

# *Factors Influencing Innovation Performance of Assembled Building Construction Companies*

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**Keywords:** Assembled buildings, construction companies, innovation performance, influencing factors

**Abstract:** In order to improve the innovation performance of assembly building construction enterprises and promote the high-quality development of assembly building construction enterprises, this paper explores the influencing factors of the innovation performance of assembly building construction enterprises. Through theoretical analysis, it is found that the influencing factors of innovation performance of assembly building construction enterprises can be analyzed from four aspects, including internal innovation elements, cooperative innovation, construction market environment, and technological innovation policies. And based on the analyzed influencing factors correspondingly put forward relevant suggestions to provide some reference and guidance for assembly building construction enterprises to improve their innovation performance.

## **1. Introduction**

Enterprise development is inseparable from innovation, and to achieve high quality development we must promote high quality innovation, and always adhere to the key position of innovation in the whole development process. As a large construction country, most of the initial construction methods due to the lack of information led to high energy consumption and low efficiency, so that the relatively crude production and construction methods driven by resources is the most important feature of traditional construction. With the continuous development of the economy, China's construction also began to transform and upgrade towards the direction of green, industrialization, management modernization and intelligence. The state and various government agencies have also started to pay more attention to the innovation of the assembly building construction enterprises, stimulating them to increase their innovation efforts and thus enhance their innovation ability. Despite this, there are still many problems, including insufficient financial investment, incomplete planning and strategy, inability to manage multiple innovation elements in a collaborative manner, and too low conversion rate of R&D results. To this end, this paper explores the key factors influencing the innovation performance of assembly building construction enterprises and seeks effective paths to enhance innovation performance in order to enrich the research related to innovation performance of assembly building construction enterprises and provide reference and reference for the innovation-driven development of assembly building construction enterprises.

## **2. Innovative Development of Assembly Building Construction Enterprises**

### **2.1. Abandoning Traditional Concepts**

At present, there are few cases of assembly building construction enterprises to “assemble” in order to “assemble”. Only a few simple components are prefabricated to meet the so-called assembly rate standards, and the building cannot be fully implemented, resulting in quality benefits cannot be achieved [1]. If you still use the traditional construction ideas to complete the line assembly building, it will inevitably lead to the construction work can't be carried out in full detail, not only the higher cost, innovation benefits can't be guaranteed, these traditional development concepts need to be abandoned in the assembly construction as soon as possible[2].

### **2.2. Combination of Assembled Building Construction Methods and High-quality Buildings**

The construction industry must be moving in the direction of improving the quality of projects and bursting with urban spirit in the development process. The assembled building construction enterprises gradually create higher and higher quality assembled buildings with the help of the assembled building process will be an important goal for some time to come. Add the design theme of green and healthy, low energy consumption and low carbon in the design process of assembly building construction enterprises, combine low carbon and assembly building to create a new set of working methods, featuring complete assembly, green building, resource saving and low energy consumption, extend to the whole industry chain, and combine the integration of multiple elements with innovative ideas to realize new construction methods to boost the construction of high quality and industry High-quality development[3].

### **2.3. Combination of Construction Industrialization and Informationization**

The process of industrialization of assembled building construction enterprises is an important way of high-quality development and transformation of the construction industry. To develop “construction industrialization” needs to be based on “construction informatization”, and in the whole process, we need to insist on leading industrialization with informatization and promoting informatization with industrialization, complementing each other and deeply integrating together[4].

### **2.4. Stimulating the Development of Innovation with Project Upgrading**

The important work of building construction enterprises is to complete construction projects, and in this construction process, it is necessary to continuously strengthen innovative ideas and create high-quality projects to adapt to the changing market and users' needs [5]. Motivating innovation and upgrading with the demand of high-quality projects, the innovative ideas are tightly combined with the actual projects of assembled buildings to form integrated application design technologies based on building products. Establish the technological innovation direction of the project and the difficulties of the project at the early (original) design stage, actively promote new ideas and technologies, and integrate scientific research and innovative ideas throughout the entire process of engineering design, construction, and operation and maintenance [6].

### 3. Analysis of the Factors Influencing the Innovation Performance of Assembly Building Construction Enterprises

#### 3.1. Internal Factors

##### (1) Human Resource Management

In the process of innovation in construction enterprises, the definition of human resource management can be explained as a series of management activities such as planning, employing, training, assessing and rewarding innovative talents in construction enterprises [7]. The whole process of trying to coordinate the relatively good interpersonal relationship between the construction enterprise and the innovative talents is to further stimulate the potential of the innovative talents and effectively achieve the intended goals of the construction enterprise. In terms of behavioral theory, innovative performance is influenced by HRM activities because innovative activities can be recognized in the company and will be rewarded with corresponding benefits and rewards [8-11]. Companies wanting to get employees to behave as desired need to make incentives and feedback on relative employee behavior. Therefore, performance appraisal and salary rewards in human resources can effectively promote the company's goals and make them better. At the same time, the transfer and promotion of personnel positions should not be neglected, so that the loss of talent can be avoided, and therefore human resource management is one of the factors that affect the innovative performance of assembly building construction enterprises [12].

##### (2) Knowledge Management

The so-called knowledge management refers to the construction enterprise managing the knowledge owned by the enterprise through a series of activities such as acquiring, creating, selecting, sharing, applying and updating, and the enterprise delivers the knowledge to the corresponding employees in a certain way at the right time, so as to enhance the organizational performance and create certain value [13-15]. Knowledge management is a complete process of creating, harvesting, accumulating, sharing and applying knowledge. After studying the knowledge characteristics of the technology of assembly building construction enterprises, it is found that most of the knowledge requires relevant experience, and the information shows that the technical personnel of building construction enterprises are basically educated by universities [16]. One writes that important positions even require a rigorous examination to be passed before they can engage in the relevant work. Therefore the knowledge reserve possessed by employees in construction enterprises is very beneficial to innovation and is one of the factors that affect the innovation performance of assembly building construction enterprises [17].

##### (3) Innovative Fund Management

After investigation, it is found that the market environment and order of the assembly building construction enterprises are chaotic, the owner's price pressure is very serious, the competition between construction enterprises is illogical and orderly, and the phenomenon of salary and payment arrears happens from time to time, which leads to the problem of capital tension more serious [18]. The original capital chain of building construction enterprises is single and not very strong, which makes the capital in innovation more tight. To strengthen the investment in research and development of new technologies in the main industry and to take the lead in scientific and technological progress to form new economic growth points for the assembly construction enterprises, we must first solve the capital problem and make scientific and reasonable planning for the limited funds to help increase the innovation performance of the assembly construction enterprises. Therefore, innovation fund management is one of the influencing factors that affect the innovation performance of assembly building construction enterprises [19].

### 3.2. Collaborative Innovation

The technology of modern architecture and the processes of building construction projects are becoming more and more complex, making the work of assembly building construction companies more and more difficult and risky for innovation, and many innovative activities cannot be carried out independently by one construction company or one scientific institution. Therefore, a more common method for construction enterprises to carry out innovation is to choose a suitable external organization to cooperate with. Through research studies, it is found that relevant construction companies usually consider universities, research institutions and enterprises for cooperation when choosing external organizations [20]. Such cooperative innovation can fully utilize the external innovation resources, which include technology as well as market information. By cooperating with these institutions, not only can the efficiency of entrepreneurship be improved, but also the innovation cycle is shortened, and not only are the risks and costs of innovation shared, but also the complementary innovation resources of both parties can be shared[21]. At the same time, by following external information technology and paying close attention to the information behavior of other institutions, construction companies will also conduct their own internal research and development to create their own unique innovation resources and advantages in all aspects of key competencies. Through multi-party cooperation, assembly building construction companies can enjoy excellent external resources from multiple perspectives with multiple partners to make up for the shortcomings of their internal innovation resources, thus further reducing technological uncertainty and improving innovation efficiency[22]. Therefore, cooperative innovation is one of the factors influencing the innovation performance of assembly building construction enterprises, as it helps assembly building construction enterprises to use external innovation resources and at the same time increases innovation performance.

### 3.3. Construction Market Environment

#### (1) Construction Market

Since construction projects are closely related to people's life and property safety, they have their own set of detailed technical specifications and strict industry controls in contrast to other industries. These strict norms hinder to a certain extent [23]. The application of technological innovation in the market for assembled building construction enterprises, and also the selection as well as the use of innovative resources are somewhat restricted.

#### (2) Owner

The scope of construction of assembled building construction enterprises mainly includes the construction of some infrastructure, the construction of public institutions such as hospitals, schools and real estate, and the construction of other industrial projects. Now, the market environment of assembly building construction enterprises is very unbalanced, and the state of supply exceeds demand has been clearly shown, especially the buyer's market. Therefore, the owner's low prices and arrears of payments as well as wages make it difficult for assembly building construction companies to work smoothly, further leading to the inability of contractors to carry out new innovative activities with the available funds [24]. Intuitively, it means that the owner is to a certain extent restricting the innovative enterprise in terms of the source of funds and the use and diffusion of results, which will lead to the failure to improve the innovative performance.

#### (3) Suppliers

The construction industry, as the backbone of the national economy, is closely linked to the development of other related industries. The most important ones include manufacturers of building materials for raw materials as well as manufacturers of equipment supply. Especially for assembly building construction enterprises, these suppliers of raw materials are in supply. The products

required by construction companies include raw materials such as steel and cement to semi-finished products such as prefabricated steel plates and prefabricated beams, and then to related machinery and equipment such as excavators and concrete mixers. These suppliers must strictly follow the relevant industry controls and regulations in order to make the new products eligible for market entry. Because these costs are high, and the regional nature of the construction market and the fragmentation of builders causes costs to skyrocket. This situation often results in suppliers not being able to specialize in the process of developing new products in the construction industry to make larger profits. All in all, suppliers of various raw materials, although rarely involved in the innovation process within the assembly building construction companies, still influence the problems caused by supplying materials and semi-finished products in terms of innovation. At the same time, because of the ultra-systematic nature of the assembly building industry makes the innovation performance of assembly building construction companies can be greatly affected.

### **3.4. Innovation Policy**

Innovation policy can be reflected in many aspects, but the main aspects include the following three, namely laws and regulations, economic leverage and policy guidance. In order to obtain higher innovation performance, construction enterprises need to create a better innovation environment to carry out corresponding innovation activities, so as to strengthen the transformation of scientific and technological achievements, cultivate the construction market, and strengthen knowledge management. An investigation of the link between innovation and policy shows that different policies have different effects on innovation performance. One of them is the policy that affects the innovation results of construction enterprises, which is related to the local government's conditions for bidding evaluation in engineering tenders, while how innovation results are promoted and implemented is related to policies such as demonstration projects. The innovation policy can improve the innovation performance of construction enterprises from two aspects: the first aspect is certain financial subsidies, preferential tax policies, and other inducement policies, which stimulate enterprises to invest in innovation resources, so as to achieve higher advantages in terms of talents and funds, and further obtain good innovation performance; the second aspect is to accelerate the transformation of innovation results, and continuously The second aspect is to accelerate the transformation of innovation achievements, to carry out demonstration projects, and to play a supportive role in intellectual property protection policies, so as to create a good innovation environment for construction enterprises and to obtain higher innovation performance by improving their enthusiasm.

## **4. Recommendations**

### **4.1. Strengthen the Management of Innovation Elements**

The assembly building construction enterprises around the main line of innovation, increase the investment of enterprise resources (funds, personnel, equipment), develop innovation strategies and implementation plans in line with the enterprise, monitoring and control system and operational mechanism reform, strengthen the innovation network of the enterprise's internal technological innovation capabilities, optimize the incentive to innovate and tap the innovation potential of the enterprise. Among them, to improve technological innovation capacity, the key is to improve the research capacity and promote the development of enterprises, and constantly improve the scientific and technological innovation capacity and enterprise technological transformation, technical equipment and process level, and encourage enterprises to establish packaging technology research and development center of solid. Enterprises have limited elements of technological innovation.

Therefore, it is necessary to manage the internal and external innovation elements scientifically and effectively to maximize their utility, so as to promote the improvement of the level of technological innovation performance of enterprises. Influenced by the technological innovation characteristics of the construction industry, talents have an important impact on enterprise technological innovation. Therefore, it is necessary to vigorously absorb outstanding talents and strengthen the science and technology team of construction enterprises.

## 4.2. Improve Construction Market Environment and Related Innovation Policies

Construction enterprises must be market-oriented, constantly carry out technological innovation, develop the market with the latest technology, the best products and the best services, occupy the market and grow in the market competition. To ensure fair and orderly competition among construction enterprises, it's necessary to improve the existing regulations on qualification management of construction enterprises and increase the industrial concentration of the construction industry. In addition, it is also necessary to effectively regulate the behavior of owners, such as prohibiting acts such as pressure level and price, advance construction, and default on construction payments, actively promoting technical achievements such as new technologies and products with more economic and efficiency advantages to owners, strengthening communication between design and construction enterprises and suppliers, and promoting active participation of owners and suppliers in technological innovation activities of construction enterprises. As the construction industry technology and its technological innovation characteristics, relying entirely on market mechanisms often cannot effectively protect the rights and interests of innovators, so in order to encourage enterprises to carry out technological innovation it is necessary for the government to set some special rights and interests.

## 5. Conclusions

This paper concludes from the analysis that the factors affecting the innovation performance of assembly building construction enterprises mainly include human resource management, innovation fund management, knowledge management, collaborative innovation, innovation fund management, construction market environment and innovation policy, and puts forward corresponding suggestions for the relevant factors. At the same time, there are some shortcomings in this study, which can be further justified and studied for expanding innovation business. The development of assembled building construction enterprises is promising, and in order to ensure their effective development, it is essential to improve innovation performance.

## Acknowledgements

This work is supported by Social Science Planning Fund Project of Liaoning Province. (L22BGL029).

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