Research on the Development Path of Construction Enterprises Led by Intelligent Construction

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Abstract. Intelligent construction is a new construction and management mode formed by the deep integration of information technology and Engineering Construction Technology, which is the only way to realize high-quality development of construction industry. This paper expounds the new requirements of intelligent construction for construction enterprises, sorts out the problems existing in the development of construction enterprises, and some suggestions are put forward to provide reference for construction enterprises to realize high-quality development led by intelligent construction.

Keywords: intelligent construction; construction enterprises; transformation and upgrading

1   Introduction

Intelligent construction is a new construction and management mode formed by the deep integration of information technology and engineering construction technology, which can enable the green development of the construction industry and help the transformation and upgrading of the traditional construction industry to achieve high-quality development [1] .Construction Enterprises are an important part of the market economy, can provide more jobs for the community, promote urban and rural development, stabilize economic growth, and promote national economic and social development. The coordinated development of intelligent construction and construction industrialization will bring new development opportunities for construction enterprises.

2   New Requirements of Intelligent Construction for Construction Enterprises Intelligent

Intelligent Con-struction is defined in English as Intelligent Con-struction, Smart Con-struction, or Wisdom Construction[2]. Intelligent construction involves the whole life cycle of construction projects, and is promoting the modernization of the construction industry by promoting the upgrading of product forms, construction methods and management concepts, construction Enterprises will also face the higher requirements of how to comply with the trend of development of the times.

2.1   Improving the Level of Digital Management

Construction Enterprises should build a data model in the decision-making stage of big data analysis, so that engineering decision-making can move from experience-driven to data-driven transformation. In the design phase, BIM technology is used to carry out visual design and multi-professional collaboration. During the construction phase, Construction Enterprises should implement prefabricated building construction, construction of smart sites and application of BIM technology for collision detection and optimization. In the operation service stage, Construction Enterprises should carry out the completion of the digital handover, to achieve timely response to operational failures, and improve the efficiency of data management and security management capabilities.

2.2   Adhering to Green and Low-Carbon Development

The ultimate goal of intelligent construction is to provide people-oriented, intelligent green and sustainable engineering products and services [3]. Green construction is to integrate the concept of green development into the whole process of project planning, design, construction and delivery.it is beneficial to saving resources, protecting environment, improving efficiency and ensuring quality. The new construction method of green, industrialization, information, intensive and industrialization is beneficial to save resources, protect environment, improve efficiency and guarantee quality. Construction Enterprises should be guided by the supply-side structural reform, to implement green construction measures to help achieve the "Double carbon" goal.

2.3   Building Diversified Development Pattern

The intelligent construction involves the whole life cycle of the project, connecting the upstream and downstream construction participants through the information network, it can promote the integrated development of the whole industrial chain covering scientific research, design, production and processing, construction and assembly, and operation.   Construction Enterprises should change their management concepts, build a diversified development pattern, strengthen the main business while extending to the upstream and downstream industries, to cultivate new profit growth points, and realize the innovation of business model from single construction business to project

investment and industrial operation, which can change the status quo of being at the bottom of the industrial value chain for a long time to achieve   high-quality enterprise development.

3   Problems In the Development of Construction Enterprises Under the Intelligent Construction Background

There are some problems in Construction Enterprises, such as the lag of management idea, the small scope of market business, the poor development competitiveness and the need to strengthen the implementation of national policies.

3.1   The Digitization Foundation of Construction Enterprise is Very Weak

Digital transformation refers to the application of new digital technology in the process of production and management to achieve data-driven production and management decision-making [4], which is the only way for construction enterprises to develop into intelligent construction. However, most of the construction enterprises have a low level of information, the leaders of the enterprises have a cognitive bias towards the digital transformation, and the digital application talents are insufficient, so they can not deeply mine the value of data, the speed of digital transformation is slower than the speed of market change, which makes enterprises unable to build intelligent construction sites and realize intelligent construction through intelligent construction and management, and digital handover of completed construction, also failed to advance with the times to enhance their own management capacity, operating methods and profitability.

3.2   The Green Low-Carbon Development Consciousness of Construction Enterprise is Very Weak

At present, most construction enterprises have not set up technology r & D centers, lack the ability of technology innovation, lack of green construction measures, and have serious environmental pollution of dust and noise, weak awareness of green procurement, Construction materials and products that have been certified as green building materials are not widely used. The new field of producing recycled aggregate, recycled concrete, mortar, block, brick, plate and other recyclable materials is not developed actively, which can not realize low consumption, low emission, high quality and high benefit in the way of industrialization and intelligent construction.

3.3   The Business Model of Construction Enterprise is Very Unitary

Intelligent construction is the integration of decision-making, design, production, construction, operation of the entire industrial chain, new mode of production for information integration and business collaboration across the entire industrial chain, energy efficiency in the construction process, and maximising the value of resources [5].Most construction enterprises donot pay attention to technological innovation, and are not competitive enough to undertake prefabricated building construction tasks. The internal management leve is low. They are not aware of seeking business opportunities, and are not able to effectively implement diversified business strategies, which affect the level of enterprise efficiency. The profit space is further compressed, which will restrict the speed of enterprise development and the pace of transformation and upgrading.

4   The Development Path of Construction Enterprises Guided by the Demand for Intelligent Construction

Intelligent construction aims to transform the construction industry through the robotic revolution to cut project costs, improve accuracy, reduce waste, and improve resilience and sustainability [6].

4.1   Accelerate the Digital Transformation and Upgrading of Enterprises

The World Economic Forum has developed a framework for the transformation of the construction industry to promote intelligent transformation and upgrading of the construction industry through the use of new technologies [7]. Accelerating digital transformation and upgrading, as well as digital empowerment, is an important lever for promoting supply side structural reform in the construction industry. Construction enterprises should utilize digital technology for comprehensive, multi angle, and full chain transformation, to promote intelligent construction through digital construction. Construction enterprises should pay great attention to the information construction from the strategic level, and establish the digital transformation cognition system from the enterprise level to the project level by strengthening the digital transformation training. In particular, the leaders of enterprises should pay attention to cultivate the thinking of data to make scientific strategic decisions, to ensure that corporate culture, management ideas, organizational behavior to meet the needs of digital development. Digital application talents can integrate digital technology with business development to realize value creation, which is the key to the success of enterprise digital transformation.

Construction Enterprises should set up digital platform to realize digitalization of enterprise management, socialization of enterprise resources, digitalization of project construction and Synergy of industry development. Construction Enterprises through the continuous promotion of enterprise digital transformation to create new advantages of enterprises, which can put BIM technology, information, modernization of the construction industry in the forefront of peers.

4.2   Promote Green and Low-Carbon Development of Enterprises

Construction Enterprises should practice the concept of green low-carbon development, strengthen cooperation with leading enterprises in the industry, promote the application of intelligent construction technology. They should stick to the road of green and low-carbon development of lean and smart construction, participate in green planning, green design, green construction, green delivery, to promote green construction and high-quality development of the construction industry [8], as shown in Figure 1.

Green technology innovation is the power source for construction enterprises to realize green and low-carbon development. Construction Enterprises should promote green technology innovation, which can accelerate the whole process of construction of green, intelligent and renewable cycle. With limited R & D capabilities, on the one hand, Construction Enterprises can use green technologies that are already mature in the market and on the other hand, they can establish a mechanism for collaborative innovation among industry, universities and research institutes, which will strengthen mutual assistance and interaction with universities and scientific research institutions, to promote the rapid and efficient application of green technological innovations by enterprises.
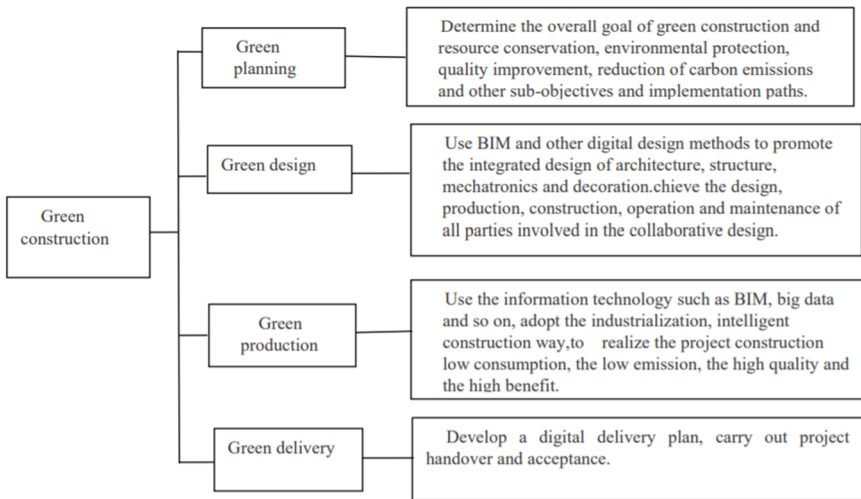

Fig. 1. Main contents of Green construction

4.3   Implement the Strategy of Enterprise Diversification

With the rapid development of BIM technology, Internet of things, artificial intelligence, cloud computing and big data, an industrial system of intelligent construction, which integrates the whole industrial chain of scientific research, design, production and processing, construction, assembly and operation, is gradually taking shape, the upstream and downstream enterprises in the construction industry chain are also looking for new profit growth points in the fierce market competition.

As the main force of high-quality development of construction industry, Construction Enterprises should strengthen their main business, at the same time, they should take the market demand as the guidance to capture the information related to the main business and optimize the allocation of resources, and conduct business analysis according to the typical business choice analysis tool Boston Matrix to , strengthen cooperation with industry leading enterprises, take the construction business as the core to extend to the upstream and downstream industries, and implement diversified business strategy, bring the industrial advantages established in the main industry into full play to the relevant new industries [9] , so as to expand the business space of enterprises and improve the risk-resistant capacity of enterprises.

5   Conclusion

Because the intelligent construction is the only way to achieve high-quality development of construction industry, Construction Enterprises should strengthen the implementation of national policies, accelerate digital transformation and upgrading, adhere to green and low-carbon development, and implement diversified management strategy, to promote the coordinated development of intelligent construction and building industrialization.

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