HO CHI MINH NATIONAL ACADEMY OF POLITICS

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FACTORS AFFECTING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN THE VIETNAM'S CONSTRUCTION INDUSTRY

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INTRODUCTION

1. Rationale for Selecting the Dissertation Topic

The construction industry plays a critical role in the national economy as it directly develops technical and social infrastructure systems that support socio-economic development. The development of transportation networks, urban areas, industrial zones, housing, and energy infrastructure not only meets development demands but also serves as a driving force for industrialization, modernization, and the enhancement of national competitiveness. In recent years, alongside accelerating urbanization and increasing infrastructure investment, the construction sector has continued to maintain its position as one of Vietnam's key economic sectors.

In the context of the Fourth Industrial Revolution, the construction industry is increasingly transitioning toward digitalization, automation, the application of artificial intelligence, building information modeling, advanced material technologies, and green construction practices. These transformations have significantly altered workforce requirements, particularly regarding high-quality human resources. Recognizing the critical role of high-quality human resources, the Party and the State have introduced various policies and strategic orientations to promote human resource development for sustainable growth. The Resolution of the 13th National Party Congress identified the development of high-quality human resources as one of the country's strategic breakthroughs. In addition, the Ministry of Construction has issued the human resource development strategy for the construction sector for the 2022–2030 period to meet the requirements of transformation and international integration.

However, current practices indicate that the construction workforce in Vietnam still faces numerous limitations in terms of quantity, quality, and structure. The shortage of high-quality human resources remains widespread, particularly in positions requiring technology engineers, project management specialists, and highly skilled technical workers. The mismatch between education and practical industry demands, together with limitations in digital skills, foreign language proficiency, and technological adaptability, continues to pose significant challenges.

In the context of increasingly deep international integration, rising requirements regarding professional standards, technological capabilities, and labor competitiveness have created an urgent need for comprehensive research into the factors influencing the development of high-quality human resources in the construction industry. Identifying these influencing factors and assessing their degree of impact is essential for establishing a scientific basis for policymaking and proposing solutions to promote the development of high-quality human resources in the construction sector during the new development stage. Based on these considerations, the doctoral candidate selected the topic entitled "Factors Affecting the Development of High-Quality Human Resources in Vietnam's Construction Industry" for this doctoral dissertation.

2. Research Objectives and Tasks

2.1. Research Objectives

Theoretical objective: To systematize, supplement, and clarify the theoretical foundations concerning factors affecting the development of high-quality human resources through a logical and systematic approach.

Practical objective: To analyze and evaluate the current situation of factors affecting the development of high-quality human resources in Vietnam's construction industry, thereby identifying the direction and magnitude of their impacts on high-quality human resource development. Based on this assessment, the dissertation proposes a system of solutions aimed at adjusting these influencing factors to promote the development of high-quality human resources for the construction sector.

2.2. Research Tasks

To achieve the above objectives, the dissertation undertakes the following research tasks:

Firstly, to systematize and further develop the theoretical foundations and establish an analytical framework for evaluating factors affecting the development of high-quality human resources in the construction industry.

Secondly, to investigate and clarify the current state of high-quality human resource development in Vietnam's construction industry.

Thirdly, to analyze the current situation of factors affecting the development of high-quality human resources in Vietnam's construction industry.

Finally, to propose solutions for adjusting the influencing factors in order to promote the development of high-quality human resources in Vietnam's construction industry, thereby meeting the demands of industrialization, urbanization, and socio-economic development during the final years of the 2021–2030 Socio-Economic Development Strategy.

3. Research Object and Scope

3.1. Research Object

The research object of this dissertation comprises the factors affecting the development of high-quality human resources in Vietnam's construction industry.

3.2. Research Scope

- **Scope in terms of research content:** The dissertation focuses on human resources and the factors influencing the development of high-quality human resources in Vietnam's construction industry, with particular emphasis on construction enterprises in Vietnam. This focus is justified by the fact that high-quality human resources are currently concentrated primarily within enterprises, especially large-scale construction firms.
- **Scope in terms of research space:** The study is conducted on a nationwide scale, with a primary focus on large-scale enterprises in the construction industry.
- **Scope in terms of research time:** The dissertation assesses the current status of high-quality human resource development and the factors influencing such development in Vietnam's construction industry from 2020 to the present. Based on this assessment, solutions for adjusting the influencing factors are proposed to promote the development of high-quality human resources in Vietnam's construction industry through 2030.

4. Research Methodology

4.1. Methods of Data and Information Collection

- **Secondary data collection methods:** The author collected and utilized data from multiple secondary sources, including publications and statistical reports from the General Statistics Office of Vietnam, the Ministry of Construction, the Ministry of Education and Training, the Ministry of Labour, Invalids and Social Affairs, as well as data provided by Vietnamese construction enterprises. These data were used to analyze and assess the current status of high-quality human resource development, and to evaluate the direction and magnitude of the impacts of various factors on the development of high-quality human resources in the construction industry.
- **Primary data collection through in-depth interviews:** The dissertation conducted in-depth interviews with 23 experts, scholars, and managerial officials working in agencies and units related to state management of the construction sector.
- **Primary data collection through surveys of construction enterprises:** The author selected 23 construction enterprises for the survey. Within these enterprises, questionnaire-based surveys were conducted to collect primary data from high-quality human resources, including managerial staff, engineers, employees holding university degrees, and skilled workers with a skill level of grade 5 or higher. The sample of high-quality human resources in the 23 surveyed enterprises was determined using a combined sampling approach, integrating purposive (typical case) sampling with random sampling techniques.

4.2. Methods of Data Processing and Analysis

- Descriptive statistical analysis
- Reliability analysis using Cronbach's Alpha
- Exploratory Factor Analysis (EFA)
- Confirmatory Factor Analysis (CFA)
- Structural Equation Modeling (SEM)

5. Contributions of the Dissertation

This dissertation analyzes, interprets, and contributes to strengthening the theoretical foundations of human resource development and the factors affecting the development of high-quality human resources in the construction industry.

Based on empirical analysis, the dissertation evaluates the impacts of various factors on the development of high-quality human resources in Vietnam's construction industry, and accordingly proposes solutions to adjust these factors in order to promote the development of high-quality human resources in the construction sector in the coming period.

6. Theoretical and Practical Significance of the Dissertation

6.1. Theoretical Significance

The dissertation systematizes and further consolidates the theoretical foundations of human resource development and the factors influencing the development of high-quality human resources in the construction industry. It identifies the key factors affecting the development of high-quality human resources in the construction sector and proposes a research model of influencing factors for the development of high-quality human resources in Vietnam's construction industry.

6.2. Practical Significance

The findings of this dissertation may serve as a reference for policymakers, organizational managers, as well as lecturers and students in the fields of

development economics and human resource management, particularly with regard to issues related to high-quality human resource development and the factors influencing such development in Vietnam's construction industry.

7. Structure of the Dissertation

In addition to the Introduction, Conclusions, Recommendations, and References, the dissertation consists of four chapters, structured as follows:

Chapter 1: Presents the literature review and research orientation of the dissertation.

Chapter 2: Discusses the theoretical and practical foundations of factors affecting the development of high-quality human resources in the construction industry.

Chapter 3: Analyzes the current situation of factors affecting the development of high-quality human resources in Vietnam's construction industry.

Chapter 4: Proposes solutions to promote the development of high-quality human resources in Vietnam's construction industry.

Chapter 1
REVIEW OF RELATED STUDIES AND RESEARCH ORIENTATION OF THE DISSERTATION

1.1. REVIEW OF PREVIOUS STUDIES AND IDENTIFICATION OF RESEARCH GAPS

1.1.1. Review of studies on high-quality human resource development by sector

1.1.1.1. Studies on high-quality human resources

Based on existing studies, human resources can be understood as a conceptual category referring to the latent strength of the population and their capacity to be mobilized to participate in the creation of material and spiritual wealth for society, both in the present and in the future. Although various approaches exist, human resources are generally understood as the aggregate of the physical and psychological attributes of workers, which collectively determine their capacity to work and their ability to participate in activities serving organizations in particular and society in general.

1.1.1.2. Studies on the content of high-quality human resource development

From the reviewed literature, scholars generally concur that high-quality human resources are characterized by high levels of education, advanced technical skills, and professional competencies. The core components of high-quality human resources typically include physical capacity, intellectual capacity, and psychological or moral capacity. Among these components, intellectual and psychological capacities play a decisive role in performing tasks that require high standards and achieving superior performance outcomes.

Furthermore, existing studies highlight that the development of high-quality human resources encompasses several essential dimensions, including ensuring adequate quantity, improving quality, and rationalizing the structural composition of high-quality human resources.

1.1.1.3. Studies on the development of high-quality human resources in the construction industry

The review of relevant studies indicates that high-quality human resources in the construction industry may be approached as comprising both direct labor—

namely, highly skilled workers with strong discipline and adequate physical fitness—and indirect labor, including highly qualified professionals who possess strong discipline and physical capacity sufficient to meet job requirements. Scholars generally agree that the development of high-quality human resources in the construction industry involves increasing the quantity of high-quality personnel, enhancing their quality, and restructuring the workforce to achieve a more rational and efficient composition of high-quality human resources.

1.1.2. Review of studies on factors affecting the development of high-quality human resources in the construction industry

The review of previous studies reveals that the development of high-quality human resources in the construction industry is influenced by a wide range of factors. These factors include human resource development policies, activities aimed at improving human resource quality, advancements in science and technology, and remuneration systems for high-quality human resources, such as income, welfare benefits, and working conditions.

1.1.3. Research gaps identified in the dissertation

Based on the review of existing studies, several research gaps can be identified that warrant further investigation in this dissertation:

1. Although numerous studies have systematized the theoretical foundations of human resources and high-quality human resource development, there is a lack of comprehensive and systematic research specifically addressing the development of high-quality human resources in the construction industry.
2. There remains a shortage of studies that provide a systematic and comprehensive assessment of the current status of high-quality human resource development in Vietnam's construction industry in recent years.
3. Few studies have conducted in-depth analyses and evaluations of the full range of factors affecting the development of high-quality human resources in Vietnam's construction industry in recent years.
4. There is limited research that systematically consolidates solutions for adjusting influencing factors in order to promote the development of high-quality human resources in Vietnam's construction industry in the coming years, particularly during the final phase of the 10-year Socio-Economic Development Strategy for the period 2021–2030, which emphasizes industrialization and urbanization.

1.2. RESEARCH OBJECTIVES, RESEARCH SUBJECTS, AND SCOPE OF THE STUDY

1.2.1. Research objectives

- General Objective
- Specific Objectives

1.2.2. Research subjects and scope

- Research Subjects
- Scope of the Study

1.2.3. Research questions

1. What are the key components of high-quality human resource development in the construction industry?
2. What has been the current situation of high-quality human resource development in Vietnam's construction industry in recent years?

3. Which factors have influenced the development of high-quality human resources in Vietnam's construction industry during the recent period? In what direction and to what extent do these factors affect the development of high-quality human resources in Vietnam's construction industry?

4. What adjustments to these influencing factors are necessary to promote the development of high-quality human resources in Vietnam's construction industry in the coming period?

1.3. RESEARCH APPROACH AND METHODOLOGY

1.3.1. Research approaches and analytical framework

- **Research Approaches**
  - Theoretical approach
  - Systems approach
  - Interdisciplinary approach
  - Participatory approach
- **Analytical framework of the dissertation**

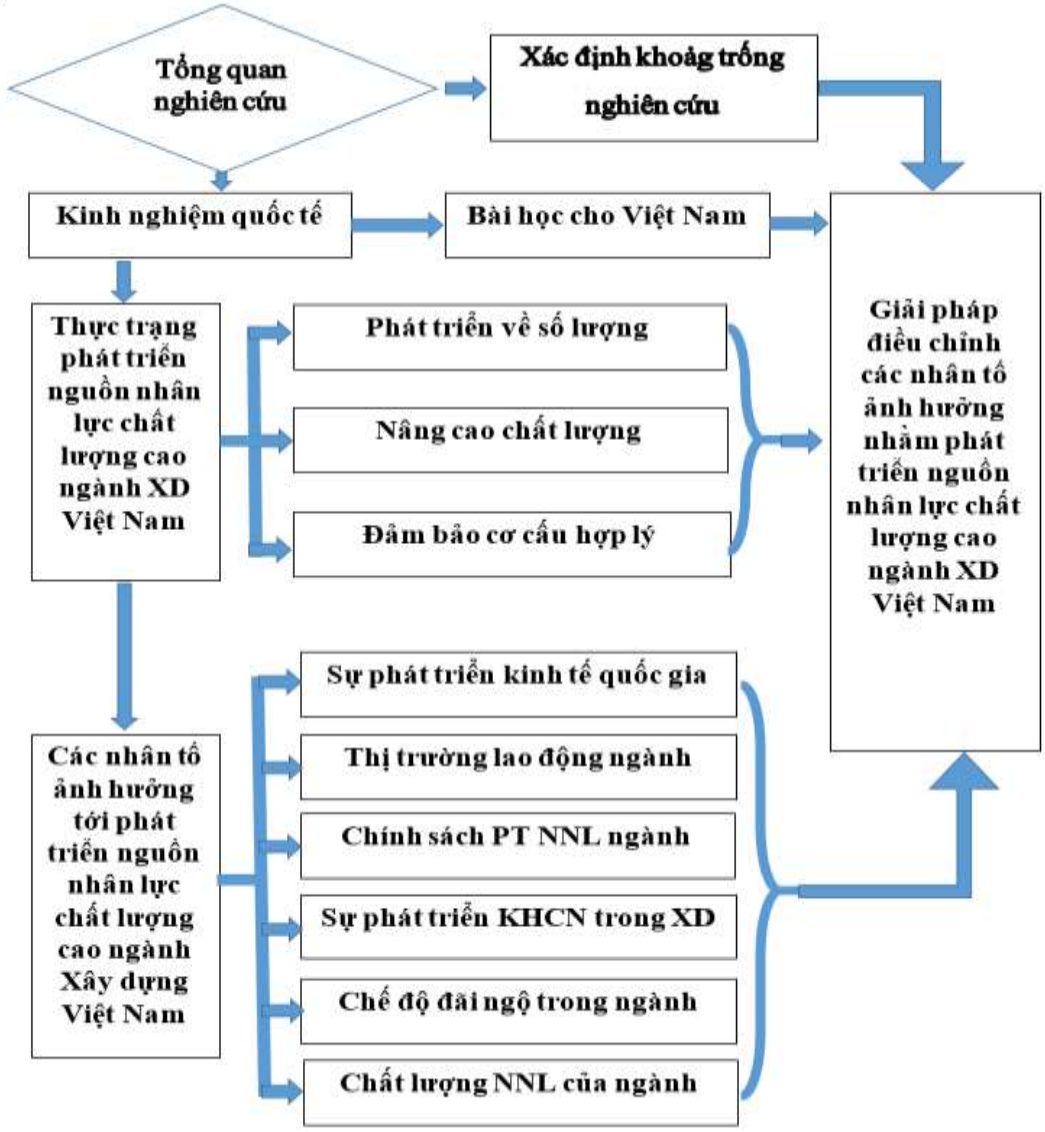

Figure 1.1. Analytical framework for factors influencing the development of high-quality human resources in the construction industry

Source: Proposed by the author

1.3.2. Methods of data and information collection

- **Secondary data collection methods:**

Secondary data were collected from official documents, statistical reports, and research publications provided by relevant state agencies, ministries, and organizations, as well as from construction enterprises. These data serve as the basis for analyzing and evaluating the current status of high-quality human resource development and identifying factors influencing such development in Vietnam's construction industry.

- **Primary data collection through in-depth interviews:**

Objects and number of in-depth interviews: In-depth interviews were conducted with experts, scholars, and managerial officials working in agencies and organizations related to state management and professional activities in the construction sector.

Content of in-depth interviews: The interviews focused on perceptions, assessments, and expert opinions regarding the current status of high-quality human resource development, key influencing factors, challenges, and policy orientations for developing high-quality human resources in the construction industry.

Period of in-depth interviews: From May 2023 to December 2023.

- **Primary data collection through surveys of construction enterprises:**

Survey subjects: The survey targeted construction enterprises and high-quality human resources working within these enterprises, including managerial staff, engineers, and skilled workers.

Survey content: The survey collected information related to the characteristics of high-quality human resources, the current status of their development, and the factors affecting high-quality human resource development in the construction industry.

Survey period: From 2020 to the end of 2023.

1.3.3. Methods of Data Processing and Analysis

- Data processing methods
- Data analysis methods

Chapter 2
THEORETICAL FOUNDATIONS OF THE FACTORS AFFECTING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN THE CONSTRUCTION INDUSTRY

2.1. KEY CONCEPTS

2.1.1. Construction Industry

The construction industry is a sector encompassing all activities related to engineering design and the construction of infrastructure. Unlike other manufacturing sectors, construction typically produces site-specific products tailored to particular clients or user groups. These may include individuals, households, organizations, or entire communities.

In a narrower sense, the construction industry refers to all domestic and foreign

enterprises engaged in construction investment activities, including new construction, repair, and renovation of works within the territory of Vietnam, and operating under the macroeconomic regulation and supervision of state management agencies in the field of construction.

2.1.2. High-quality human resources in the construction industry

High-quality human resources represent an elite segment of the overall workforce. Each individual within this group possesses a combination of essential attributes, including a high level of education and technical expertise or advanced occupational skills, good physical health, sound professional qualities, and a strong sense of discipline.

Based on the concepts of the construction industry, high-quality human resources, and the structure of human resources in the construction sector, within the scope of this dissertation, high-quality human resources in the construction industry are defined as an elite component of the sector's workforce. This group includes both indirect personnel with high levels of education and technical expertise, and direct labor with advanced occupational skills; all possessing good physical health, strong professional ethics, and high discipline. High-quality human resources in the construction industry include personnel in managerial positions, engineers, specialists, employees holding university degrees or higher, and skilled workers with a skill level of grade 5/9 or above.

2.1.3. Development of high-quality human resources in the construction industry

Drawing on theoretical perspectives on human resource development and the concept of human resources in the construction industry, within the scope of this dissertation, the development of high-quality human resources in the construction industry is understood as the process of increasing quantity, improving quality, and ensuring a rational structure of high-quality human resources in order to better meet the evolving needs of the construction industry.

2.2. CONTENTS OF HIGH-QUALITY HUMAN RESOURCE DEVELOPMENT IN THE CONSTRUCTION INDUSTRY

2.2.1. Quantitative development

The quantitative development of high-quality human resources is achieved through the recruitment of high-quality personnel and through education and training activities aimed at improving professional qualifications and enhancing technical skills for the construction workforce.

2.2.2. Improvement of quality

1. **Enhancement of intellectual capacity**

Enhancing intellectual capacity, or professional competence, involves equipping workers with updated knowledge and professional skills in order to keep pace with changes in the contemporary labor market.

2. **Enhancement of physical capacity**

Improving physical capacity requires ensuring adequate nutrition in daily meals for workers. In addition, it involves promoting physical exercise and sports activities within organizations outside working hours, as well as paying attention to

workers' living conditions - particularly those of high-quality human resources.

3. **Enhancement of psychological and moral capacity**

Improving workers' professional qualities has a direct impact on the quality of human resources, as it forms the foundation of all work-related behaviors. Enhancing the psychological and moral capacity of high-quality human resources essentially entails developing discipline, ethics, and a sense of responsibility; fostering industrial work styles; strengthening cooperation in the workplace; and promoting dynamism, creativity, and adaptability to work demands.

2.2.3. Rationalization of structure

Rationalizing the structure of high-quality human resources in the construction industry is a process of optimizing and reorganizing the workforce to best meet requirements related to skills, knowledge, and technology. This process contributes to sustainable development and enhances the competitiveness of the construction industry. The primary objective of structural rationalization is to establish an efficient and balanced workforce structure while simultaneously improving the overall quality of labor in the sector.

2.3. CRITERIA FOR EVALUATING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN THE CONSTRUCTION INDUSTRY

2.3.1. Criteria for evaluating quantitative development

To evaluate the quantitative development of high-quality human resources, various criteria may be applied; however, the following three criteria are commonly employed:

1. The increase in the proportion of workers holding university and postgraduate degrees within the total labor force.
2. The increase in the proportion of high-quality professional and technical personnel.
3. The increase in the proportion of trained and highly skilled technical workers.

2.3.2. Criteria for evaluating quality improvement

1. **Physical capacity:** Criteria such as the proportion of human resources at different health levels, the proportion of workers experiencing reduced working capacity, and the proportion of workers suffering from occupational or general illnesses help managers assess the development of physical capacity among human resources in general and high-quality human resources in particular.
2. **Intellectual capacity:** Criteria including the proportion of high-quality professional personnel at different educational levels, the proportion of highly skilled workers who have received professional and technical training, and the average length of work experience of high-quality human resources reflect the development of intellectual capacity.
3. **Psychological and moral capacity:** This dimension may be evaluated through the following criteria:

- Indicators assessing work style and labor discipline;
- Indicators assessing the level of dedication and commitment to work;
- Indicators assessing cognitive ability and readiness to adapt to changes in job requirements among high-quality workers;

- Indicators assessing work-related psychological conditions;
- Indicators assessing the ability to withstand work pressure and stress.

2.3.3. Criteria for evaluating structural rationalization

1. Adjustment of the structure of high-quality human resources by level of education and training.

2. Adjustment of the structure of high-quality human resources by gender.

3. Adjustment of the structure of high-quality human resources by job position.

2.4. RESEARCH MODEL OF FACTORS AFFECTING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN THE CONSTRUCTION INDUSTRY

2.4.1. Theoretical Basis

The research model employed in this dissertation is developed based on a synthesis of previous studies on factors influencing the development of high-quality human resources in the construction industry

2.4.2. Proposed model of factors affecting the development of high-quality human resources in vietnam's construction industry

Factors Affecting the Development of High-Quality Human Resources in the Construction Industry

Influencing Factors	Observed Variables	Previous Studies
National Economic Development	- Strong economic growth provides a foundation for the implementation of large-scale and complex construction projects.- International economic integration creates opportunities for enhancing the competencies of high-quality human resources in the construction industry.- Increased inflows of foreign direct investment (FDI) into the construction sector.- Rapid development of infrastructure systems.	Mahbub ul Haq (1996); Sudhir Anand (2008); Ismail Sirageldin (2009); Lê Thị Hồng Điệp (2010); Jones & Merrick (1992); Linda Low & Douglas M. Johnston (2003); Kye Woo Lee (2005); Ruddock & Lopes (2006); Nguyễn Bá Ngọc (2014); Ngo Quan Huy & Khau Văn Bich (2021); Nguyen Thi Van & Nguyen Thi Nga (2024); Tô Ngọc Thanh (1991)
Construction Industry Labor Market	- Expansion in the scale of training programs for high-quality human resources in construction at higher education institutions.- Increase in the proportion of construction workers who have received formal training.- Growing demand for high-quality human resources in the construction industry.	Enrico Moretti (2010); Matthias Bahr & Leif Laszig (2021); Yao-Chen Kuo (2024)
Policies for Human Resource Development in the Construction	- Policies aimed at improving the quality of human resources in the construction industry.- Policies on occupational safety and working conditions.- Policies encouraging investment in research and development (R&D) in construction.-	Jones & Merrick (1992); Marianne J. Koch (1996); Kye Woo Lee (2005); Keith D. Hampson (2014); George Seaden (2010); Chuck Eastman (2011); Justinas Anelauskas (2017);

Influencing Factors	Observed Variables	Previous Studies
Industry	Policies promoting innovation and creativity in the construction sector.- Policies related to wages, welfare, and incentive schemes for construction workers.	Nguyễn Hong Hai (2024); Olabode Adekunle Ayodele (2019)
Development of Science and Technology in the Construction Sector	- Innovation in production technologies.- Increasing levels of automation and robotics.- Widespread application of artificial intelligence (AI).- Strong acceleration of digital transformation in construction activities.	Chuck Eastman (2011); Justinas Anelauskas (2017); Li et al. (2019); Narasimha (2019); Michael Max Bühler (2022)
Compensation and Incentive Systems in the Construction Industry	- Income levels commensurate with job positions.- Adequate and safe working conditions.- Rational job allocation and workload distribution.- Appropriate training and retraining activities.- Availability of career advancement opportunities.	Loosemore et al. (2003); Anthony Olomolaiye & Charles Egbu (2004); A. Dainty (2007); Thomas D. Schneid (2019); Olabode Adekunle Ayodele (2019); Yao-Chen Kuo (2024)
Current Quality of Human Resources in the Construction Industry	- Professional qualifications adequately meet job requirements.- Workers possess strong technical and professional skills relevant to job demands.- Construction human resources are capable of applying advanced technologies in their work (e.g., BIM, 3D printing, AI).- High level of awareness and compliance with occupational safety regulations in the construction industry.	Olabode Adekunle Ayodele (2019); Rabia Al-Mamlook (2020); Nguyen Thanh Liem & Nguyen Thanh Thao Vy (2012); Vo Anh Tuan, Tran Thi Loi & Le Thi Thanh Binh (2024)

Source: Compiled by the author

2.5. INTERNATIONAL EXPERIENCE IN DEVELOPING HIGH-QUALITY HUMAN RESOURCES IN THE CONSTRUCTION INDUSTRY AND LESSONS FOR VIETNAM

2.5.1. International experience in developing high-quality human resources in the construction industry

2.5.1.1. Experience of the United States

The experience of the United States in developing high-quality human resources in the construction industry can be summarized as follows: strict enforcement of labor discipline through labor contracts and standardized working regimes, combined with attractive remuneration policies to encourage and attract high-quality workers. In parallel, continuous training and professional development programs are regularly implemented to enhance workers' professional competence, thereby improving the overall quality of human resources in the construction sector.

2.5.1.2. Experience of China

Chinese construction enterprises place strong emphasis on training and continuously upgrading the skills and qualifications of high-quality human resources, while increasingly adopting Internet of Things (IoT) technologies to operate machinery as a substitute for low-skilled labor. The development orientation of China's construction industry clearly focuses on high-quality human resource development through strict recruitment screening, ongoing in-house training and retraining, and the gradual reduction of reliance on unskilled labor.

2.5.1.3. Experience of the Republic of Korea

An effective measure implemented by the Republic of Korea is the promotion of close cooperation and exchange between construction enterprises and universities. This approach aims to facilitate early employment opportunities for graduates, thereby attracting high-quality human resources to the construction industry while simultaneously meeting enterprises' demand for highly skilled labor.

2.5.1.4. Lessons from Singapore

Well-structured training programs, together with the extensive application of advanced technologies in training activities, have made a significant contribution to improving the quality of human resources. These practices have effectively promoted the development of high-quality human resources in Singapore's construction industry.

2.5.2. Lessons Learned for Vietnam's Construction Industry

Based on international experience, several key lessons can be drawn for the development of high-quality human resources in Vietnam's construction industry:

- Enhancing the qualifications and professional competence of construction sector human resources to meet development requirements;
- Promoting research and development (R&D) activities within the construction industry;
- Attracting high-quality human resources to the construction labor market;
- Ensuring consistency and coherence in talent recruitment, training, planning, and remuneration policies;
- Applying appropriate labor motivation measures tailored to high-quality human resources;
- Improving and completing the policy framework for the development of high-quality human resources in Vietnam's construction industry.

Chapter 3
CURRENT STATUS OF THE FACTORS AFFECTING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN VIETNAM'S CONSTRUCTION INDUSTRY

3.1. OVERVIEW OF VIETNAM'S CONSTRUCTION INDUSTRY

3.1.1. Operational sectors of the construction industry

Vietnam's construction industry comprises three major sub-sectors, namely: residential and non-residential building construction; civil engineering construction; and specialized construction activities.

3.1.2. Position and growth rate of the construction industry

The construction industry is one of Vietnam's 21 key economic sectors. At present, the construction sector contributes approximately 6.3% to the national Gross Domestic Product (GDP).

3.1.3. Development of stakeholders in the construction industry

Similar to other economic sectors, the construction industry involves multiple types of economic entities participating in production and business activities, including enterprises, cooperatives, and individual household-based establishments. According to data from the General Statistics Office of Vietnam (2023), there are currently 104.1 thousand construction enterprises operating with positive production and business results, 455 construction cooperatives operating effectively, and 90.0 thousand individual construction establishments nationwide.

3.1.4. Employment in the construction industry

According to the General Statistics Office of Vietnam (2023), as of 2022, approximately 4.6 million workers were employed in the construction industry nationwide, representing an increase of 2.2% compared to 2020. Employment in the construction sector accounts for about 9.2% of the total workforce across all economic sectors. Of these, approximately 1.4 million workers are employed in construction enterprises, accounting for around 30.4% of total employment in the construction industry.

3.2. CURRENT SITUATION OF HIGH-QUALITY HUMAN RESOURCE DEVELOPMENT IN THE CONSTRUCTION INDUSTRY

3.2.1. Development in terms of quantity

At present, there are no official statistical data on high-quality human resources (HQHR) across the entire construction industry. However, due to the specific characteristics of HQHR, this workforce is primarily employed in construction enterprises, particularly large-scale firms. Based on aggregated data from 23 construction enterprises selected as typical case studies in this dissertation, the overall trend indicates a decline in total employment, including high-quality human resources. Nevertheless, adjustments vary across individual enterprises, although the majority still exhibit a reduction in workforce size. Large-scale enterprises tend to maintain more stable employment structures, whereas small-scale enterprises experience greater fluctuations.

3.2.2. Improvement in quality

3.2.2.1. Enhancement of physical capacity

Although high-quality human resources generally provide positive feedback regarding occupational safety and health practices, the current situation indicates that occupational accidents still occur. These accidents mainly take place at construction sites and are largely attributable to workers' carelessness. Skilled workers with high qualifications, advanced technical skills, and extensive experience are less likely to be involved in occupational accidents. Nevertheless, construction enterprises and the construction sector as a whole need to implement comprehensive measures to minimize occupational accidents, ensure workplace safety and health, and thereby contribute to the sustainable development of the industry's human resources.

3.2.2.2. Enhancement of intellectual capacity

Survey results show that 352 respondents, accounting for 47.28% of the surveyed high-quality workforce, agreed that skill training activities are effective, while only 18.98% perceived limited effectiveness from enterprise-organized training programs. However, construction enterprises have not fully leveraged internal resources for training and capacity building. Highly skilled engineers, technical staff, and experienced workers possess substantial knowledge, skills, and practical experience that could be shared among colleagues. Despite this potential, up to 71.87% of workers reported that they have not benefited from internal knowledge-sharing and experience-sharing activities within their enterprises.

3.2.2.3. Enhancement of psychological and motivational capacity

Overall, high-quality human resources demonstrate a strong sense of discipline in complying with enterprise rules and regulations and proactively fulfilling assigned tasks. Consequently, high-quality personnel in construction enterprises highly appreciate the strict enforcement of workplace discipline and awareness-raising activities, and some even actively participate in promoting labor discipline within their organizations. However, to further enhance positive work attitudes and stress resilience among high-quality human resources, construction enterprises should intensify collective and movement-based activities, particularly those specifically designed for high-quality human resources.

3.2.3. Ensuring a rational workforce structure

The construction workforce comprises both high-quality human resources and unskilled labor. In recent years, although total employment in construction enterprises has gradually declined, the reduction in unskilled labor has been more pronounced. As a result, the workforce structure has shifted toward an increasing proportion of high-quality human resources.

Efforts to ensure a rational structure of high-quality human resources in construction enterprises have achieved certain positive outcomes, as high-quality personnel are capable of handling substantial workloads and most workers consider personnel allocation to be appropriate to job characteristics and requirements. Nevertheless, the rotation and restructuring of high-quality human resources require further review and adjustment to achieve greater effectiveness and alignment.

3.3. ANALYSIS OF THE CURRENT SITUATION OF FACTORS AFFECTING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN THE CONSTRUCTION INDUSTRY

3.3.1. Measurement of the impacts of factors on the development of high-quality human resources in the construction industry

3.3.1.1. Description of the survey sample

Primary data were collected through a survey of high-quality workers, including managerial staff, employees holding at least a bachelor’s degree, and skilled manual workers with a vocational skill level of grade 5 or higher, across 23 construction enterprises. A total of 760 questionnaires were distributed. After excluding invalid responses, 743 valid questionnaires were retained for analysis, accounting for 96.99% of the total surveyed workforce in the construction industry.

3.3.1.2. Descriptive statistical analysis of measurement scales for factors affecting the development of high-quality human resources in the construction industry

The data analysis results indicate that the measurement scales exhibit different mean values and standard deviations. Specifically:

Table 3.17. Mean values and standard deviations of the measurement scales

Observed Variable	Variable Description	Mean	Standard Deviation
PTKT	National economic development	3.3271	0.81187
PTKT1	Strong economic growth provides a foundation for implementing large-scale and complex construction projects	2.67	1.052
PTKT2	International economic integration creates opportunities to enhance the competencies of high-quality human resources in the construction industry	3.35	0.851
PTKT3	An increase in foreign direct investment (FDI) inflows into the construction industry	3.45	0.901
PTKT4	Strong development of infrastructure systems	3.87	0.898
TTLD	Labor market of the construction industry	3.2624	0.81782
TTLD1	Expansion of training capacity for high-quality human resources in construction at higher education institutions	3.44	0.889
TTLD2	Increase in the proportion of trained human resources in the construction industry	3.16	0.977
TTLD3	Growing demand for high-quality human resources in the construction industry	3.19	1.010
CSPT	Policies for human resource development in the construction industry	3.2003	0.77435
CSPT1	Policies aimed at improving the quality of human resources in the construction industry	2.94	1.023
CSPT2	Policies on occupational safety and working conditions	3.20	1.010
CSPT3	Policies encouraging investment in research and development in the construction industry	3.22	0.956
CSPT4	Policies promoting innovation and creativity in the construction industry	3.18	0.973
CSPT5	Policies on wages, benefits, and incentive schemes for construction industry workers	3.47	0.836
KHCN	Development of science and technology in the construction sector	3.1760	0.79168
KHCN1	Innovation in production technologies	2.88	1.022
KHCN2	Continuous advancement of automation and robotics	3.39	0.887
KHCN3	Widespread application of artificial intelligence	3.20	1.002

Observed Variable	Variable Description	Mean	Standard Deviation
KHCN4	Strong digital transformation	3.24	0.944
CDDN	Compensation and incentive systems in the construction industry	3.2821	0.77730
CDDN1	Income commensurate with job positions	3.82	0.895
CDDN2	Adequate working conditions	3.11	1.004
CDDN3	Appropriate job assignment and allocation	2.93	1.031
CDDN4	Appropriate training and retraining activities	3.14	0.983
CDDN5	Opportunities for career advancement	3.40	0.886
CLNNL	Current quality of human resources in the construction industry	3.0441	0.76863
CLNNL1	Professional qualifications adequately meet job requirements	3.09	0.936
CLNNL2	Human resources possess skills that meet job requirements	2.91	0.955
CLNNL3	Construction workforce's ability to apply technologies in work (BIM, 3D printing, AI, etc.)	2.94	0.974
CLNNL4	Awareness of and compliance with occupational safety regulations in the industry	3.23	0.939
PTNNL	Development of high-quality human resources in the construction industry	2.96	0.791
SL	Increase in the quantity of high-quality human resources in the construction industry	2.94	0.786
CL	Improvement in the quality of high-quality human resources (qualification, physical capacity, and labor discipline)	3.12	0.744
CC	Rationalization of the structure of high-quality human resources in the construction industry	2.95	0.808

Source: Author's compilation based on survey data and calculations

3.3.1.3. Validation of the research model

Assessment of measurement scales using cronbach's alpha reliability coefficient

After reliability testing, the observed variable *"International economic integration creates opportunities to enhance the competencies of high-quality human resources in the construction industry"* was removed. The remaining 24 observed variables converged into six latent factors that satisfied the requirements for subsequent Confirmatory Factor Analysis (CFA).

Assessment of measurement scales using Confirmatory Factor Analysis (CFA)

Accordingly, the CFA results for the six measurement scales, comprising 24

independent observed variables and three observed variables representing high-quality human resource development (HQHRD), indicate that the measurement scales exhibit satisfactory goodness-of-fit and reliability. Therefore, these scales were retained for further analysis using Structural Equation Modeling (SEM).

Results of Structural Equation Modeling (SEM)

The SEM results show that the research model has 303 degrees of freedom, with a Chi-square value of 531.372 and a significance level of $p = 0.000$. The normed Chi-square (χ^2/df) is 1.754. Other goodness-of-fit indices also meet the recommended thresholds, including GFI = 0.941 (> 0.90), CFI = 0.976 (> 0.90), TLI = 0.972 (> 0.90), and RMSEA = 0.032 (< 0.06). These results indicate that the proposed research model demonstrates a good fit with the empirical data.

Results of model validation using the Bootstrap method

In this study, the bootstrap method was employed to validate the research model using 1,000 resamples. The bootstrap analysis indicates that the absolute values of the critical ratios (CR) are small, suggesting that although some bias may exist, it is relatively minor and negligible. Therefore, the parameter estimates of the research model can be considered reliable and robust.

3.3.2. Evaluation of factors affecting the development of high-quality human resources in the construction industry based on model results

The quantitative research results indicate that the compensation and incentive system in the construction industry**,** human resource development policies for the construction sector**,** the development of science and technology in construction**,** the current quality of human resources in the industry**,** the construction labor market**,** and national economic development all exert significant impacts on the development of high-quality human resources in Vietnam's construction industry.

With an overall satisfactory model fit, the SEM analysis reveals that the above factors influence the development of high-quality human resources in Vietnam's construction industry with standardized coefficients of **0.273**, **0.232**, **0.167**, **0.197**, **0.124**, and **0.098**, respectively. The coefficient of determination (R^2) for the dependent variable (HQHRD) is **0.674**, indicating that these explanatory variables account for **67.4% of the variance** in the development of high-quality human resources in the construction industry.

3.3.2.1. Compensation and incentive system in the construction industry

The SEM results indicate that the development of high-quality human resources in the construction industry is significantly influenced by the compensation and incentive system**,** with a standardized coefficient of **0.273**. This coefficient implies that a one-unit increase (on the Likert scale) in factors related to compensation and incentives leads to a **0.273-unit positive change** in the development of high-quality human resources in the construction industry.

This finding suggests that, to promote the development of high-quality human resources, greater attention should be paid to compensation and incentive mechanisms, particularly those targeting high-quality personnel. Such mechanisms

include income-based incentives, opportunities for training and career advancement, the provision of safe and adequate working conditions, and appropriate job assignment and allocation.

3.3.2.2. Human resource development policies

The SEM analysis also confirms the positive impact of human resource development policies on the development of high-quality human resources in the construction industry. The results show that high-quality human resources perceive the influence of HRD policies on HQHRD to be the **second strongest**, with a standardized coefficient of **0.232**.

This coefficient indicates that a one-unit improvement in human resource development policies leads to a **0.232-unit increase** in the development of high-quality human resources in the construction industry, in a direction consistent with policy enhancement. The findings demonstrate the comprehensive and pervasive role of policy frameworks in promoting high-quality human resource development. Accordingly, the policy implication is that HRD policies should be implemented in a coordinated, consistent, and effective manner to foster the sustainable development of high-quality human resources in the construction sector.

3.3.2.3. Development of science and technology in the construction sector

The model results indicate that the impact of science and technology development on the development of high-quality human resources in the construction industry is relatively modest, with a standardized coefficient of **0.167**. This outcome can be attributed to the current shortage of high-quality human resources in the industry, as well as the limited opportunities for workers to access and apply advanced construction technologies.

According to statistics from the Vietnam Construction Association, fewer than 20% of construction enterprises currently utilize drone technology in construction surveying and execution. The policy implication of this finding is the need to implement measures that promote the widespread adoption of advanced technologies in the construction industry, accelerate digital transformation, and strengthen the application of artificial intelligence, automation, and robotics in construction management and execution. These efforts would, in turn, contribute to enhancing the development of high-quality human resources in the construction sector

3.3.2.4. Current quality of human resources in the construction industry

According to the General Statistics Office of Vietnam (2023), more than 50% of construction workers do not hold vocational certificates and have acquired skills primarily through on-the-job experience. Another notable issue is the relatively low level of adoption of advanced technologies in professional practice. According to the 2023 report of the Institute of Construction Economics, only 20% of engineers and construction enterprises in Vietnam apply Building Information Modeling (BIM) in project management, whereas the corresponding rate in developed countries ranges from 60% to 70%**.**

Given this context, although the current quality of human resources is a

critically important factor, the empirical results indicate that its standardized impact coefficient on the development of high-quality human resources is **0.197**. This implies that a one-unit increase (on the Likert scale) in the factor *Current Human Resource Quality*—measured by the observed variables *"professional qualifications meet job requirements," "skills adequately meet job requirements," "ability to apply technologies in construction work (BIM, 3D printing, AI, etc.),"* and *"awareness of and compliance with occupational safety regulations"*—leads to a **0.197-unit increase** in the development of high-quality human resources in the construction industry.

The policy implication of this finding is that it is necessary to implement comprehensive and coordinated measures to enhance professional qualifications, technical skills, and discipline awareness among construction workers, particularly in the context of the rapid advancement of the Fourth Industrial Revolution.

3.3.2.5. Construction labor market

Currently, Vietnam has 46 education and training institutions specializing in construction-related disciplines. Of these, the northern region accounts for 25 institutions (15 universities and 10 colleges), the central region has 5 institutions (2 universities, 2 colleges, and 1 branch campus), and the southern region comprises 16 institutions (11 universities and 5 colleges). According to the assessment report on the current status of construction human resources published by the Vietnam Construction Association, approximately 65% of the construction workforce in Vietnam has received formal training.

However, in practice, the quality of construction human resources has not yet adequately met market demand. The SEM results indicate that the construction labor market has a positive impact on the development of high-quality human resources in the construction industry. Based on the measurement scales *"expansion of training capacity for high-quality construction human resources at higher education institutions," "increase in the proportion of trained construction human resources,"* and *"growth in demand for high-quality construction human resources,"* the labor market factor exerts an impact with a standardized coefficient of 0.124**.**

This coefficient suggests that a one-unit change in labor market–related observed variables results in a 0.124-unit positive change in the development of high-quality human resources in the construction industry. The policy implication is that promoting high-quality human resource development requires greater emphasis on construction-related education and training at higher education institutions to ensure both the quantity and quality of skilled labor supply. This, in turn, enables enterprises to meet labor demand and contributes to the formation of a high-quality human resource workforce that is sufficient in quantity, strong in quality, and balanced in structure.

3.3.2.6. National economic development

Empirical evidence indicates that **national economic development** influences the development of high-quality human resources in the construction industry. However, as this factor belongs to the macroeconomic environment, its impact is less

pronounced than that of industry-specific factors. According to the SEM results, the factor *National Economic Development* exhibits the lowest standardized coefficient among the six examined factors, at 0.098**.**

This result implies that a one-unit change in the observed variables representing national economic development leads to a 0.098-unit change in the development of high-quality human resources in the construction industry, in the same direction as the change in these variables. The significant observed variables for this factor include *"strong economic growth providing a foundation for large-scale and complex construction projects," "increased foreign direct investment (FDI) inflows into the construction industry,"* and *"robust development of infrastructure systems."*

The policy implication of this finding is that macroeconomic development policies that promote sustained economic growth and infrastructure investment will indirectly facilitate the development of high-quality human resources in the construction industry.

Discussion of the Model Results

Overall, the research findings indicate that factors within the industry's internal environment, including compensation and benefits policies, human resource development policies, and the current quality of the workforce, exert a greater influence on the development of high-quality human resources than macro-level factors such as labor market conditions and national economic development. This finding suggests that the development of a high-quality workforce in the construction sector depends primarily on the industry's ability to create work motivation, provide a supportive professional development environment, establish effective policy mechanisms, and ensure the quality of workforce training and education. These results also provide an important basis for proposing priority solutions in the coming period to enhance the effectiveness of high-quality human resource development in Vietnam's construction industry.

Chapter 4
DIRECTIONS AND SOLUTIONS FOR DEVELOPING HIGH-QUALITY HUMAN RESOURCES IN VIETNAM'S CONSTRUCTION INDUSTRY

4.1. CONTEXT RELATED TO FACTORS AFFECTING THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN THE CONSTRUCTION INDUSTRY

In the context in which the Ministry of Construction is actively strengthening policy framework development, promoting digital transformation, and advancing administrative reform, alongside the rapid growth of the construction industry, the construction sector in general and construction enterprises in particular need to implement coordinated and comprehensive solutions. These solutions should aim to adjust and optimize the influencing factors identified in the empirical analysis in order to effectively promote the development of high-quality human resources in the

construction industry.

4.2. OBJECTIVES AND DEVELOPMENT ORIENTATION FOR HIGH-QUALITY HUMAN RESOURCES IN VIETNAM'S CONSTRUCTION INDUSTRY

4.2.1. Objectives

The overarching objective of human resource development in Vietnam's construction industry for the period 2022–2030 is to transform construction-sector human resources into a key competitive advantage that contributes to the country's sustainable development in general and to the advancement of the construction industry in particular. This objective emphasizes enhancing the competitiveness of the construction workforce to meet the requirements of the **Fourth Industrial Revolution** and international integration, while remaining aligned with sectoral development policies and the national industrial development strategy toward 2030, with a vision to 2045**.**

4.2.2. Development orientation

The fundamental orientations for the development of high-quality human resources in the construction industry are as follows:

First**,** the development of high-quality human resources in the construction industry must be closely aligned with construction sector development planning.

Second**,** high-quality human resource development should ensure comprehensive improvement in quantity, quality, and structure, thereby meeting the evolving demands of construction industry development.

Third, the development of high-quality human resources should be based on enhancing efficiency across the entire human resource lifecycle, from education and training to effective utilization in practice.

Fourth, priority should be given to developing high-quality human resources in the construction industry who are capable of rapid adaptation to dynamic labor market conditions and emerging scientific and technological advances, possess strong professional competencies, and demonstrate high levels of foreign language proficiency, information technology skills, and occupational expertise, thereby supporting the rapid and efficient development of the construction industry.

4.3. PROPOSED SOLUTIONS FOR ADJUSTING INFLUENCING FACTORS TO PROMOTE THE DEVELOPMENT OF HIGH-QUALITY HUMAN RESOURCES IN VIETNAM'S CONSTRUCTION INDUSTRY

4.3.1. Solutions related to national human resource development policies and policies for the development of high-quality human resources in the construction industry

- Review, revise, and strengthen the implementation mechanisms of policies issued by the Government and sectoral authorities, with particular emphasis on key policies related to human resource development in the construction industry.
- Innovate and develop policy frameworks, mechanisms, and policy instruments for effective human resource management in alignment with the Fourth Industrial Revolution and digital transformation. Undergraduate, postgraduate, and

vocational training programs should deeply integrate content related to Building Information Modeling (BIM), artificial intelligence in construction, construction data analytics, smart construction management, and other relevant digital technologies. This approach aims to develop a workforce capable of rapid adaptation to modern production and management environments.

- Develop higher education policies that attract learners to enroll in construction-related disciplines currently experiencing shortages of high-quality human resources.
- In addition to incentive-based measures, establish mandatory competency development requirements for managers at all levels to ensure compliance with professional standards and job position requirements.
- Implement tuition support policies for students enrolled in vocational education, particularly in construction-related technical trades that are in high demand by the industry.
- Encourage economic groups, state-owned corporations, enterprises, and both domestic and foreign investors to invest in the development of high-quality human resource training for the construction industry.
- Promote and incentivize local governments to develop and integrate construction-sector human resource development plans into their respective socio-economic development strategies.
- Improve policies on compensation, incentives, and talent attraction.

4.3.2. Solutions to Strengthen Training Activities

- Enhance the quality of training for high-quality human resources in the construction industry at vocational training institutions and higher education institutions.
- Develop demand-driven training models that are aligned with the practical needs of construction enterprises.
- Encourage construction enterprises to actively participate in human resource training, including on-the-job training, retraining, and cooperative training programs with educational institutions.

4.3.3. Solutions to enhance awareness of the role of high-quality human resource development in the construction industry

It is necessary to organize extensive and in-depth communication and awareness-raising activities on the position, role, and importance of developing high-quality human resources in the construction industry for all units within the sector and for workers at all levels, particularly organizational leaders. These efforts should emphasize that human resources constitute the fundamental foundation and the most decisive factor in the development of the construction industry in particular and socio-economic development in general.

At the same time, such activities should highlight the role and responsibility of enterprises and sectoral stakeholders in training and effectively utilizing high-quality human resources as a critical task in the current period. This approach aims to

transform existing challenges related to high-quality human resources—such as limited quantity, constrained quality, and an imbalanced structure—into a competitive advantage in the future.

4.3.4. Enhancing the effectiveness of high-quality human resource attraction in the construction industry

Recruitment activities for high-quality human resources should be innovated and diversified, with the application of Industry 4.0 technologies to recruitment processes in order to ensure objectivity, accuracy, and efficiency. These measures will help attract a workforce that genuinely possesses appropriate qualifications, professional competencies, and occupational skills aligned with job positions, as well as positive attitudes and professional ethics, a willingness to contribute, and a commitment to continuous self-improvement.

As a result, these efforts will contribute to the development of a high-quality workforce in the construction industry in terms of both quantity and quality.

4.3.5. Establishing appropriate compensation and incentive systems for high-quality human resources

First, high-quality human resources should be appropriately assigned to positions that match their competencies and strengths, thereby creating favorable conditions for them to fully utilize their knowledge and talents, contribute effectively, and receive due recognition and respect.

Second, salary and bonus policies should be implemented in close alignment with labor productivity and the operational performance of enterprises.

4.3.6. Strengthening labor discipline awareness among high-quality workers

In general, high-quality workers demonstrate a relatively high level of labor discipline. Nevertheless, strengthening labor discipline remains a highly relevant task, as labor discipline constitutes a critical foundation for ensuring effective task performance.

- Strengthen communication and legal education activities to further enhance workers' understanding of laws and regulations and promote voluntary compliance with labor laws and workplace discipline. These activities should be conducted in a more in-depth and specialized manner, focusing on workers' rights and obligations, while also emphasizing the values and benefits associated with strong labor discipline, thereby fostering a proactive and responsible workforce.
- Continuously develop and enhance organizational and corporate culture to reinforce labor discipline among high-quality workers, while gradually embedding discipline as a habitual practice and a distinctive cultural characteristic of high-quality human resources.
- Timely recognize and commend exemplary individuals and collectives who demonstrate strong compliance with labor discipline, while simultaneously addressing and criticizing violations in order to contribute to the education and development of professional work attitudes and labor skills.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

1. Conclusions

The development of high-quality human resources is a priority area of interest and investment for governments worldwide, particularly in the context of rapid advances in science and technology. However, the effective development of high-quality human resources remains a distinct challenge for each country and each sector, as such development in different territories and industries is influenced by diverse sets of factors. The development of high-quality human resources in Vietnam's construction industry is likewise shaped by multiple influencing factors. Based on an in-depth examination of these factors, the dissertation yields the following key findings:

First, the study systematizes the theoretical foundations related to factors affecting the development of high-quality human resources, including relevant concepts, the content of high-quality human resource development, evaluation criteria for high-quality human resource development, and the factors influencing such development.

Second, the dissertation analyzes the current situation of high-quality human resource development in Vietnam's construction industry, highlighting positive progress in this area despite a decline in the overall construction workforce due to the impacts of the COVID-19 pandemic.

Third, the dissertation proposes a model of factors influencing the development of high-quality human resources and applies Cronbach's Alpha reliability testing, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Structural Equation Modeling (SEM), and Bootstrap testing to identify the influencing factors, as well as the direction and magnitude of their impacts on high-quality human resource development.

Fourth, based on both quantitative and qualitative analyses, the dissertation evaluates six factors represented by 24 observed variables that affect the development of high-quality human resources in the construction industry. These results provide a scientific basis for proposing solutions to promote the development of high-quality human resources in the construction sector.

Fifth, the dissertation examines the objectives and development orientations for high-quality human resources in the construction industry and proposes a system of solutions aimed at fostering the sustainable development of high-quality human resources within the sector.

2. Recommendations for future research

Future research directions identified by the author include further investigation into the factors affecting the development of high-quality human resources in Vietnam's construction industry, with a particular focus on advancing high-quality human resource development toward the formation of a green and sustainable workforce**.**

The author welcomes constructive feedback and contributions from researchers, experts, and policymakers to support the development of more rigorous and impactful studies in the future.

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