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Systematic Training to Improve the Transformation of Migrant Workers into Industrial Workers within the Construction Sector in China

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Abstract: The transformation and modernization of the construction industry in China has introduced higher knowledge, skill, literacy, and innovation ability requirements for construction workers. Subsequently, more than 53 million migrant workers, comprising the main workforce of China's construction sector, require transitioning into the roles of high-quality and highly skilled construction industry workers. As an important means to improve human capital, systematic training is the key method for the development of migrant workers into industrial workers within China's construction industry. This paper constructs and verifies the theoretical model underlying the operating mechanism of the training system for migrant workers within the construction industry. As such, a structural equation model was established for the mechanism of transforming construction migrant workers into industrial workers. The results show that as the driving forces, the government and construction industry play important roles in promoting the operation of the training system for migrants in the construction industry as they provide internal vocational and social training. Construction enterprises have a direct role in promoting professional literacy training as one of the direct beneficiaries of construction workers' training. Therefore, this paper provides a critical reference for policy promoting the transformation of migrant workers into industrial workers through appropriate training within China's construction industry.

Keywords: construction industry; migrant workers; industrial workers; training; structural equation model

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1. Introduction

At present, the construction industry in China is at an important stage of the transformation from a traditional, labor-intensive construction industry into a modernized one. This modernization is embodied in the deep integration of building industrialization and information technology [1], introducing higher knowledge, skill, innovation ability, and cultural literacy requirements for first-line construction workers and creating an urgent need for many high-quality, highly skilled industry workers. However, China's traditional construction industry relies on migrant workers as the main workforce [2]. According to the 2022 Migrant Workers Monitoring Survey Report, the construction industry, comprising 52.32 million migrant workers, heavily relies on manual labor and traditional technical skills, lagging in the application of information technology [3]. Although some mega-construction enterprises are implementing the development of technology-led intelligence, it is difficult to realize the transformation and upgrading of the construction industry due to its traditional labor-intensive development history. Since China's economy has entered

the new normal, the upgrading of industrial structures has accelerated and the demand for human capital by construction enterprises also focuses on labor quality [4]. In order to train migrant workers in the construction industry, it is necessary to first solve the dilemma of the structural human capital shortage within markets in China [5].

From the theoretical and practical perspectives, systematic training within different industries is critical. However, the transformation of the construction industry's migrant workers into industrial workers is probabilistic, with problems that are difficult to quantify. Training according to the principles of the human capital theory and labor economics is the most direct and effective way to resolve the problem of probability, which is difficult to quantify in the process of transforming construction industry migrant workers into industrial workers [6]. However, construction workers in China still have a low level of education, and the skill requirements for an update of the construction industry have increased. According to the Migrant Workers Monitoring Survey Report from 2004 to 2022, despite the slight increase in the proportion of workers with a college or higher education, the average years of education changed insignificantly among migrant workers in the construction industry, with a growth rate of only 1.2%.

The government has recognized the importance of training and some support policies were established in recent years, however, with no clear effect [7]. Many problems still exist, such as the low skill level of migrant workers, low enthusiasm toward training participation, a shortage of training funds, an unclear main body of work organization, and the low willingness of construction enterprises to undertake training responsibilities [8]. This is because China's construction industry has yet to form a scientific training system to transform the construction industry's migrant workers into industrial workers. After formal or informal training, the comprehensive literacy of migrant workers is not significantly improved. Therefore, it is necessary to rethink and improve the existing training policy mechanisms, build a scientific and effective training system for migrant workers in the construction industry, improve the human capital and labor productivity of the construction industry, and realize the goal of transforming migrant workers into industrial workers.

Scholars from all over the world have conducted research on the transfer of the surplus rural labor force and its human capital development. Adam and Ravenstein proposed that the rational difference between the labor market supply and demand was the main reason for labor transfer [9] and clarified that the proficiency and judgment of labor skills necessarily restricts the ability and level of labor, while the proficiency of labor skills can be improved through education and training [10,11]. Schultz proposed that human capital was embodied in the workers in terms of the sum of values of the workers' knowledge, technical level, ability to work, and health status [12,13]. In the process of human capital formation, human capital investment is the most valuable, and education and training are the most important forms of human capital investment. According to Gary, training is a process that provides employees with or imparts the basic skills they need to perform their jobs [14], while Tyro et al. systematically proposed the principles of training and its implementation system [15]. In his research on the human capital development of practitioners in the construction field, Johari investigated the factors hindering construction workers' skills training through unorganized interviews and brainstorming methods, proposing steps to make the training program more attractive and setting up a model of a skill training plan for construction workers that can be successfully applied in any developing economy (e.g., India) [16].

With the urgent need for migrant workers in the construction industry to be transformed into industrial workers, domestic research has focused on the training of migrant construction workers, reporting on its gradual increase. The Research Group of the Development Research Center of the State Council of China proposed that in the training of migrant workers, issues such as enrollment management, student registration management, training institution construction, migrant worker training funding policies, and supervision should be addressed [17]. Li et al. presented the current situation and analyzed the problem of the labor shortage within China's construction industry from a macro and

micro perspective [18]. Zhang et al. predicted the trend of the labor supply and demand in the construction industry and found that the retirement rate and GDP growth rate of construction industry employees are the most sensitive to changes in the number of employees [19]. Ren analyzed the promoting effect of labor quality on economic growth, indicating that in the context of the gradual disappearance of the population dividend, the construction industry urgently needs to pay attention to the improvement of labor quality to achieve industry transformation and upgrading [20]. Zhao et al. analyzed the obstacles and countermeasures for the skills training of migrant workers in the construction industry from three perspectives: the policy system, the construction enterprises, and the migrant workers in the construction industry [21].

The present research on the training of migrant workers in the construction industry widely relates to different levels of training policies, models, status quo, funds, and other issues. However, it is limited to the field of vocational skills training of migrant workers in the construction industry without a systematic perspective. Furthermore, analyses combining high-quality qualitative and quantitative approaches are still needed. Therefore, the seed germination theory is introduced to reveal the inherent law of the systematic training of migrant workers in the construction industry in this paper. Given that a closed correlation exists between the various factor variables, as well as the difficulty of direct measurement, it is challenging to directly use traditional statistical methods for an effective analysis. This paper applies the structural equation model (SEM) to conduct a verification analysis of the training system and compensate for the lack of traditional paradigms.

The innovative contribution of this study to the existing knowledge lies in the following three aspects: first, this study fills the gap in the systematic training of migrant workers within China's construction industry. In the process of China's vigorous promotion of industrialization, the transformation of the construction industry is imminent. The weakest link in this transformation is the improvement of the quality of front-line workers. The modernization of the construction industry has led to the deep integration of construction industrialization and digitalization, and there is an urgent need for a large number of high-quality and highly skilled construction industry workers as the support. This study fills the gap in the research filed by comprehensively discussing how to train migrant workers to become competent industrial workers suitable for the development needs of the industry.

The second point of innovation stems from the research perspective. This study considers the training of migrant workers in the construction industry from the perspective of the system theory, and the systematic view of the training of migrant workers in the construction industry is not limited to the traditional professional training. Due to the division of multiple sectors, fragmentation, and a lack of top-level planning and system construction, traditional training is only a formality and the training effectiveness is so poor that migrant workers retain the same status after training. The training of migrant workers is not an isolated task; rather, it involves citizen training (referring to the training activities for migrant workers in the construction industry to integrate into urban social life, which mainly includes social culture and civilization quality, not vocational skills) at a deeper level, which is a complex and systematic project. Therefore, more scientific and systematic theories and methods are needed to provide guidance.

Finally, in terms of research methods, this study proposes and validates a theoretical model for the operational mechanism of the training system for migrant workers in the construction industry. The potential and observed variables of the dynamic system were determined using an SEM analysis model and the data were collected through questionnaires. Then, an operation mechanism and structural equation model construction of the training system were carried out for migrant workers in the construction industry, employing the measurement of variables, reliability and validity analyses, model hypothesis testing, verification and analysis of results, etc., to explain "how the system operates".

The rest of the paper is arranged as follows. We systematize the training theory in Section 2, and the questionnaire design and data analysis are presented in Section 3.

Section 4 outlines the model modification, and the results and implication are found in Section 5. The final part summarizes the research and proposes future prospects.

2. Systemized Training Hypothesis

To fill the gap in the research on training for migrant workers in the construction industry, this paper establishes 15 hypotheses (H1–H15) based on a literature review to describe the mechanism of the transformation of these migrant workers into industrial workers. The 15 hypotheses are described as follows.

Hypothesis H1. *The driving force of construction enterprises is positively affected by the driving force of the construction industry*.

The gradual disappearance of China's demographic dividend has prompted the traditional construction industry to shift to a modern production management model, characterized by industrialization and standardization [22]. In this context, the production and industrial environments of construction enterprises have undergone tremendous changes. Ke believes that these changes will be transmitted to construction enterprises through industry channels. When construction enterprises receive "stimulus" information from the industry, they will respond according to various favorable and unfavorable changes [23].

Hypothesis H2. *The internal driving force of migrant workers is positively affected by the driving force of construction enterprises*.

Many scholars have researched the mutual influence between construction enterprises and migrant workers. Ke proposed that information transmission also exists between construction enterprises and migrant workers, with enterprises forcing migrant workers to become industrial workers by changing construction methods. This interaction will form new adaptive rules to complete the transformation of construction enterprises and the industrialization of migrant workers. Detsimas researched Australian construction workers' perceptions of enterprise training. The results show that employees in the construction industry are generally aware of the importance of enterprise training in their professional development and consider training a key factor in successfully fulfilling their duties and maintaining their employability [24]. Beginning with the willingness of migrant workers in the Chinese construction industry to change their employers, Wang studied the mobility of migrant workers and pointed out that the daily wages and duration of enterprises have the greatest impact on migrant workers' job changes [25].

Hypothesis H3. *The driving force of social power is positively affected by the driving force of the government department*.

With the continuous development of the urbanization process, a large amount of the surplus labor in rural China was transferred to nonagricultural industries, but the inadequate social security system makes it very unlikely that migrant workers, as marginalized people in the city, can enjoy social security. The migrant workers in vulnerable groups lack relevant social rights protection policies, and the relevant legislation needs to be improved [26]. China's vigorously promoted, government-led, socially coordinated, publicly participatory, and rule-of-law social governance system construction has suggested a new path for promoting the status of migrant workers [27]. In addition, Liu highlighted the close relationship between the current status of migrant workers' management and the reform of the employment system for construction workers, arguing that the improvement of migrant workers' management in the construction industry should be led by the government to reform the labor system and promote the transformation of migrant workers into modern industrial workers [28].

Hypothesis H4. *The internal driving force of migrant workers is positively affected by the driving force of social forces*.

Although migrant workers in the construction industry work in cities, their status is still that of migrants [29]. Ren pointed out that the dual economic system in China's urban and rural areas has prevented migrant workers in the construction industry from receiving equal benefits such as medical care, insurance, and old-age social security [2]. Before the related policies are introduced, the care and active participation of welfare organizations and nongovernmental groups will help migrant workers resolve the life problems and psychological baggage that affect their ability transformation [30].

Hypothesis H5. *Vocational training results are positively affected by the driving force of the construction industry*.

Under the new normal of China's economy, industrial restructuring is the only path for economic transformation and upgrading. China's construction industry has a significant driving role in other industries and has promoted the development of the entire economy [31]. The industrialization and modernization of the construction industry require many high-quality and highly skilled construction industry workers as support. At present, the construction worker group, which is characterized by intensive physical labor and traditional technical skills, is unable to adapt to and meet the transformation and upgrading of the construction industry. It is very important for the whole industry to improve the production efficiency of construction [32]. Ho established a conceptual model of labor supply for the Hong Kong construction industry, which suffers from severe labor and skill shortages, and found three strategies that could bring rapid change to the industry, namely, increasing wages for workers, importing foreign workers, and hiring employers to provide training [33].

Hypothesis H6. *Vocational training results are positively affected by the driving force of construction enterprises*.

In the context of construction industrialization, the construction enterprises' demand for human capital is more focused on the quality of labor, and it is urgent to improve its technical and professional levels by integrating modern industrial workers. Construction companies have the responsibility to encourage migrant workers to participate in related vocational training by adjusting internal training mechanisms [34]. Chan's research on the occupational safety issues experienced by foreign construction workers of ethnic minorities shows that the main factor affecting their safety and health is the serious lack of safety and language training in enterprises [35]. Fayek found that the construction companies' vocational training for workers is the most effective way to increase productivity and minimize loss [36].

Hypothesis H7. *Vocational training results are positively affected by the internal driving force of migrant workers*.

Vocational training is one of the most important ways to improve the skills of migrant workers in the construction industry. By constructing a theoretical model of the migrant workers' vocational training satisfaction, Luo et al. found that the perceived quality and value of migrant workers have a significant effect on their satisfaction. A perceived value plays an intermediary role between migrant workers' perceived quality and satisfaction and, thus, improves migrant workers. The key to the satisfaction of professional literacy training is to improve its perceived quality and perceived value [37]. Hu found that the opinions of the new generation of migrant workers on vocational skills training are reflected in the disconnection of training goals and content, low practicality and understanding, inflexible training methods, and failure to meet their needs, making the actual training

results of these people less than ideal [38]. Hence, the self-will of migrant workers has a certain impact on training results.

Hypothesis H8. *Vocational training results are positively affected by social forces.*

There are often large cultural differences and communication barriers between migrant workers in the construction industry and the cities they migrate to, affecting their vocational training to a certain extent [39]. According to research by Wasilkiewicz, migrant workers in the Norwegian construction industry are more prone to occupational accidents than local workers. This difference is usually caused by poor communication skills and a lack of language skills, with an emphasis on communication, culture, and language [40].

Hypothesis H9. *Social literacy training results are positively affected by the driving force of the construction industry.*

The current characteristics of the Chinese construction workers' group have failed to meet the needs of the modern construction industry, and these problems cannot be solved without the industrialization of the latter [41]. Zhao's research confirms that the specificity of the construction industry itself does not directly damage the rights and interests of construction workers. The poor working conditions and basic labor rights and interests of migrant workers in the construction industry in China come from the "amplification" of the industry's specificity [42]. To improve the current situation of migrant workers, it is necessary to return to the production process itself.

Hypothesis H10. *Social literacy training results are positively affected by the driving force of construction enterprises.*

Construction enterprises are the employers and managers of migrant workers in the construction industry. The management level of construction enterprises directly affects the quality of migrant workers in the construction industry. In reality, a high demand for skilled personnel and a low enthusiasm for organizational skills training often coexist, and so do the diverse needs of migrant workers for training and the solidification of on-the-job training management with the lack of an existing training system that does not match the status quo [43]. Lingard conducted data collection and analysis on the quality of work in Australian construction enterprises of different sizes. The results show that workers in small construction organizations are directly and personally managed by the business owner/manager and are more able to obtain on-demand, informal, work–life support [44].

Hypothesis H11. *Social literacy training results are positively affected by the internal driving force of migrant workers.*

With the increase in their number and the awakening of self-awareness, migrant workers hope to change their status to become part of the city in the context of social progress and development, and education and training can promote this identity change [45]. Zhu pointed out that the willingness of migrant workers to participate in training is affected by factors such as work income, attitude, perception of behavior control, and regional type. The willingness to pay for training costs is affected by personal characteristics, pretraining experience, attitude, and income [46].

Hypothesis H12. *The results of social literacy training are positively affected by the driving force of social forces.*

The social literacy training of migrant workers is the key to integrating them into urban society and, gradually, civilization. An urban society both welcomes and rejects migrant workers entering the city. It welcomes them to undertake the dirtiest, most tiring,

and hardest work in urban society and rejects many problems such as the urban image, civilized order, and benefit distribution brought to them [47]. Chen's research confirmed that significant differences exist in the occupational and housing conditions of urban residents and migrant workers in China's major cities. The housing system under the urban household registration system has led to unequal employment and housing markets for migrant workers in central China's urban areas, leading immigrant families to poverty [48]. The participation of social forces work together to improve the basic living conditions of migrant workers, reduce their physical and mental health problems, and further increase the productivity of construction projects.

Hypothesis H13. *The results of social literacy training are positively influenced by the driving force of the government department*.

Achieving a high degree of integration requires the joint efforts of new actors, locals, and the government [49]. The government's supervision and management of civil society literacy often occurs through the introduction of corresponding policy forms by promoting the construction of spiritual civilization at the overall level of society and the improvement of civil society literacy for all citizens [50]. In addition, migrant workers' integration into urban life is inseparable from solid material security. In reality, migrant workers are frequently owed wages in arrears, and the government should largely solve the problem of migrant workers' wage defaults [51].

Hypothesis H14. *The construction industry migrant worker training system is positively affected by vocational training*.

Vocational education and skills training help migrant workers engage in technical positions and management. Technical training has a positive effect on improving the job satisfaction of migrant workers [52]. The research by Huang et al. points out that migrant workers agree with the policy of "strengthening vocational skills training." In the future, we should focus on integrating the tripartite resources of the government, the market (enterprise), and society, and establish a trinity linkage mechanism to promote the healthy development of vocational skills training systems [53].

Hypothesis H15. *The training system of construction industry migrant workers is positively affected by social literacy training*.

Chang proposes to guide migrant workers in protecting their rights and interests through legal channels, improving their employment environment, strengthening individual protection, paying attention to civility and politeness, and cultivating scientific, civilized, and healthy lifestyles to ensure their occupational safety and health in the construction industry [54]. Enterprises, governments, and society should strengthen the physical and mental health of migrant workers in the construction industry, help them better integrate into urban life, and provide spiritual and concrete support for their training [55].

Combined with the structure, function, and operating mechanism of the training system for migrant workers in the construction industry, this study determined that dynamic mechanism factors include the internal driving force of migrant workers in the construction industry; their professional, vocational, and social literacy training; the driving force of the construction industry; the driving force of construction enterprises; and the driving force of social forces. In other words, the government drives eight variables. The preliminary theoretical framework for the verification of the training dynamic mechanism of migrant workers in the construction industry is shown in Figure 1.

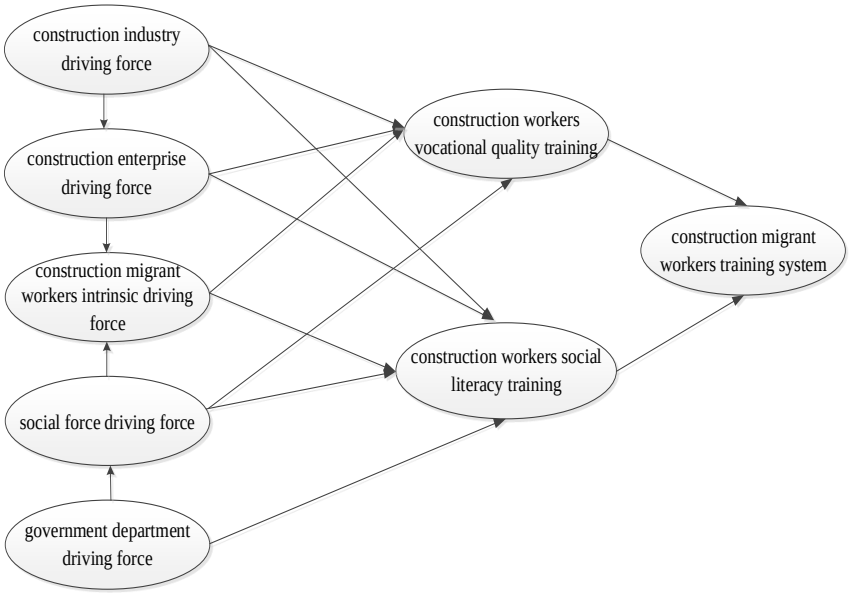


Figure 1. Preliminary theoretical framework.

According to the theoretical model in Figure 1, the study proposed 15 study hypotheses based on eight latent variables. In this paper, the construction workers vocational quality training (VQT), social literacy training (SLT), workers training system (WTS), construction industry driving force (CID), construction enterprise driving force (CED), government department driving force (GD), construction migrant workers intrinsic driving force (CWID), and the social force driving force (SFD) are identified.

3. Questionnaire Design and Data Analysis

3.1. Questionnaire Design

This study considered three aspects during the investigation: first, to clarify the research background, research purpose, and significance; second, the unit of the survey object must cover the relevant subjects of the training of migrant workers in the construction industry, such as construction enterprises, construction units, training institutions, government departments, etc.; third, the investigation of the operation mechanism of the training system for migrant workers in the construction industry, which mainly includes the construction industry module, construction enterprise module, government department module, migrant workers' internal module, and social force driving force module. In order to ensure the reliability and validity of the questionnaire, a small-scale questionnaire was filled out before the formal release of the questionnaire. First, 2 to 3 respondents from related fields, including 11 representatives of government agencies, construction industry, construction enterprises, training social forces, and migrant workers, were invited to conduct small-scale interviews and fill out questionnaires to solicit their opinions. In the process of filling in the questionnaire, the pretest investigators found that there were ambiguities, unreasonable expressions of options, or that items were modified to form the final questionnaire.

In this study, the initial measurement index of each variable and the initial design were first illustrated and then refined; the scale involves eight variables, namely, CID, CED, GD, CWID, SFD, VQT, SLT, and WTS, and a total of 38 questions, as detailed in Table 1.

Table 1. Datasheet for the verification of the operating mechanism of the training system for migrant workers in the construction industry.

Element	Code	Measuring Item
CID	CID1	Establishment of a vocational access system for the construction industry
	CID2	Strict implementation of a system of a certified induction for construction workers
	CID3	Strengthening the supervision and inspection of the skill level and staffing ratio of field operators
	CID4	Formulating supporting policies for systematic training in the construction industry
	CID5	Preparation of staffing standards for construction sites, urging enterprises to strengthen skills training and carry out skills appraisal
	CID6	Innovating the model of examination and training, combining actual engineering production with appraisal
	CID7	Establishing a scientific assessment system for the systematic training of construction migrant workers to become industrial workers
	CID8	Strengthening the construction of the construction labor training market's information network
CED	CED1	Developing construction industry workers' training plan according to market demand
	CED2	Optimizing and integrating training resources, and establishing training bases
	CED3	Improving the career promotion channel for construction workers
	CED4	Establishing a reasonable salary system for construction workers that matches the skill level
	CED5	Establishing an expert database and chief technician system
	CED6	Establishment of special funds for the training of construction workers
	CED7	Establishing a scientific skill appraisal system
	CED8	Reinforcing the main role of the workers' organization in construction enterprises
GD	GD1	Incorporating the annual training program for transforming migrant workers into industrial workers through local economic and social development plans
	GD2	Timely revision of enterprise qualification standards, linking the training of construction workers with market access, bidding, integrity system, evaluation, etc.
	GD3	Rational preparation of the budget for the systematic training of migrant workers in the construction industry to become industrial workers
	GD4	Striving to create a skills-oriented industry and social environment
	GD5	Establishment of the construction industry workers' training department
	GD6	Carrying out inspection, management, and supervision of the systematic training of migrant workers in the construction industry for their transformation into industrial workers
	GD7	Improving the standards and evaluation norms of relevant vocational skills for construction workers
	GD8	Promoting the professional appraisal of construction workers
CWID	CWID1	Mastering the necessary professional skills
	CWID2	Learning operational skills in combination with the job
	CWID3	Consciously learning, improving cultural literacy, and perfecting the career promotion channel of construction workers
	CWID4	Improving the literacy of social civilization and enhancing the ability to integrate into urban life
	CWID5	Paying part of the training costs appropriately
SFD	SFD1	Encouraging the active participation of various training institutions and organizations in the construction workforce
	SFD2	Establishing and perfecting the teacher training model of "school–enterprise interaction" and the management system of part-time training teachers
	SFD3	Motivating social capital to take an active part in building training
	SFD4	Expanding the full coverage of the vocational training of workers in the construction industry
VQT	VQT1	Migrant workers in the construction industry have a high level of skills
	VQT2	Migrant workers in the construction industry have better professional ethics
SLT	SLT1	Migrant workers in the construction industry have the same social general knowledge, social public moral consciousness, and legal concepts as the citizens of the city
	SLT2	Migrant workers in the construction industry quickly adapt to the habits and norms of urban life
WTS	WTS	Establishing a systematic training system for migrant workers in the construction industry

3.2. Data Analysis

In this study, offline and online questionnaire distribution methods were used. The offline distribution was mainly conducted through interviews with Fujian Province's Housing and Construction Department, industry associations, training centers, and other related structural staff, as well as some construction companies and research institutions. During the visit, a total of 90 questionnaires were distributed, 90 were returned, and 74 questionnaires were valid, with an effective rate of 82.2%. The online distribution was mainly conducted through apps and emails to government departments, construction industry associations, construction enterprises, college scientific research units, social training institutions, and others. A total of 163 questionnaires were collected and returned, of which 151 were valid, and the effective rate of recovery was 92.6%.

The descriptive statistics results show that the absolute values of skewness of each question were all less than 3, and the absolute values of kurtosis were less than 10. Both the skewness and kurtosis met the conditions for a normal distribution, indicating that each topic can be directly used in the statistical analysis of, for example, reliability and validity.

(1) Questionnaire reliability analysis

This article used Cronbach's alpha to test the reliability and validity of the questionnaire research variables for various measurement items. From the results, the Cronbach's coefficient of the variables was 0.941 for the construction industry, 0.922 for construction enterprises, 0.910 for government departments, 0.854 for migrant workers, 0.930 for social power, 0.787 for professional literacy, and 0.856 for social civilization, all of which are greater than 0.7. The results show that the variables had good internal consistency reliability, and the CITCs were all greater than 0.5, indicating that the measurement items are in line with the research expectations. From the perspective of deleting the Cronbach value of this item, deleting any one item does not cause an increase in the Cronbach value, indicating that each scale had good reliability.

(2) Questionnaire validity analysis

This study verified the structural validity of the scale through general exploratory factor analysis tests. Based on the above, verification was performed using SPSS22.0 software, and the results are shown in Table 2.

Table 2. KMO and Bartlett's test.

Kaiser–Meyer–Olkin Metric for Sample Sufficiency		**0.875**
Bartlett's test of sphericity	Approximate chi-square	5719.130
	df	666
	Sig.	0.000

From the above table, it can be seen that KMO = 0.875, greater than 0.7, and Bartlett's test of sphericity value was significant (Sig. < 0.001), which indicates that the questionnaire data meet the prerequisites of factor analysis; further analysis was then performed. The principal component analysis method was used in factor extraction, extracting common factors with feature roots greater than one, and in factor analysis, with a maximum orthogonal rotation of variance during factor rotation. The factor analysis results obtained a total of seven factors: interpretation ability was 15.548%, 14.423%, 13.788%, 9.100%, 8.878%, 4.483%, and 4.421%, respectively. Furthermore, the total interpretation ability reached 70.641%, greater than 50%, indicating that the seven factors screened had good representation. The factor load coefficient shows that the factor load of each measurement item was greater than 0.5, and the cross load was less than 0.4. Each item corresponds to its own factor, indicating that the scale had good structural validity.

4. Model Modification

When applying the SEM as a theoretical model for verification, reasonable model matching is a necessary condition for SEM analysis. Figure 2 is the initial SEM based on the preliminary theoretical framework. The higher the degree of consistency between the expected covariance matrix and the sample covariance matrix obtained through the appropriate analysis model is, the closer the model and the sample are. Based on this, the relevant research must consider the important relevant statistical indicators provided by the SEM—the CMIN test, ratio of CMIN/DF, fitness index (GFI), adjusted fitness index (AGFI), root mean square error of approximation (RMSEA), non-benchmark fitness indicator (NNFI), incremental fitness indicator (IFI), comparative fitness indicator (CFI), etc.—to evaluate the overall fitness of the model and comprehensively consider the value of each indicator. When most indicators meet the requirements, it can be concluded that the model and the data fit well.

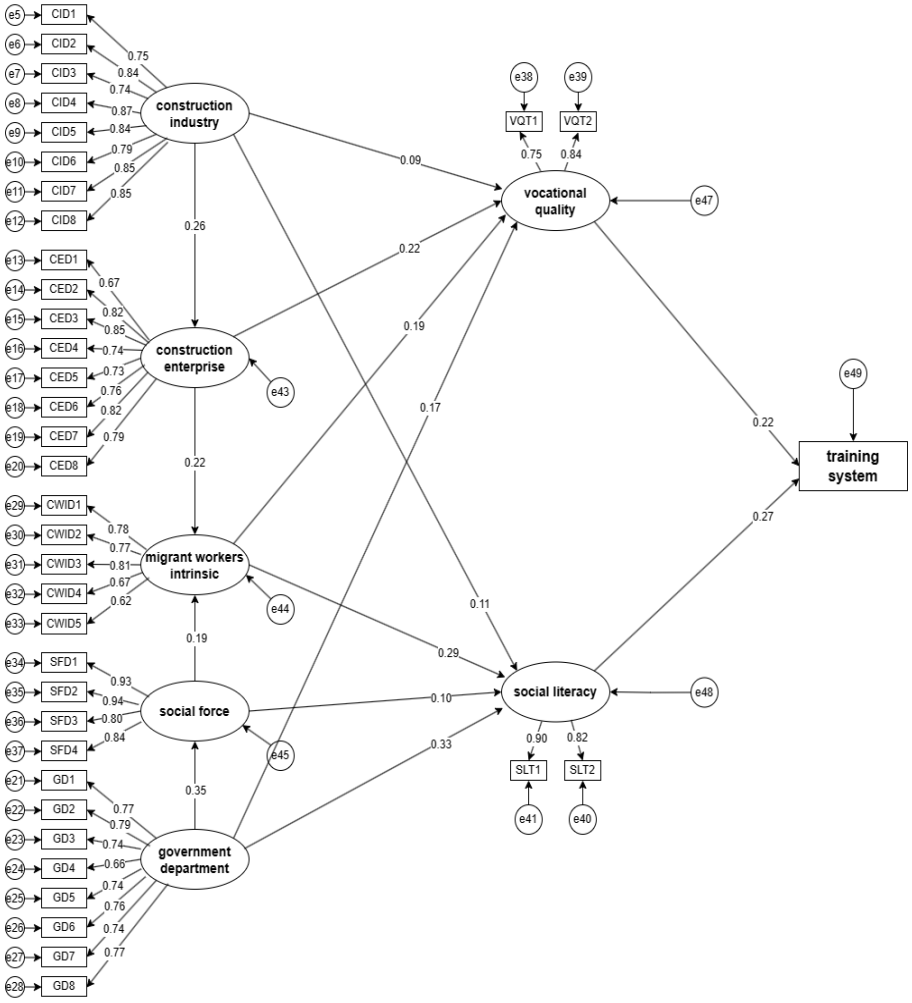


Figure 2. Initial SEM.

(1) Fitting degree of SEM

As seen in Table 3, the CMIN/DF was 1.584, which is less than 3. TLI, IFI, and CFI all reached the standard of 0.9 or higher. The RMSEA was 0.051, less than 0.08, and GFI = 0.816 reached the standard of 0.8 or more. The AGFI was 0.790, which does not reach the standard above 0.9. It can, therefore, be concluded that the fit of the model does not reach the optimal standard; thus, the model can be revised and optimized so that it reaches the best fit.

Table 3. Correlation analysis results.

Fitting Index	Measurement	Acceptable Range
CMIN	1029.641	
DF	650	
CMIN/DF	1.584	<3
GFI	0.816	>0.8
AGFI	0.790	>0.8
RMSEA	0.051	<0.08
IFI	0.931	>0.9
TLI(NNFI)	0.925	>0.9
CFI	0.930	>0.9

(2) Path coefficient of SEM

As seen in Figure 3 (* means the sig value is less than 0.05, ** means the sig value is less than 0.01, and *** means the sig value is less than 0.001. Under normal circumstances,

as long as it is *, it can be considered significant), in addition to the construction industry vocational quality, social force vocational quality, construction industry social literacy, construction enterprise social literacy, and social force social literacy, the *p*-values of these five paths were greater than 0.05, which indicates that none of them had a significant impact. The hypothesis is not supported, and the *p*-values of other paths were less than the significant standard of 0.05, which were all supported. The SEM is generally modified by replacing the path relationship between internal and external variables and modifying the residual covariance. The model modification process is shown in Figure 4, and the model fit degree and path coefficient after model modification are shown in Table 4 and Figure 5.

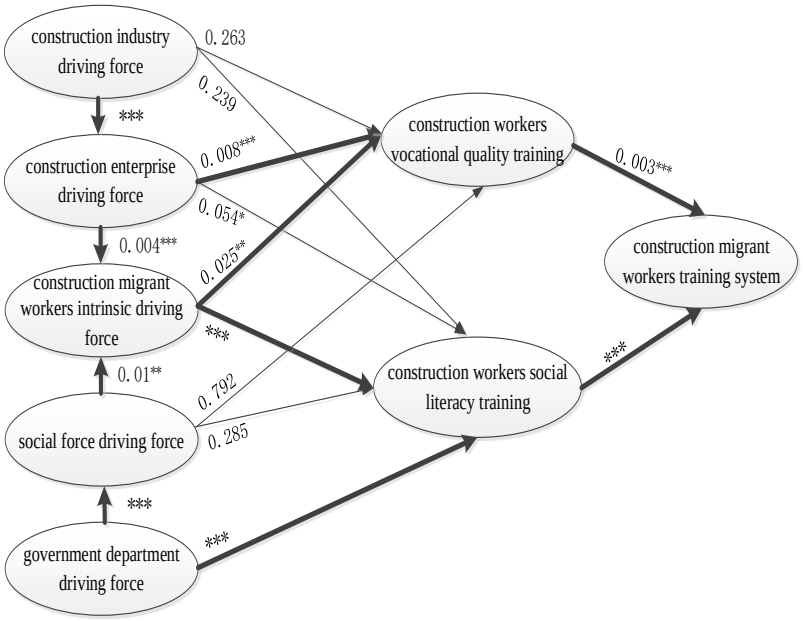


Figure 3. Path coefficient of SEM.

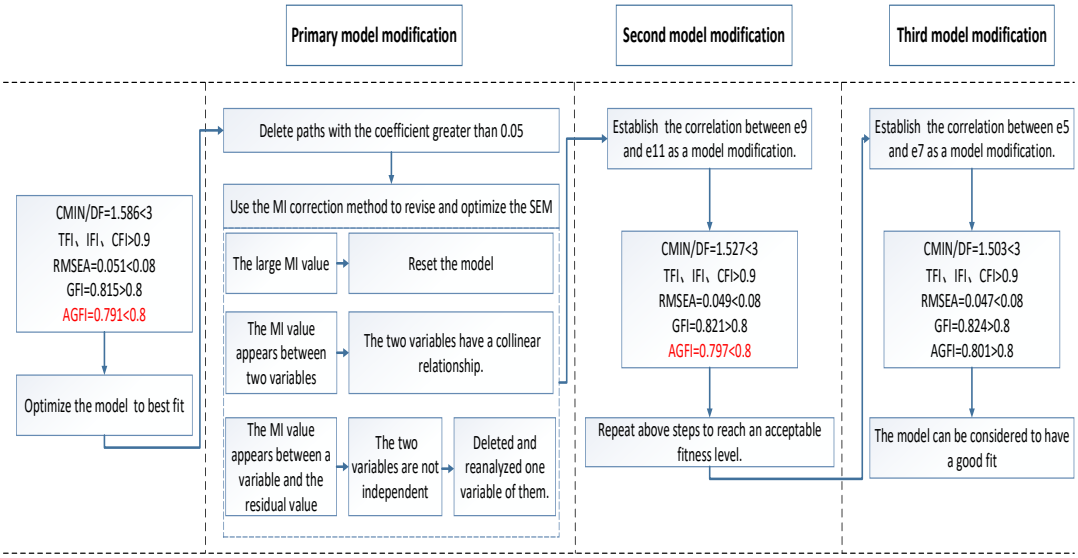


Figure 4. Model modification process.

Table 4. Model fit degree.

Fitting Indicators	Acceptable Range	Measurement
CMIN		981.594
DF		653
CMIN/DF	<3	1.503
GFI	>0.8	0.824
AGFI	>0.8	0.801
RMSEA	<0.08	0.047
IFI	>0.9	0.940
TLI(NNFI)	>0.9	0.935
CFI	>0.9	0.940

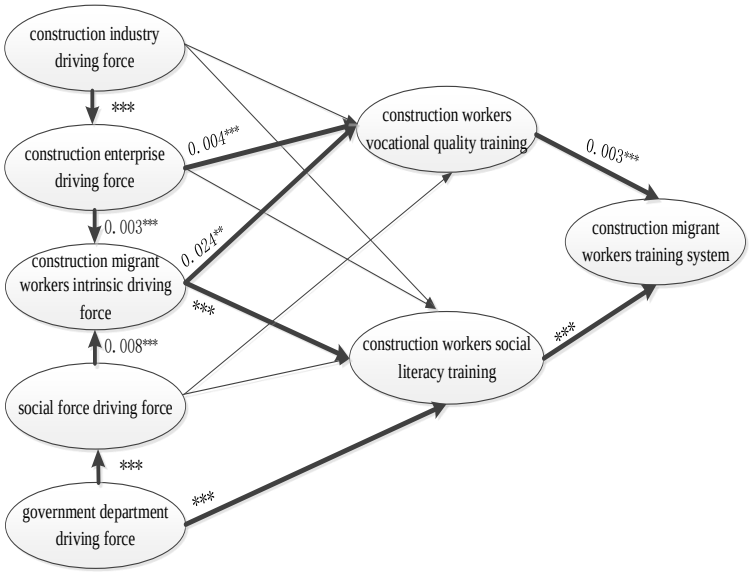


Figure 5. Path coefficient after model modification.

5. Results and Implication

5.1. Results

In this paper, a hypothesis test analysis was conducted based on the modified full model path coefficients and the significance level corresponding to the paths. The results are shown in Table 5.

Table 5. Hypothesis test result.

Hypothesis	Supported or Not Supported	Path Coefficient
H1	supported	0.254
H2	supported	0.220
H3	supported	0.353
H4	supported	0.191
H5	not supported	
H6	supported	0.239
H7	supported	0.185
H8	not supported	
H9	not supported	
H10	not supported	
H11	supported	0.309
H12	not supported	
H13	supported	0.383
H14	supported	0.218
H15	supported	0.279

According to the above table, we can analyze the key paths driving the transformation of construction migrant workers into industrial workers:

Path 1: driving force of construction industry → driving force of construction enterprises → vocational quality training → construction industry migrant workers into industrial workers' training system (CID → CED → VQT → WTS);

Path 2: driving force of construction industry → driving force of construction enterprises → internal driving force of migrant workers → vocational quality training → construction industry migrant workers into industrial workers' training system (CID → CED → CWID → VQT → WTS);

Path 3: government department driving force → social force driving force → internal driving force of migrant workers → vocational quality training → construction industry migrant workers into industrial workers' training system (GD → SFD → CWID → VQT → WTS);

Path 4: driving force of construction industry → driving force of construction enterprises → internal driving force of migrant workers → social literacy training → construction industry migrant workers into industrial workers' training system (CID → CED → SLT → WTS);

Path 5: government department driving force → social literacy training → construction industry migrant workers into industrial workers' training system (GD → SLT → WTS);

Path 6: government department driving force → social force driving force → internal driving force of migrant workers → social literacy training → construction industry migrant workers into industrial workers' training system (GD → SFD → CWID → SLT → WTS).

Based on the above, the GD and CID forces play important roles in promoting the operation of the training system for migrant workers in the construction industry. From the results of the critical path displayed by the SEM model, it can also be seen that external factors, such as the construction industry, construction enterprises, social forces, and the government, internally drive the vocational and social training of migrant workers in the construction industry. Construction enterprises have a direct role in promoting professional quality training, as they are direct beneficiaries of the training effectiveness for construction workers, and are directly affected by the effects of training. Relating SLT, in addition to the migrant workers themselves having the desire and ability to improve, the role of the government is directly related to it and particularly important.

5.2. Policy Implications

Systematic training subjects include training institutions of government construction enterprises and construction migrant workers. The responsibilities of each subject in the training system are defined by the theory of learning organization, which is helpful in improving the effectiveness of systematic training for construction migrant workers.

① The government's responsibilities based on the theory of learning organization.

Under the pattern of big governments and small markets, government departments control most of society's resources, and a unified urban and rural labor market has not yet been established. In this situation, only the government can assume the main responsibility for the systematic training of migrant workers in the construction industry and play a leading role. Although the training of migrant workers in China has attracted the attention of all levels of the government in recent years, and various levels of government have promulgated and implemented many training policy documents, the lack of top-level planning and systematic institutional arrangements means that the training results are unsatisfactory. Under the concept of systematic training, the government should implement an overall plan, long-term goals, and policies of systematic training at the top level; reasonably prepare the budget to solve the shortage of training funds; organize or select suitable training institutions in accordance with market laws; actively conduct training inspection, management, and supervision; establish a scientific appraisal system; improve the standard system of building skills identification and professional qualification;

respect and attribute importance to the civilization of migrant workers in the construction industry; and create a good social environment.

② The enterprises' responsibilities based on the theory of learning organization.

As the direct beneficiaries, the construction enterprises are important subjects of systematic training for migrant workers. The enterprises should attach importance to the theory of learning organization and human resource development, actively build a learning team, implement actual job training, and constantly improve the professional level of migrant workers in the construction industry. Concrete measures can be as follows: reconstruct the organization structure of construction workers by establishing a flat structure; encourage an open, sincere, and innovative organizational culture; reposition the role of migrant workers in the learning team of the construction industry; guide their quality development; effectively plan and organize learning; help migrant workers sort out their personal development goals; actively reach direct agreements with private training institutions to promote the systematic training of migrant workers in the construction industry and increase the training budget of enterprises; strengthen the training of migrant workers in the construction industry to become citizens; and improve the ability of migrant workers to integrate into urban life. In order to prevent construction enterprises from evading the main responsibility of training to reduce costs, the government should encourage construction enterprises to actively participate in and fulfill this social responsibility through various measures.

③ The training institutions' responsibilities based on the theory of learning organization.

The products provided by the training institutions directly affect the effectiveness of the systematic training of migrant workers in construction, which is undoubtedly an important subject of responsibility. Therefore, systematic training implementation plans for workers in the construction industry must be formulated according to the government training plan. Furthermore, cultural knowledge, social skills, and other aspects must be promoted for a better integration into urban life.

④ The migrant workers' responsibilities based on the theory of learning organization.

Under the framework of the theory of learning organization, the migrant workers in the construction industry should take the initiative to participate in systematic training with a positive attitude, master the necessary job skills, combine them with the actual job to actively learn practical and operational skills, and continuously improve their human capital.

6. Conclusions

In this paper, a theoretical model was constructed and verified proposing the operating mechanism of the training system for migrant workers in the construction industry. First, it constructed a theoretical framework for this mechanism. Then, through the design and correction of the questionnaire, data collection, descriptive statistical analysis of the data, and reliability and validity tests, a factor analysis of the scale was performed. Finally, the SEM of the training system's operating mechanism was tested and revised to verify the hypotheses proposed in this paper. Through the fitting and optimization of the model, six key paths were obtained. The main conclusions of this article are as follows:

(1) GD force and CID force play an important role in promoting the operation of the training system for migrant workers in the construction industry.
(2) The construction industry, construction enterprises, social forces, and government internally drive the vocational and social training of migrant workers in the construction industry.
(3) The construction enterprises have a direct role in promoting professional literacy training as one of the most direct beneficiaries of construction workers' training results and as an entity directly affected by the effects of their training.
(4) In terms of SLT, in addition to the migrant workers themselves having the desire and ability to improve, the role of the government is directly related to it and particularly important.

The main conclusions drawn in this paper can be used as entry points for policy arrangements to promote the training of migrant workers in the construction industry and transform them into industrial workers, providing a strong reference for solving the underlying problem of the new requirements for construction workers in China.

The systematic training of migrant workers in the construction industry is a product of the transformation and upgrading of the industry itself and is an expected proposition for the future.

Due to the size of China, the complexity of the geographical environment, the uneven development of the economic and social population, the regional policy formulation and implementation of inconsistencies, and other factors, various regions are facing different economic, demographic, and institutional conditions, with the systematic training of construction migrant workers becoming complex and variable. Due to the limitation of the objective conditions, this study mainly referred to empirical data from certain provinces in China, selected some representative provinces and regions as the object of investigation for analysis, and proposed corresponding countermeasures according to the conclusion drawn, though with certain regional differences. Although the training system of migrant workers in the construction industry was verified through theoretical models, empirical data analysis, and case evaluation, based on the limitations of the research resources, the analytical model used in the quantitative analysis process is based on the survey results as the main evaluation basis, with an inevitable degree of innate or missing variables. To this end, the next step should go beyond empirical research, broaden the geographical scope of the empirical survey objects, and aim to conduct quantitative analysis on the basis of a full qualitative analysis. Doing so will strengthen the integration and further enhance the comprehensive, typical, and representative features of the research results, allowing more developing countries facing similar problems as China to benefit from them.

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