

Improvement of Core Competitiveness of Chinese Construction Enterprises Against the Background of High-Quality Development

Lu Chunfang¹, Wu Jun^{2,3}, Wang Mengjun³, Li Xinsheng⁴, Liu Bo⁴, Liang Chao⁴, Hu Xiaodong³

1. China Railway Society, Beijing 100844, China

2. China Railway Group Limited, Beijing 100039, China

3. School of Civil Engineering, Central South University, Changsha 410075, China

4. China Tiesiju Civil Engineering Group, Hefei 230031, China

Abstract: The construction industry is a pillar of the national economy. Complex international competition and pressure from domestic reforms necessitate the improvement of the core competitiveness of Chinese construction enterprises. In this study, we first analyze the development status and challenges of the core competitiveness of Chinese construction enterprises. Subsequently, we summarize the factors that influence the core competitiveness of Chinese construction enterprises via a fishbone diagram; literature review; and expert consultation, including human resource management, scientific and technological innovation, culture and brand building, project management, professional construction, and industrial chain integration. Furthermore, we propose the corresponding suggestions and countermeasures from the perspectives of the government and the enterprise. Specifically, the government should improve the mechanism of scientific and technological innovation, improve relevant standards and policies of green construction, and enhance industry governance. Moreover, construction enterprises should improve the quality of human resource management, promote scientific and technological innovation, create brand soft power, integrate high-quality resources of the industrial chain, and promote core business advantages.

Keyword: construction enterprises; high-quality development; core competitiveness; ability improvement

1 Introduction

High-quality development is the new theme of Chinese economic and social development. According to the national 14th Five-Year Plan and the outline of the 2035 vision, high-quality development must ensure the deepening of structural reform on the supply side, lead and create new demand through innovation and high-quality supply, and enhance the resilience of the supply system and its adaptability to domestic demand. Facing the challenges generated by domestic reform pressure and complex international competition situation, there is an urgent need for the transformation and upgrading of construction enterprises to ensure high-quality and efficient development [1]; accordingly, the improvement of core competitiveness is the key to breakthrough. The enhancement of core competitiveness means that enterprises will provide higher value products and services, thus gaining a unique and lasting competitive advantage in the market and occupying a larger market share and higher market position. In recent years, with the optimization of the policy and economic environment, Chinese construction enterprises have

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Corresponding author: Wu Jun, professor-level senior engineer of China Railway Group Limited. Major research field is railway and bridge engineering. E-mail: tsjwj@126.com

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accelerated the integration of advantageous resources, continuously improved their business strength, and significantly enhanced their core competitiveness; however, generally, they are still facing development obstacles such as a low quality of supply, insufficient high-end supply, and weak innovation drive. Therefore, enhancing their core competitiveness and achieving high-quality development is a realistic problem that Chinese construction enterprises urgently need to solve.

The core competitiveness of construction enterprises is an important research area of academic interest, but limited literature has examined the factors influencing the core competitiveness of construction enterprises. Some studies emphasize on the research background of low-carbon economy and industrialization [2,3], while some scholars conduct research on the influencing factors system based on the structural equation model [4,5]. Considering the background of high-quality development, this study analyzes the development status and influencing factors of the core competitiveness of Chinese construction enterprises and proposes measures to improve their core competitiveness from two levels of management institutions and enterprises in order to provide reference for the high-quality development of the construction industry.

2 Current status of the development of core competitiveness of Chinese construction enterprises

2.1 Overview of the development of core competitiveness of the construction enterprises in China

According to the report of the fourth national economic census, since 2013, the total output value of the national construction industry has exceeded 20 trillion CNY; and, overall, construction enterprises have shown strong market competitiveness. According to the overseas market operation, the *Statistical Analysis of the Development of the Construction Industry in 2020* released by the China Construction Industry Association shows that among the world's 250 largest international contractors per the *Engineering News Record (ENR)* in 2020, the overseas business revenue of Chinese-led enterprises accounted for 25.4% of the total revenue. Relating to financing management, the project financing channels of Chinese construction enterprises include equity financing, financial leasing, debt financing, credit financing, and export credit, among others. Production–financing integration and financing insurance, among others, provide a strong guarantee for controlling financing risks. From the perspective of brand building, construction enterprises in China were included in the list of the top 100 most valuable brands in the world in the annual report published by Brand Finance from 2016 to 2021.

At present, management institutions have created a suitable external environment for construction enterprises to build their scientific and technological innovation capacity. Guided by a series of national policies, such as the Urban Construction Letter (2017) No. 32 and Finance and Taxation (2018) No. 99, construction enterprises have attached increasing importance to scientific and technological innovation and carried out a series of major research projects, research and development (R&D) platform construction, and other innovative activities [6]. The amount of R&D investment by construction enterprises nationwide has been on a rapid upward trend year by year, with the total R&D investment of Chinese construction enterprises listed in the top 10 of the ENR list of the world's largest international contractors in 2019, reaching as much as 45.817 billion CNY (Fig. 1). The number of scientific and technological achievements of Chinese construction enterprises has increased from 1739 in 2014 to 2781 in 2019 [7].

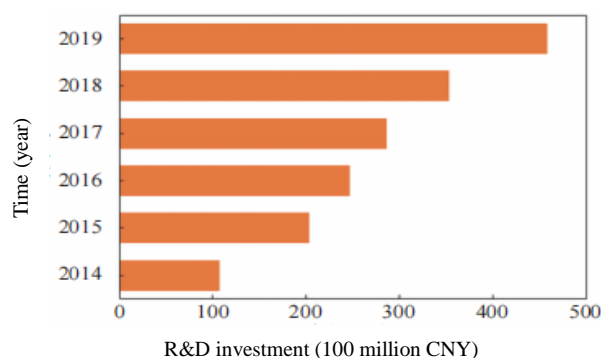


Fig. 1. Cumulative annual R&D investment of the top 10 Chinese construction companies listed by ENR as the world's largest international contractor in 2020.

Note: The data are obtained from the annual reports of each company from 2014 to 2019.

With the support of favorable national policies such as the *Action Plan for the Creation of Green Buildings* and *Management Measures for Green Building Identification*, green buildings in China have developed rapidly, such that some of them have reached international leading levels. By the end of 2018, over 15 900 projects nationwide had been awarded China Green Building marks, with an increasing proportion of new green buildings gaining two-star and three-star ratings [8]. In addition, the number of prefabricated buildings in China has been increasing year by year (Fig. 2), with the construction of new prefabricated buildings in a $6.3 \times 10^8 \text{ m}^2$ area to be started in 2020, accounting for approximately 20.5% of new building area, which has already fulfilled the target of the *13th Five-Year Plan for Prefabricated Buildings* in regard to the proportion of prefabricated buildings in new building areas [9,10].

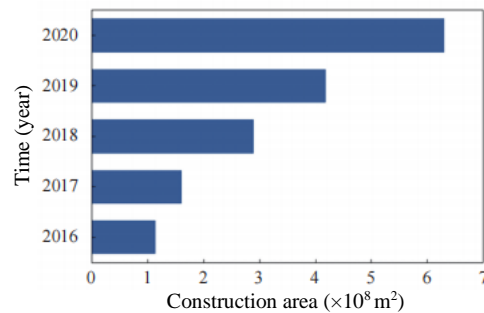


Fig. 2. Area of newly started prefabricated buildings in China from 2016 to 2020.

Note: The data are derived from the statistics on the development of prefabricated buildings of the Ministry of Housing and Urban-Rural Development in China.

The number of employees involved in Chinese construction enterprises has been on the rise from 2009 to 2019 (Fig. 3), and a large number of personnel has emerged; however, most of them had not received professional education or training in new construction technologies such as building information modelling (BIM), intelligent building, and prefabricated building, thereby making it difficult to meet the new demand for high-quality construction [11]. Moreover, the depth of professional knowledge of construction enterprise managers is insufficient, and their ability to handle and respond to new materials, structures, and processes is weak. Although the construction and operation of international engineering projects have higher requirements regarding the managerial ability and comprehensive quality of construction enterprise personnel, China does not have sufficient reserves of high-quality composite international engineering project talents. Particularly, there is a lack of composite talents with knowledge of market development and management, rich financial knowledge, high foreign language level, and advanced professional technology. This is also one of the reasons why Chinese construction enterprises are still significantly disadvantaged compared to the internationally renowned contractors [12].

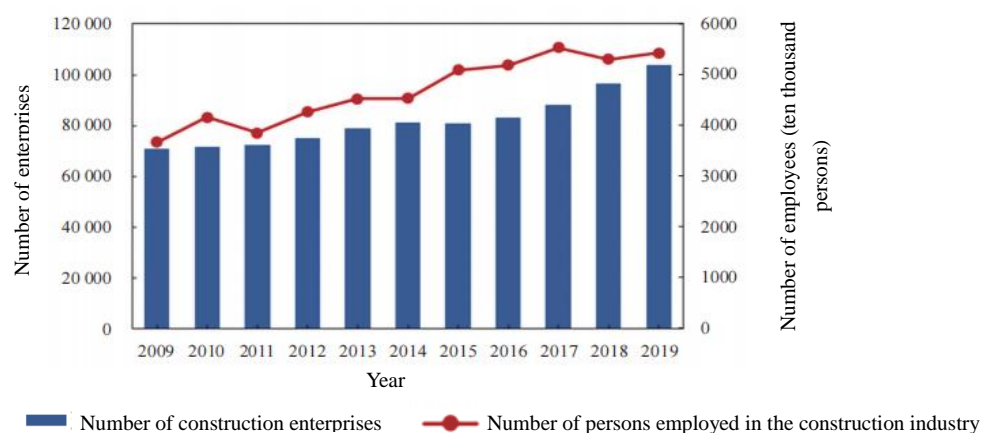


Fig. 3. Number of construction enterprises and employees in China from 2009 to 2019

Note: The data are obtained from the *China Statistical Yearbook 2020*.

2.2 Main challenges facing the development of the core competitiveness of Chinese construction enterprises

2.2.1 Weak ability to transform scientific and technological achievements

Technological innovation is not only important for improving the economic benefits of enterprises, but also a key factor for the development of enterprises. Additionally, it acts as an important measure to deepen the supply-side structural reform of the construction industry and achieve high-quality development of the construction industry [13]. The abilities of Chinese construction enterprises to transform their scientific and technological achievements into real productive forces is not sufficient to match the level of first-class enterprises in developed countries. In addition, the incentive mechanism for the transformation of scientific and technological achievements is not perfect as there exist challenges in terms of low awareness of transformative scientific and technological initiatives and lack of motivation [14].

2.2.2 Insufficient comprehensive risk control ability of overseas business

At present, although the financing risk control ability of construction enterprises in China has enhanced, they are relatively lacking in commercial financing experience and capital markets capability, especially in the international capital market; moreover, they are highly dependent on the state's policy-based financial support [15]. The overseas construction project environment of Chinese construction enterprises is complicated, further aggravated by the disunity of construction standards and laws, fragmentation of resources, weak risk management ability, vicious competition, and information asymmetry. The imperfect financial environment in countries (regions) along the Belt and Road generates high risks in geopolitics, trade protection, national sovereignty, and investment protection. Overall, the comprehensive risk control ability of the overseas businesses of Chinese construction enterprises is not sufficient to provide a strong guarantee for overseas business expansion [16].

2.2.3 Preliminary stage of the resource and comprehensive integration capabilities of the whole industrial chain

Compared with international well-known contractors, Chinese construction enterprises exhibit strong competitiveness in equipment manufacturing and engineering construction in the industrial chain, but experience disadvantages in overseas financing, investment and development, operation management, and the integration ability of the whole industrial value chain of large-scale engineering projects [17]. Driven by the transformation and industrialization of the construction industry, prefabricated buildings are gradually being popularized. However, at present, the preliminary planning, feasibility study, engineering design, component production, construction, and installation of relevant domestic projects are completed by individual enterprises. Furthermore, the information sharing mechanism of all parties involved is not perfect, as collaborative management is difficult to accomplish and collaborative operation ability is insufficient. All links of the whole industrial chain have not been effectively connected, and the resource advantages of the whole industrial chain need to be integrated [18].

2.2.4 Insufficient brand influence and weak cultural construction

In the increasingly competitive market environment, Chinese construction enterprises are gradually realizing the importance of enterprise brand and culture. Brand enterprise, as an important intangible asset, is the direct embodiment of enterprise competitiveness. Corporate brand and culture are mutually integrated, such that the construction of corporate culture needs to be integrated into the construction of corporate brand [19]. Although there are many famous international brands in China, the level of brand control and operation ability of Chinese construction enterprises still need to be improved in order to enter the mainstream markets in Europe and America to strengthen overseas business. In particular, brand strategy still needs to undergo a long development process to improve product quality, service, and brand influence [20].

3 Factors influencing the core competitiveness of Chinese construction enterprises

Based on the research status, literature analysis, and consultation with industry experts, this study uses a fishbone diagram to summarize the factors influencing the core competitiveness of Chinese construction enterprises, covering six categories: human resource management, core scientific and technological innovation, enterprise brand and culture construction, project management, professional construction, and industrial chain integration (Fig. 4).

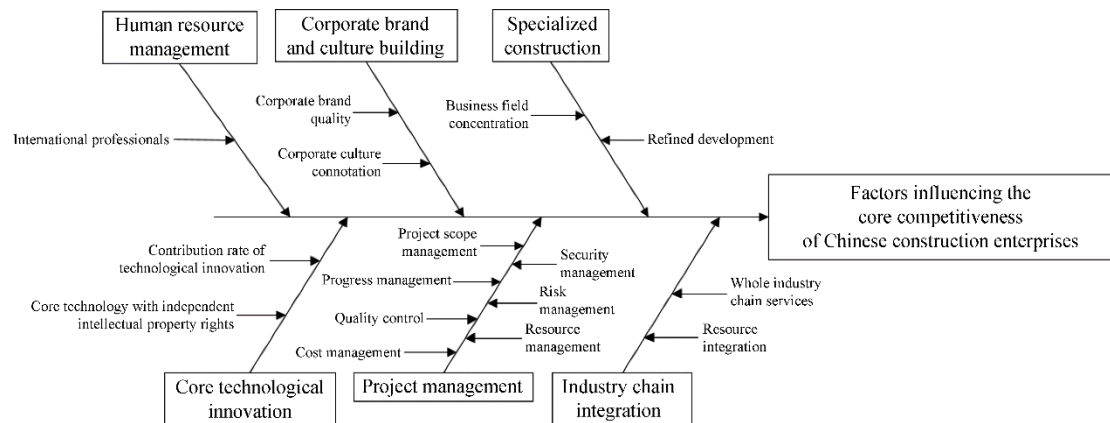


Fig. 4. Fishbone diagram representing the influencing factors of the core competitiveness of China's construction enterprises.

3.1 Human resource management

Human resource management has always been an important aspect of the core competitiveness of enterprises. As China's construction industry globalizes, the turnover of foreign contracted projects of Chinese construction enterprises has achieved rapid growth; therefore, the demand for international talents is increasing daily. The comprehensive quality of international talents is mainly reflected in the response to overseas market and competitive advantage strategy, which will ultimately affect the implementation of the internationalization strategy of construction enterprises. Currently, Chinese construction enterprises have insufficient talents equipped with insufficient international management ability; furthermore, the comprehensive training ability of talents in engineering is relatively weak. Moreover, the training duration concerning international management personnel through dispatching is lengthy, which leads to obvious shortcomings in the scale of international talents. At the same time, the international talent management mechanism of Chinese construction enterprise requires further development, the performance appraisal and promotion system should further support overseas projects, the enterprise personnel lack international initiative and enthusiasm for participating in international project, and there exists high international brain drain. Therefore, construction enterprises need to accelerate the implementation of international talent strategy, strengthen the discovery of high-quality international compound talent, consider a targeted selection and training, and improve the competitiveness of the international construction market.

3.2 Core scientific and technological innovation

With the advent of the era of knowledge economy, scientific and technological innovation ability has become the foundation for the steady growth and development of construction enterprises. The economic benefits brought by science and technology are not only a measure of the survival and competitiveness of enterprises, but also a measure of the market position and growth potential of enterprises. Although construction enterprises are constantly increasing their efforts in scientific and technological innovation, most enterprises are still at the level of imitation learning and technology introduction, lacking core technologies with independent intellectual property rights. The contribution rate of science and technology is still at a low level [21], and the core technology competition has not been alleviated. With the acceleration of economic globalization and concentration of internationally renowned construction contractors, the competition in the construction market is becoming increasingly fierce, which makes the traditional development model of the construction industry unsustainable. Under the new situation, Chinese construction enterprises must adapt to the market needs and changes in engineering science and technology to improve the level of scientific and technological innovation, so as to gain competitive advantage and sustainable development.

3.3 Enterprise brand and cultural construction

With the development of economic globalization, Chinese construction enterprises are facing unprecedented pressure in market competition. Enterprises can sustain their competitive advantage only by cultivating and shaping their core competitiveness through corporate brand and culture. Although many construction enterprises have realized the importance of brand effect and are constantly improving their brand quality, the brand building effect of enterprises is not ideal. Many construction enterprises' understanding of brands focuses on the popularity, ignoring

the spiritual core and key values of brands. For example, employees' understanding of the connotation of corporate culture is rather vague. Furthermore, their failure to identify with the corporate culture makes the integration of employees' values and corporate culture and their fulfillment of roles difficult. Therefore, construction enterprises need to create distinctive brands and cultures for the international and domestic markets and build first-class brand positions in the industry to establish and maintain sustainable competitive advantages.

3.4 Project management

A project in construction is the main objective in the production and operation of construction enterprises and is an important source of economic benefits for enterprises. Competition among construction enterprises is no longer simply the competition of resource elements but the comprehensive competition of management and science and technology, in which project management is the core of the competition among construction enterprises. With the increasing application of public-private partnership, build-operate-transfer, engineering-procurement-construction, and other management modes, project management should not be limited to the traditional management mode and should be integrated in the entire process, closely connecting management elements such as project scope, schedule, quality, cost, safety, risk, and resources. Ideally, project management covers business links such as project planning, bidding, labor subcontracting, financial funds, environmental protection and energy saving, materials and equipment management, and civilized construction as well as the systematic, standardized, and integrated management of project plan formulation, implementation, and comprehensive change control [22]. Construction enterprises should adhere to standardized management, strengthen the management and control over engineering projects, enhance the efficiency-creating ability of projects, and cultivate profit growth points, thereby enhancing their core competitiveness and achieving high-quality development.

3.5 Professional construction

At present, it is a strategic period for China to promote high-quality development. Construction enterprises should change their focus from extensive to refined development through quality and efficiency reforms. Specialization is the development trend of construction enterprises, which can lead to unique and competitive market advantage. The homogenization competition among Chinese construction enterprises is common due to the concentration of business areas in similar target markets. Coincidentally, the proportion of specialized construction enterprises in China is lower than that in developed countries, and it does not match the multi-level specialized division of production demand in the construction market. Therefore, some construction enterprises must take the road of specialization, improve their performance, and strengthen specialized businesses to ensure they gain professional competitive advantage.

3.6 Industrial chain consolidation

In the development and transformation of the modern construction industry, construction enterprises are no longer limited to a single development model; they should develop toward diversification and consider the entire industrial chain. Related enterprises could play an integrated and synergistic role, improve the efficiency of resource utilization, and thus create greater economic value. Currently, most construction enterprises in China have not played their complete role in the industrial chain. Additionally, the integration process and results are not satisfactory due to many factors such as the involvement of a wide range of fields, many affiliated enterprises, and the complex distribution of interests. Industry consolidation requires large upfront investment for construction enterprises, and once the industrial chain is formed, determining whether resources and technology can be effectively shared within the industry to reduce operational costs is the key to achieve profitability. This is a competitive process of survival for the fittest as well as a process of redistribution of resources and markets. The core competitiveness of most construction enterprises in China cannot adapt to the integration process, which leads to a low degree of industry consolidation. Therefore, construction enterprises should improve the vertical and horizontal integration degree of industrial chain, actively play the leading role of industry, realize the integration of capital flow, information flow and logistics [23], and promote the sustainable and healthy development of construction industry based on their resourcefulness.

4 Suggestions and measures for improving the core competitiveness of Chinese construction enterprises

4.1 Management level

4.1.1 Improving the system and mechanism of scientific and technological innovation, and promoting Chinese construction standards

Management departments should further improve the market-oriented mechanism, submit to the guiding role of market-oriented demand, formulate financial subsidies or preferential tax policies, and encourage construction enterprises to increase R&D investment. Furthermore, they should expand the production–education–research–application channel and support construction enterprises to jointly build a scientific and technological innovation platform with other scientific research forces, coordinate the R&D of scientific and technological achievements and economic transformation, promote the innovation of the transformation mechanism of scientific and technological achievements and the incentive mechanism of property rights, and continuously improve the transformation effect of scientific and technological achievements. Additionally, the management should attach great importance to the formulation and promotion of construction standards from the national strategy and reduce the technical barriers and market access obstacles encountered by Chinese construction enterprises in the international engineering market. Moreover, they should strengthen the cooperative research on standards and norms with other countries or regions; actively participate in the formulation of international standards; concentrate on industry efforts; establish systematic Chinese engineering technical standards, including survey, design, and construction, and translate and publish them in multiple languages; and give priority to the promotion and use of the technical standards proposed by China in international markets.

4.1.2 Implementing the concept of “green” and “smart” to promote the digital transformation of the construction industry

Administrative departments should further improve laws and regulations, strictly assess the responsibility for energy-saving targets of the construction sector, establish the green building standards, improve the green building incentive policies, and establish a long-term incentive mechanism based on the market. Additionally, the management should improve prefabricated building technology and relevant product standards; promote the R&D and promotion of a technical system; and conduct engineering practice pilot projects at a large scale. With the development, popularization, and application of an integrated construction mode such as general contracting, strengthening its combination with prefabricated buildings to better realize the deep integration and unified management of multiple links in engineering construction is necessary. Furthermore, they should embrace BIM, Internet of Things, blockchain, cloud computing, and other information technology means and constantly promote the transformation of production and organization modes. Finally, they should formulate digital standards and specifications, realize the organic combination of management and technology and barrier-free communication of information and data, and promote the digital transformation and upgrading of construction enterprises.

4.2 Enterprise level

4.2.1 Strengthening the management of human resources and optimizing the personnel training mechanism

Enterprises should be strategy-oriented and have a matching human resource management system that adheres to the people-oriented thought and can transform into a process of value flow and appreciation. Construction enterprises should guarantee culture, adhere to the correct employment orientation, cultivate employees’ sense of belonging, and create a good talent cultivation environment. Based on the mechanism, they should adjust the organizational structure. Furthermore, establishing a reasonable incentive and restraint system, improving the talent training and development mechanism, implementing the talent grading evaluation management, and improving the talent management performance are important. Relying on major scientific research, demonstration, and application projects, they should be able to cultivate a team of high-quality multi-level and international talents who understand theory and practice well as well as deepen cooperation with domestic and foreign outstanding enterprises, industry associations, institutions of higher learning, and so on. Finally, construction enterprises can strengthen the training of reserve talents echelon.

4.2.2 Promoting scientific and technological innovation and participating in the formulation and promotion of international construction standards.

Enterprises should keep up with the forefront of green, intelligent, and lean industries and formulate flexible scientific and technological innovation strategies; increase investment in scientific and technological innovation; cultivate the R&D system based on the core business and supplemented by related businesses; and realize the flow, agglomeration and efficient utilization of scientific and technological innovation elements. Construction enterprises can cultivate scientific and technological innovation ability and lay a solid foundation for realizing independent innovation through technology introduction, technological transformation, and production–education–research cooperation among other ways. To break through the international engineering market barriers, construction enterprises should actively participate in the formulation and promotion of international construction standards and norms based on the existing engineering practice knowledge and taking the international engineering market expansion as a path.

4.2.3 Building brand soft power to enhance international market influence

Enterprises should establish the quality concept, build high-quality brands with high-quality products, and further reach the high-end market to maintain the existing market share. To accelerate the upgrading of international brands, construction enterprises need to constantly enrich and expand the connotation of corporate brands and strengthen the brand marketing of transnational and cross-markets. Moreover, they need to improve the awareness, trust, and reputation of new customers. In addition, construction enterprises can overcome the threat of non-technical barriers, consolidate the existing market share, and enhance market influence by making full use of the support of management agencies and the long-established efficient social network.

4.2.4 Integrating high-quality resources in the industrial chain and improving the risk management system

Enterprises should innovate the thinking mode of project management, learn and apply advanced international project management theories and methods, update the concept of project management, conduct management innovation based on experience summary and project conditions, and improve project management efficiency. Furthermore, they should integrate all kinds of high-quality resources in various business sectors and industrial chains, carry out strategic cooperation with internationally renowned contractors, and integrate multi-dimensional advantages. Additionally, they are required to meet the integrated service demands of the owners. They need to improve the depth and breadth of project management informatization and cross-regional, cross-disciplinary, and multi-level engineering project management system with the support of an information management platform. Moreover, they should strengthen the overall risk assessment of target areas and countries, and improve risk early-warning and control systems.

4.2.5 Deepening core business advantages and promote the globalization of the whole industrial chain

Faced with the increasing value demands of international owners, Chinese large-scale construction enterprises with strong overseas competitiveness and comprehensive professional strength should actively transform from contractors to investors and service providers, improve the integrated layout of investment, construction and operation; and build a whole industrial chain enterprise integrating all aspects of engineering construction. Especially in the post-epidemic era, the international engineering market is facing pattern reconstruction, and large-scale construction enterprises should seize the opportunity to carry out cost-effective merge and acquisition integration activities; make full use of the unique advantages in a certain field; strengthen the diffusion of core business; and promote the whole industrial chain to the international construction market from point to point.

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