

# *Research on Restricting Factors and Countermeasure of Assembled Architecture Development*

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**Abstract:** With the drawbacks of traditional construction methods becoming more and more prominent, many cities in China have responded to the call to actively promote assembly building. In some industrialized developed countries, assembly building occupies a high proportion and a mature technical system, including high standardization of parts, components, and perfect industrial chain. Compared with developed countries, cast-in-situ construction is the main construction method in China, and the construction efficiency is not high. In order to save resources, protect the environment and speed up the structural reform of supply in the construction industry, assembly building has become a way to reform the construction mode in China. This paper first analyses the difference between assembled building and cast-in-place building, then analyses the restricting factors on assembled building, and finally it puts forward some suggestions.

## **1. Introduction**

The development of assembled buildings is a change of traditional construction methods. Which is one of the main measures to promote construction industrialization. China must promote the structural reform of supply side in construction industry. In the process of promoting assembly building, we will inevitably encounter various obstacles, which will not only restrict the development of assembly building, but also affect the transformation of production mode. The development of assembly building is an important way for the urban construction industry transformation, which helps to deepen the understanding of assembly building. Therefore, this study has certain theoretical exploratory and practical significance.

## **2. The difference between assembled building and cast-in-place building**

### **2.1 The application of assembled building in developed countries**

Assembled building is a kind of building product which is formed by the transportation with prefabricated parts, components and materials. And then through the proprietary connection technology, the building structure will take shape. In 2016, Premier Li Keqiang emphasized that "assembly building has brought great changes to the construction mode, and it can greatly promote the structural reform of the supply side and urbanization construction." Assembled buildings have

been widely used in foreign countries for a long time. The proportion of foreign assembly buildings is shown in Figure 1. However, the proportion of assembled buildings in new buildings in China is less than 5%.

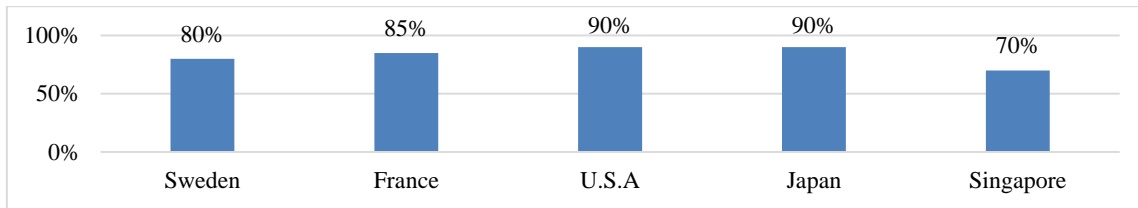


Figure 1: The proportion of foreign assembled buildings (%)

## 2.2 The difference between assembled building and cast-in-place building

The difference between the assembled building and the existing cast-in-place building is shown in Table 1. Relevant data show that assembly building can save 20% of materials, 60% of water resources, 20% of land and 70% of construction waste. Which improves the recycling rate of construction waste, saves more than 40% of labor, and shortens the construction cycle by 1/3 compared with traditional construction. Assembled building reflects the requirements of new industrialization, informatization and greening, and it is the inevitable trend of construction mode reform in China.

Table 1: Differences between Assembled and Cast-in-situ Buildings

	Cast-in-place building	Assembled Architecture
Building material	Construction raw materials such as cement, sand, steel bar and block	Mass concrete members, steel structures, parts and components
Worker	Mainly migrant workers	Technical Workers with Industrial Workers as the Main Body
Management	Package management	Technology-led Engineering Management
Efficiency	Long cycle and low efficiency	Can shorten the construction cycle
Environmental protection	Much Waste of Resources and Much Construction Waste	Energy saving, environmental protection and green
Architectural design	Insufficient depth, more mistakes, leaks, collisions and deficiencies	Assembled Architecture

## 3. Restricting factors of assembled architecture development

### 3.1 Market environmental factors

At present, although the government vigorously promotes the assembly building, China is still dominated by Cast-in-place building. There are two main reasons. Firstly, the degree of collaboration among participants is low. The industry involves development enterprises, design, prefabricated component factories, transportation and construction units. There is a lack of effective resource sharing platform between all parties. Secondly, the previous one-time investment is generally high. The production enterprises need a large amount of funds for research, pipeline construction, and the 17% value-added tax of the construction industrial products. So the enthusiasm of the participants is not enough.

### **3.2 Policy and regulatory factors**

Although the government has issued policies to encourage the construction of assembly buildings, there are still many problems, such as imperfect implementation details, inadequate implementation of local governments, lack of training mechanism for enterprises, and failure to guide the enterprises transformation, and so on. Although the government has issued policies to encourage the construction of assembly buildings, there are still many problems, such as imperfect implementation details, inadequate implementation of local governments, lack of training mechanism for enterprises, and failure to actively guide the transformation of enterprises, and so on. At the same time, there are some very realistic problems. Firstly, the standard system of design, production, installation, construction and acceptance of assembly buildings has not yet been established in China. Secondly, the standards and requirements of different provinces have not yet been unified, and it is difficult to achieve the standardized production and construction of components. The compilation of standard takes a certain time. In some aspects, it lags behind the development of new engineering technology, and there are imperfections and conflicts.

### **3.3 Immature technical system**

The development of assembly building must be based on advanced technology, but at present, there are many imperfect technologies. Firstly, the research on key technology of assembly building is insufficient, such as joint connection of components, dimension deviation of combined installation position, maintenance of finished products, earthquake resistance and so on. Secondly, the achievements of supporting industrial production machinery and tools are insufficient, so the level of production and installation technology is insufficient, and the quality of production equipment and raw materials can not meet the requirements. In addition, in the assembly building development, the lack of professionals is also an important factor. At present, the technicians engaged in assembly building still have some problems, such as low overall quality, low technical level and so on. Therefore, technology is a prominent restriction factor in the development of assembly building.

## **4. Countermeasure of the Assembled Architecture Development**

### **4.1 Strengthening support at the policy level**

Policy support and guidance are of great significance to the development of assembly buildings. In order to promote the development of assembled buildings in China towards a better direction, the policy level should also give some control and support. Firstly, we should set up the assembly building leading organization. The leading body are composed by the municipal government, the urban construction commission, Finance Bureau and the land and resources bureau. Under the leadership, an office is set up. The office is mainly responsible for the following aspects of assembly building, such as policy formulation, standard improvement, project evaluation, technical demonstration, etc. For each office, the scope of work and responsibilities should be clearly defined to ensure that each office cooperates. Secondly, we should step up the introduction of assessment methods for assembly buildings. Through this method, we can realize the scientific and reasonable assessment, and then promote the healthy and stable development of the assembly building. Thirdly, government departments should formulate medium and long-term development plans for assembly buildings. Through this plan, enterprises can clearly define development goals, main tasks, safeguards, and so on.

## 4.2 Increasing market cultivation

We must build a healthy, upward and positive market atmosphere, which requires more market cultivation. First, we should do a good job in guiding the layout of production capacity, and improve the industry's in-depth and comprehensive understanding of assembly building. Relevant departments should plan assembly building production bases and industrial parks according to market development needs. Secondly, we should establish the project reserve of assembly constructions and industrial bases. Through the supervision and management of the assembly building, the quality and efficiency of the building can be guaranteed. At the same time, we can also control the overall market.

## 4.3 Improving technical level

Technology is the support of the assembly building development. Only by ensuring the technical level, can the assembly building be further promoted. We should strengthen scientific research and investment in assembly building, and constantly improve and optimize technology. The assembly building technical support system includes standard design, assembly construction, quality safety, inspection and acceptance. In order to improve the technical level of assembly building development, it is necessary not only to strengthen the scientific research of related technologies, but also to strengthen the training of professionals.

## 5. Conclusions

With the continuous development of science and technology, people's requirements for the construction industry are getting higher and higher. In order to better meet the development needs, the construction industry must constantly reform and optimize, so assembly building is an important development direction. Assembly building has become the trend of the construction industry development, which has a huge development prospects. It is necessary to constantly update the theoretical knowledge, technology and practical ability of assembly building. Only in this way, can we promote the sustainable development of construction enterprises and China's construction industry.

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