularly in new industrialized construction and green building initiatives which has significantly increased demand for skilled professionals. However, the industry currently faces a severe imbalance between talent supply and

demand, as traditional vocational training systems struggle to meet the need for high-quality skilled personnel. In this context, strengthening vocational skills training in construction has become not only an essential requirement for industry development but also a critical step toward transforming and upgrading the sector. By improving workers' professional skills and occupational competence, vocational training effectively addresses the shortage of skilled talent in the construction industry, providing a solid talent foundation for its sustainable development.

1.2. Problem Statement

While vocational skills training in the construction sector holds significant theoretical importance, a widespread imbalance between supply and demand persists in current practice. On the one hand, construction enterprises face growing urgency in recruiting highly skilled professionals, particularly in emerging technologies such as prefabricated construction and BIM applications, yet existing training systems struggle to provide corresponding skill support. On the other hand, training institutions' curriculum design and teaching content often lag behind industry demands, preventing training outcomes from being directly translated into corporate productivity. Furthermore, uneven distribution of training resources and ineffective information communication exacerbate this supply-demand imbalance. Such disparity not only hinders construction enterprises' production efficiency and technological innovation capabilities but also impedes the career development trajectories of skilled professionals, necessitating systematic research to develop targeted solutions.

1.3. Research Objectives

This study aims to comprehensively analyze the current state of supply-demand alignment in vocational skills training for the construction sector, delve into the underlying causes of supply-demand imbalances, and propose practical recommendations to inform the optimization of industry training systems. Specifically, the research begins by examining the actual needs of construction enterprises and comparing them with the teaching offerings of training institutions, identifying gaps and their root causes. Building on this foundation, the study focuses on enhancing supply-demand alignment through measures such as improving information communication, refining training content, and strengthening policy support. Ultimately, this research seeks to provide theoretical foundations and practical guidance for cultivating skilled professionals in the construction industry, thereby facilitating its high-quality and sustainable development.

2. Literature Review

2.1. Theories Related to Talent Demand in the Construction Industry

As a vital pillar of the national economy, the construction industry exhibits

multi-tiered and diverse talent demands. [3]Research on cultivating skilled workers in the sector reveals three primary categories: traditional construction workers, technical workers, and interdisciplinary professionals. Traditional workers primarily handle physically labor-intensive tasks, while technical workers possess specialized knowledge and skills—such as site supervisors and cost estimators. Interdisciplinary professionals combine technical expertise with managerial capabilities, playing a crucial role in the industry's transition toward intelligent and sustainable development. Furthermore, reforms in civil engineering education models highlight that talent requirements extend beyond technical skills to encompass professional ethics and innovation capabilities. These insights provide robust theoretical foundations for analyzing the alignment between vocational training supply and demand in the construction sector.[6][7]

2.2. Current Research Status on Vocational Skills Training

Vocational skills training serves as a crucial pathway to enhance workforce competence, with extensive research conducted by scholars both domestically and internationally. In China, studies on vocational education programs supporting the transformation and upgrading of the service and construction industries, such as "Current Status Review and Enhancement Strategies for Vocational Education in Construction"with highlight structural supply-demand imbalances in construction worker training, manifested through excessive demand versus insufficient supply, and rapid expansion of training capacity coupled with quality stagnation. [2]Meanwhile, research on integrating science and education to empower vocational training in prefabricated construction emphasizes that existing programs fail to adequately address emerging job requirements, necessitating reforms through industry-education collaboration and interdisciplinary approaches. The analysis of talent demand alignment between green building sectors and vocational program offerings further explores talent development challenges, advocating for optimized curriculum designs to better meet industry needs. International studies, particularly focus on innovative training models; for instance, the feasibility of implementing modern apprenticeship systems in construction has been demonstrated as an effective skills-training methodology. Overall, domestic and international research provides robust theoretical foundations and practical references for vocational skills training in the construction sector.[1][5]

2.3. Current Research Status on Supply-Demand Matching

While supply-demand matching research has been conducted across various industries, studies specifically focusing on vocational skills training in the construction sector remain insufficient. Analysis of current educational practices and development trajectories in the construction industry reveals challenges such as uneven resource distribution and ineffective information flow, hindering effective

alignment between supply and demand. Examinations of the feasibility of implementing modern apprenticeship programs in construction have explored potential solutions for supply-demand matching from a training model perspective; however, most existing research remains at the theoretical level without empirical validation. Additionally, although studies analyzing the alignment between talent demands in the green building sector and vocational program offerings have made preliminary progress, their scope remains limited and fails to comprehensively cover other subsectors within the industry. Future research should therefore deepen systematic analyses of supply-demand matching in construction vocational training, particularly by incorporating emerging industry trends to develop more targeted solutions.[7][8]

3. Research on the Current Supply and Demand Situation of Vocational Skills Training in the Construction Sector

3.1. Research on Construction Enterprise Needs

3.1.1. Job Skill Requirements

Through questionnaire surveys and in-depth interviews with construction enterprises, the study revealed diverse skill requirements across different roles. Taking construction supervisors as an example, their competencies encompass not only mastery of traditional construction techniques but also proficiency in advanced industrialized building technologies such as prefabricated construction operations. Additionally, cost estimators must demonstrate expertise in utilizing BIM technology for cost management and project measurement, reflecting new vocational demands arising from the industry's digital transformation. In the green building sector, enterprises' skill requirements have expanded to include specialized knowledge in energy-saving technologies and environmentally friendly material applications. These findings indicate that with rapid industry development and technological upgrades, traditional skills can no longer meet modern construction enterprises' practical needs, making the shortage of emerging technical competencies an urgent issue requiring resolution.[4][11]

Table 1 Research Data Table on the Demand for Emerging Technical Skills in Key Positions within Construction Enterprises					
Job Title	Proportion of traditional basic skill requirements	Proportion of demand for skills related to emerging technologies	Core Emerging Skills Requirements	The company considers that the proportion of employees lacking the required skills for this position is...	data sources
Construction Crew	91.8%	82.3%	Installation of prefabricated components; control of industrialized construction processes; operation and maintenance at smart construction sites.	85.5%	This survey involved 62 construction companies.
Cost Estimator	89.2%	87.1%	BIM modeling, BIM quantity measurement, dynamic cost control using BIM, and application of digital cost estimation platforms	82.7%	
Quality Controller	90.5%	76.4%	Quality acceptance of prefabricated buildings, energy efficiency testing for green buildings, and application of digital quality control systems	79.3%	
safety officer	93.1%	71.2%	Smart construction site safety monitoring, AI-based identification of potential safety hazards, and safety management for prefabricated construction projects	75.8%	
technical director	88.7%	90.3%	Full-process application of BIM technology, technical solutions for prefabricated buildings, integration of green building technologies, and digital project management	88.2%	
project manager	85.3%	92.6%	End-to-end lifecycle management of digital projects; implementation of BIM technology; coordinated planning for prefabricated projects; green construction management.	90.1%	
Special Position for Green Building Projects	65.2%	94.7%	Building energy-efficient design, application of new environmentally friendly building materials, energy consumption control in green construction practices, and carbon emission calculation	92.3%	

Table 1. Research Data Table on the Demand for Emerging Technical Skills in Key Positions within Construction Enterprises

Research data reveal that construction enterprises exhibit distinct hierarchical patterns in their demand for skilled professionals. For instance, in construction management roles, beyond fundamental technical competencies, companies place greater emphasis on employees' organizational coordination skills and on-site problem-solving abilities. Similarly, for high-skilled positions such as project managers, employers expect candidates to possess interdisciplinary knowledge and strong innovation capabilities to address technical challenges and managerial complexities in complex projects. These findings provide crucial insights for analyzing the supply-demand alignment in vocational skills training within the construction sector, while highlighting deficiencies in the current training system regarding skill coverage.

Table2 Research Questionnaire on the Hierarchical Characteristics of Skill Requirements for Positions in Construction Enterprises				
Position Level	Core Position	Core Competency Dimension	Proportion of enterprise demands	Capacity Priority
Basic Technology Position	Construction Supervisor, Quality Inspector, Safety Officer	On-site technical proficiency and practical skills	94.2%	1
	Construction Supervisor, Quality Inspector, Safety Officer	Ability to handle unexpected issues that arise on-site	88.7%	2
	Construction Supervisor, Quality Inspector, Safety Officer	Organizational coordination and communication skills within teams	81.3%	3
	Construction Supervisor, Quality Inspector, Safety Officer	Basic Application Capabilities of Digital Tools	76.5%	4
Intermediate Management Position	Technical Lead, Construction Supervisor	Cross-disciplinary technical coordination capability	90.3%	1
	Technical Lead, Construction Supervisor	Optimization of Technical Solutions and Innovation Capabilities	84.6%	2
	Technical Lead, Construction Supervisor	Project's capability in managing technical risks	82.1%	3
	Technical Lead, Construction Supervisor	The ability to effectively implement BIM technology in practical applications	79.5%	4
Advanced Project Position	Project Manager, Project Director	Interdisciplinary knowledge base and comprehensive coordination skills	90.3%	1
	Project Manager, Project Director	Overcoming challenges in complex projects and fostering innovation capabilities	84.6%	2
	Project Manager, Project Director	Comprehensive management capabilities throughout the entire lifecycle of digital projects	77.5%	3
	Project Manager, Project Director	Ability to coordinate cross-party resources and conduct business negotiations	76.2%	4

Table 2. Research Questionnaire on the Hierarchical Characteristics of Skill Requirements for Positions in Construction Enterprises

3.1.2. Expected Talent Competencies

When recruiting and developing skilled professionals, construction enterprises focus not only on their technical expertise but also set clear requirements for

professional knowledge and professional competence. Research indicates that companies expect skilled personnel to systematically master core areas such as construction engineering technologies, project management, and relevant laws and regulations, while possessing interdisciplinary knowledge to meet the diverse demands of the construction industry. For example, in the prefabricated construction sector, employers expect practitioners to not only be proficient in construction techniques but also understand structural design principles and information management processes, thereby enhancing their ability to participate throughout the entire project lifecycle.

In terms of professional competence, construction enterprises place particular emphasis on employees' teamwork spirit, sense of responsibility, and professional ethics. These soft skills are considered crucial for ensuring efficient project execution. Additionally, companies demand strong lifelong learning capabilities from their staff, requiring skilled professionals to proactively adapt to industry technological advancements and master new technologies and processes through continuous education. This finding indicates that vocational skills training in the construction sector should not only focus on skill acquisition but also strengthen professional ethics education to comprehensively enhance employees' overall competencies, thereby meeting enterprises' demand for high-quality skilled talent.

3.2. Research on Training Institution Supply

3.2.1. Course Structure

Regarding the curriculum design for vocational skills training in the construction sector, this study conducted a detailed survey of multiple vocational colleges and private training institutions. The findings indicate that current training programs primarily focus on traditional construction skills such as building construction technology and project cost management, while coverage of emerging technologies which including prefabricated construction, BIM technology, and green buildings that remains limited. For instance, some training institutions fail to update their course content promptly to reflect the latest advancements in the construction industry, resulting in a significant gap between the knowledge acquired by trainees and actual job requirements.

Nevertheless, a small number of training institutions have begun offering course modules related to new industrialized construction practices. For instance, some vocational colleges have incorporated prefabricated building construction technologies into their curricula and developed corresponding skill training packages under the "1+X" certification system, aiming to provide learners with more comprehensive skill support. However, due to the lack of unified teaching standards and effective resource integration mechanisms, the actual instructional outcomes of these courses vary significantly. Overall, current training programs still fall short in both coverage scope and update frequency to fully meet the demand for skilled

professionals among construction enterprises.

3.2.2. Allocation of Teaching Resources

Regarding the allocation of teaching resources, this study focused on evaluating training institutions' faculty qualifications, practical training facilities, and textbook development. The survey revealed significant deficiencies in many institutions' teaching staff, particularly in emerging technology fields where there is a severe shortage of "dual-qualified" instructors with practical experience. For instance, although some institutions offer courses related to prefabricated construction, the lack of hands-on experience among instructors often results in curriculum content that emphasizes theoretical instruction rather than effectively enhancing students' practical skills.[9][10]

Furthermore, the development and utilization of practical training facilities remain concerning. Due to funding constraints, some training institutions have failed to equip themselves with training equipment that matches advanced industry technologies, making it difficult for trainees to gain authentic hands-on experience. Regarding textbook development, existing materials generally suffer from outdated content and limited practicality, particularly in fields such as green buildings and intelligent construction technologies, where high-quality teaching resources are scarce. These issues not only hinder the improvement of training quality but also undermine the overall effectiveness of vocational skills training in the construction sector, thereby exacerbating the supply-demand imbalance.

4. Analysis of the Supply-Demand Imbalance in Vocational Skills Training for the Construction Sector

4.1. Imbalanced Skill Requirements

The rapid development of the construction industry has raised higher demands for skilled professionals. However, a significant gap exists between the actual skill requirements of construction enterprises and the competencies cultivated by training programs. On the one hand, with the emergence of emerging fields such as prefabricated construction and green buildings, there is growing demand for professionals proficient in advanced technologies like BIM and intelligent construction management. On the other hand, vocational training curricula remain largely rooted in traditional construction techniques and skill standards, failing to keep pace with industry technological advancements, which results in a disconnect between training content and practical needs. For instance, although energy-saving technologies and eco-friendly materials have become widely adopted in green buildings, training programs still inadequately address these areas, falling short of meeting enterprises' requirements for highly skilled technical personnel. Furthermore, some training institutions overemphasize theoretical knowledge while neglecting practical skill development, exacerbating the imbalance in

competency demands.[8][9]

From the perspective of supply-demand alignment, this imbalance in skill requirements not only undermines construction companies' efficiency in talent acquisition but also limits the effectiveness of vocational skills training. Research indicates that due to mismatches between training content and corporate needs, many construction firms must allocate substantial resources for secondary training after recruitment to address employees' skill gaps. This phenomenon not only increases operational costs but also delays the industry's overall technological advancement. Therefore, bridging the gap between the actual skill demands of construction enterprises and the curriculum offerings of training institutions has become a critical issue for improving the alignment between vocational skills training supply and demand.

4.2. Time Matching Imbalance

The scheduling of vocational skills training in the construction industry conflicts with both construction project cycles and employees' working hours, constituting another major factor contributing to supply-demand imbalance. The sector is fundamentally project-driven, with corporate operations typically aligned with specific project timelines, while fixed training schedules often clash with production plans. For instance, during peak construction periods for large public building projects, companies must deploy all staff to operational tasks, making it difficult to allocate personnel for centralized vocational training. Conversely, during project intervals when companies have available training slots, some training institutions fail to synchronize their course schedules accordingly, resulting in wasted training resources and low utilization rates.

Furthermore, the nature of work in the construction industry exacerbates the imbalance between working hours and training schedules. On-site workers typically face high-intensity tasks and irregular working hours, making it difficult for them to allocate additional time for training activities outside their regular duties. Meanwhile, some training institutions fail to adequately address trainees' need for flexible scheduling in their curriculum design, continuing to rely on traditional centralized teaching methods, which further diminishes employees' motivation to participate. Research indicates that conflicts between training schedules and work hours lead many construction workers to adopt a negative attitude toward vocational skills training, resulting in a vicious cycle of low participation rates and poor outcomes. Therefore, optimizing training schedules to better align with construction companies' production cycles and employees' work rhythms has become a critical issue for improving the alignment between training supply and demand.

4.3. Imbalanced Regional Distribution

The uneven regional distribution of vocational training resources in the construction sector, combined with varying demands from construction enterprises across different areas, has led to supply-demand mismatches in certain regions. In China, the development level of the construction industry exhibits significant regional disparities: coastal eastern regions and economically developed cities boast larger industry scales and an urgent need for highly skilled technical professionals. Although these areas possess relatively abundant training resources, intense competition results in high training costs that many small and medium-sized enterprises cannot afford. In contrast, central and western regions suffer from relatively scarce training resources, while the teaching quality and service capabilities of local training institutions are generally weaker, failing to meet the practical needs of local construction enterprises.

Furthermore, the differentiated demands of construction enterprises across regions have exacerbated regional distribution imbalances. For instance, in major labor-importing provinces like Guangdong Province, the development of the construction workforce exhibits unique characteristics, with heightened needs for skill enhancement among migrant workers. However, due to uneven distribution of training resources, these workers often struggle to access high-quality vocational skills training opportunities. Meanwhile, although construction enterprises in economically underdeveloped regions have potential demand for skills training, this need remains unmet due to insufficient training resources. Research indicates that regional distribution disparities not only hinder overall skill improvement in the construction industry but also widen interregional development gaps. Therefore, rational allocation of training resources and narrowing the supply-demand gap between regions have become critical strategies for enhancing the alignment between vocational skills training supply and demand in the construction sector.[6]

5. Strategies to Improve the Match Between Supply and Demand in Vocational Skills Training for the Construction Sector

5.1. Strengthening Information Communication

5.1.1. Establish an information sharing platform

Establishing an information-sharing platform between construction enterprises and training institutions is a key initiative to address the supply-demand mismatch. Currently, significant information asymmetry exists between these entities, leading to a disconnect in skill training needs and offerings. By creating an integrated platform that facilitates demand posting, course recommendations, and resource consolidation, effective information exchange and resource alignment can be achieved.[11]Such a platform not only provides construction companies with clear channels for publishing talent requirements but also enables training institutions to stay updated on industry trends and evolving skill demands, thereby optimizing curriculum design and teaching content. Moreover, implementing this platform

proves highly feasible, requiring minimal technical complexity while leveraging existing internet technologies and big data analytics to enhance matching accuracy and efficiency. Therefore, advancing this platform will not only mitigate current supply-demand imbalances but also lay a solid foundation for the sustainable development of vocational skills training in the construction sector.

5.1.2. Regular Communication Mechanism

Beyond information-sharing platforms, establishing regular face-to-face communication mechanisms such as periodic exchange meetings serves as a vital approach to strengthen collaboration between construction enterprises and training institutions. These regular exchange mechanisms, through organizing seminars and symposiums involving representatives from both parties that facilitate in-depth dialogue and cooperation. Such mechanisms not only enhance mutual understanding of each other's needs but also enable the development of practical solutions for specific skills training challenges. For instance, construction enterprises can share real-world skill gaps encountered during operations during these meetings, allowing training institutions to adjust their teaching plans and curriculum content accordingly. Furthermore, the implementation of modern apprenticeship programs offers innovative insights for these exchange mechanisms, as direct interaction between mentors and apprentices more effectively imparts practical skills and professional competencies. Therefore, establishing regular communication channels not only improves the relevance of training content but also strengthens collaborative relationships between construction enterprises and training institutions, thereby driving continuous improvement in supply-demand alignment.

5.2. Optimize training content

5.2.1. Stay abreast of industry developments

With the rapid development of the construction industry, the continuous emergence of new technologies and techniques has raised higher demands for vocational skills training. Training institutions should closely monitor industry trends and promptly integrate emerging technologies into their curricula to ensure that training content remains cutting-edge and practical. For instance, the widespread adoption of innovative construction methods such as prefabricated buildings and green buildings requires workers to master advanced skills in modular construction and energy-efficient technologies.[12] However, many training programs still focus on traditional construction techniques without timely updates to meet evolving industry needs. To address this, institutions should establish dynamic industry monitoring mechanisms to regularly collect and analyze technological trends, translating them into tailored training modules and instructional materials. Furthermore, the integration of science and education provides crucial support for

optimizing training content. By combining practical production and research experiences, training institutions can develop more targeted and applicable curriculum systems that better meet the actual needs of construction enterprises.

5.2.2. Personalized Course Design

In optimizing training content, personalized curriculum design serves as a crucial approach to enhancing training relevance. Given the significant variations among construction enterprises in business scope, technical capabilities, and talent requirements, standardized training programs often fail to meet their actual needs. Therefore, training institutions should provide customized course solutions tailored to specific corporate requirements. For instance, specialized construction management courses can be designed for large public building projects, while targeted training on energy-efficient and sustainable technologies is suitable for green building initiatives. Moreover, tiered and phased training models further enhance curriculum flexibility and adaptability. Basic skills workshops can be offered for entry-level workers, while advanced skill enhancement courses are tailored for experienced technicians. This approach not only better addresses the diverse needs of construction enterprises but also significantly improves training effectiveness and participants' professional competencies.

5.3. Improving Policy Support

5.3.1. Policy Development and Guidance

The government plays a pivotal role in vocational skills training for the construction sector, as its policy-making and guidance capabilities directly influence the alignment between training supply and demand. Currently, China's policy framework for construction-related vocational training remains inadequate, particularly lacking in targetedness and practical implementability. To address this, the government should introduce more focused and actionable policies that clarify training objectives and development directions, providing clear guidance to training institutions and construction enterprises. For instance, establishing detailed vocational skill standards could standardize training content and quality requirements, thereby enhancing overall training quality. Additionally, the government should actively promote deeper integration between the construction industry and vocational education, encouraging corporate participation in training system development through policy incentives such as tax benefits and financial subsidies to encourage investment in employee skills training. The implementation of these policies will not only facilitate the orderly growth of construction vocational training but also provide robust institutional safeguards for talent cultivation in the industry.

5.3.2. Regulation and Incentives

While enhancing policy support, the government must strengthen oversight of training processes and quality while establishing corresponding incentive mechanisms to encourage active participation from enterprises and training institutions. First, the government should establish a comprehensive training quality assessment system that conducts regular inspections and third-party evaluations to comprehensively monitor training institutions' curriculum design, teaching quality, and practical training outcomes, ensuring content aligns with industry standards and corporate needs. Second, the government can create dedicated reward funds or subsidy programs to recognize and support enterprises and training institutions demonstrating outstanding performance in vocational skills training, thereby motivating their involvement. For instance, companies successfully cultivating high-quality skilled professionals could receive financial incentives or preferential policies, while training institutions achieving significant breakthroughs in innovative training models could gain enhanced resource allocation and platform support. By strengthening regulatory oversight and incentive measures, the government not only improves overall training quality but also fosters a competitive market environment, thereby providing robust safeguards for matching supply and demand in construction vocational skills training.

6. Pathways for Vocational Education Institutions to Enhance Training Services in Support of the Construction Industry's Transformation and Upgrading

The structural supply-side contradictions in vocational skills enhancement training for construction workers necessitate that academic education and vocational training further align their objectives and work in synergy [4]. The collaborative approach between the new round of vocational education reform and vocational skills enhancement training for construction workers must be comprehensive and multi-dimensional, advancing holistically across four key dimensions: certification systems, teaching reforms, educational institutions, and conceptual frameworks. This collaborative pathway is illustrated in Figure 1.

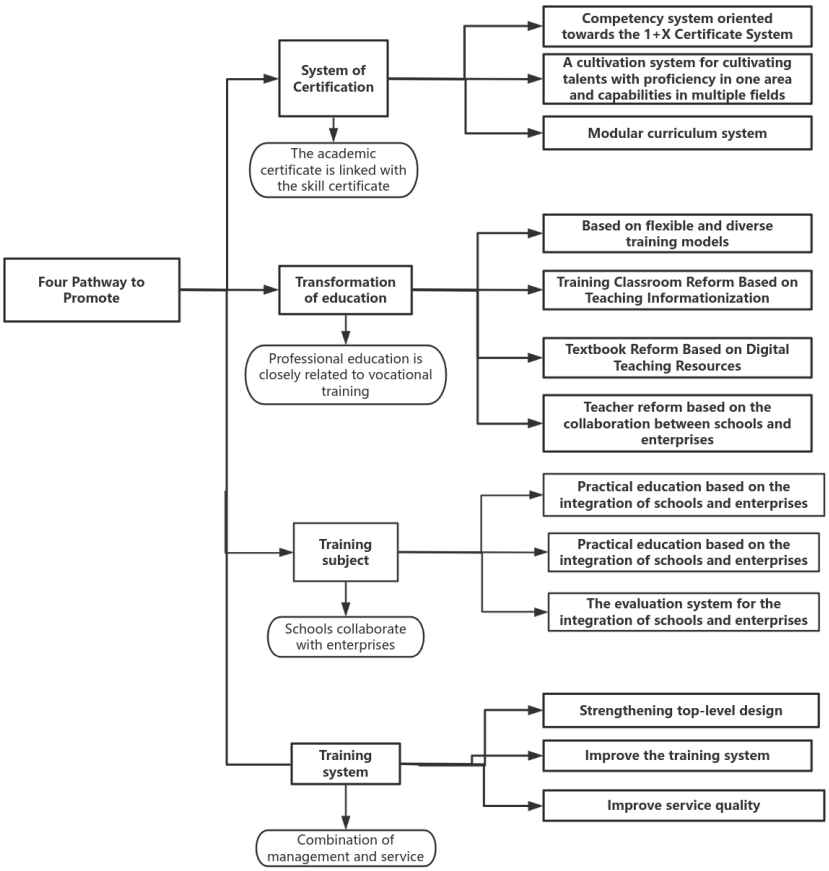


Figure 1. Synergistic Pathway Between Vocational Education Reform and Skill Enhancement Training for Construction Workers

In the reform of vocational education, vocational training receives significant attention and must be advanced in tandem with skill enhancement programs for construction workers. This is implemented across four dimensions: the certification system, teaching reforms, educational institutions, and operational mechanisms.

6.1. Establish a certification system that integrates academic degree certificates with vocational skill certificates

Develop a 1+X certification competency framework, enhance the multi-skilled training system, and redesign the modular curriculum structure.

6.2. Advancing the teaching reform that integrates professional education with vocational training

Implement flexible training models to advance information technology-driven classroom teaching reforms, textbook reforms supported by digital resources, and the establishment of collaborative teacher teams involving government, industry, schools, and enterprises.

6.3. Establish a training entity that facilitates deep integration between schools and enterprises

Promote the development of practical education, quality education, and evaluation systems that integrate schools and enterprises.

6.4. Establish a training mechanism that integrates management with services

Strengthen top-level design, improve the training system, and enhance service quality.

7. Conclusion

7.1. Summary of Research Findings

This study reveals an imbalance between supply and demand in vocational skills training for the construction sector regarding skill requirements, time alignment, and geographical distribution. The causes include inadequate information communication, lagging updates to training content, and insufficient policy support. The study proposes countermeasures such as enhancing information exchange, optimizing training content, and strengthening policy support. These findings provide a theoretical foundation and practical guidance for improving the alignment between supply and demand in construction vocational skills training, facilitating the effective cultivation of skilled professionals and meeting the industry's rapidly growing demand for high-quality talent. Future research could focus on integrating new technologies into training systems, aligning training content with the industry's green transformation needs, and promoting international cooperation in vocational skills training.

7.2. Research Outlook

Although this study has achieved certain results in matching supply and demand for vocational skills training in the construction sector, there remains considerable room for further exploration. Firstly, with the rapid technological advancements in the construction industry, the application of new technologies such as artificial intelligence, big data, and the Internet of Things will profoundly impact vocational skills training. These technologies not only optimize the design of training content but also enhance practical training effectiveness through methods like virtual simulation, thereby narrowing the skills gap between supply and demand. Therefore, future research should focus on how to effectively integrate these technologies into training systems and evaluate their actual impact on improving training quality.

Secondly, the green transformation and sustainable development of the construction industry have imposed new demands on skilled professionals. For instance, the demand for expertise in low-carbon construction, energy conservation,

and environmental protection is growing steadily, requiring training institutions to place greater emphasis on cultivating environmental awareness and technical competencies in their curriculum design. Future research could further explore how policy guidance and technological support can align training content with the industry's green transition needs.

Furthermore, international cooperation and exchange in the construction industry amid globalization have brought both new challenges and opportunities. The growing number of multinational projects requires construction firms to employ skilled professionals with cross-cultural communication capabilities and a global perspective. Therefore, future research could focus on how to conduct vocational skills training through international collaboration to meet the workforce demands of construction enterprises in a globalized context.

In summary, research on the alignment between supply and demand in vocational skills training for the construction sector is an evolving field. Moving forward, it is essential to integrate industry trends and technological advancements, continuously exploring new research directions and methodologies to ensure a robust talent foundation for the high-quality development of the construction industry.

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