A Feasible System of Infill Supply for Urban Housing in China

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Abstract

In recent years, Chinese house production has reached the vast scale of ten million units each year, many of which are being commercialized. China has gradually developed a unique form of two-stage unit realization where the unit owner, the long-term lessee, endeavors to procure fitting out. This causes various risks for the stakeholders, such as the authority, the developer, the infill supplier and especially the owner. The authors have investigated the state-of-the-art of the fitting out practice for multi-family housing in Chinese metropolises, and structured the risks imposed on the stakeholders. Having found a similarity in the supply pattern with single-family detached housing rather than multi-family housing in other countries, a viable means to avoid the risks was sought. Proposed in this paper is a system which combines incremental inspection with escrow service, a type which has already been introduced to the custom-built single family housing market in Japan.

Keywords: housing in China; infill supply; inspection; escrow service

1. Introduction

At present, the scale of Chinese housing supply has reached ten times that of Japan, and is developing rapidly in the process of housing market-orientation. In recent years as the population has continued to move to the urban areas, there is a great need for multi-family housing in Chinese cities. Considering factors such as state-owned land tenure, a short cycle of funds and so on, China has gradually developed a common form of two-stage unit realization where the unit owner endeavors to procure fitting out after the developers have sold the housing directly without the fitting out. In one word, the SI (Skeleton-Infill) separation form, which is at the stage of being explored, searched and tested in Japan and other countries, is being applied in a special way in China. Of course, there exist all kinds of problems in the process of application. By analyzing the data and information at hand and investigating the fitting out practice for multi-family housing in the autumn of 2003, the authors discuss the situation and the existing problems of the form of two-stage unit realization in China. The Chinese fitting out market called "Jiazhuang" (Home Fitting Out) is similar to the single family detached housing market in Japan, which belongs to the individual, is dispersed, custom ordered and of built market in quality. On the basis of this argument, it is more viable to adopt the system of Japanese newly-built housing supply which combines incremental inspection with escrow service so as to avoid the risks imposed on the stakeholders, including housing quality for the owner, payment for the infill supplier and so on. The system is discussed in this paper.

2. The Existing Construction Situation of Multi-family Housing in China

2.1 The Scale

In recent years, Chinese housing construction has developed rapidly and outstandingly. According to the national statistics data, it is reported that there are 440 million square meters of newly-built housing every year. If every housing unit occupies an area of 40 to 50 square meters this adds up to nearly 10 million units of housing under construction per year. At the same time, the area of housing for sale increased by up to 180 million square meters in 2001, a total over 6 times that of 1991, of which more than 90% was bought by private owners. The market has developed rapidly.

Taking Shanghai, the most outstandingly developed city as an example, on the basis of the statistical data and information provided by Professor Lai from Tongji University, it has averaged 17 million square meters in 2002. Supposing that on average every unit occupies an area of 100 square meters, it adds up in total to 0.17 million units of newly-built houses every year. Based on an urban population of 13 million (the registered population is 8 to 9 million), the
rate of housing under construction for one thousand people per year is 11.5 units, which is higher than the Japanese index.

2.2 Market

After the establishment of the People's Republic of China in 1949, people built a large quantity of multi-family housing units, which were designed to the standards of the Soviet Union. In recent years, custom-built housing such as single-family units have existed, however most are still multi-family housing.

By the early 1980's, an administratively allocated special housing system for workers was still the norm in the housing market. Such housing was either allocated to workers free of charge or rented at low fees. At that time, the living standard of city residents was quite low, and the housing area per person was less than 5 square meters on average.

After the 1980's, with the implementation of the housing reform the "marketisation" of housing was established on the basis of "Commodity Housing" which is maturing day by day. Especially in recent years, the construction of urban housing has been developing rapidly, and "Market-oriented Commodity Housing" has reached more than 80 percent of the housing market. At the same time, housing loans are widely available with market-oriented "Commodity Housing". Since the relevant laws were revised in 1999, the yearly lending rate has been changed to about 5%, and the time limit for payment has been extended to 30 years.

According to the policy of "Xiaokang Housing" (Comfortable Housing) proposed in the early 1990s, it was assumed that on average, every person owned 8 square meters of housing by 2000. Based on that, the Chinese government devised the plan of "1.2 billion square meters of housing construction during the period 1996 to 2000. As a matter of fact, in recent years housing area per capita has increased by a large amount in urban areas.

2.3 Real Estate Market/Housing Price/Commodity Housing

After the relevant laws were revised in 1988, land tenure became transferable. Further, the Urban Real Estate Management Laws of 1995 made strict regulations regarding the sale, use and duration of land use. It is 70 years for residential land use, 50 years for industrial land use and 50 years for public land use, such as for education.

According to the data from the National Statistics Bureau, the average sale price for ordinary commodity housing in Beijing was 4919 RMB per square meter and 3321 RMB per square meter in Shanghai in 2000. Since then housing prices in the Metropolises have continued to rise.

Distinguished from the modality, the nearer the buildings are to the center of the city, the higher the building height is. In recent years, due to the limitation of floor area, more and more residential areas consist of mixed low and high-rise blocks. Moreover, "Xiaoaoaceng" (mid-rise blocks) with 12 to 15 floors have become more expensive due to the building height limit and because buildings must be equipped with elevators if they are more than 7 floors high.

Unlike Japanese housing with a corridor on one side, Chinese prefer "two in one" – sharing of public stairs and elevator between two units with their areas apportioned to the buyer's sale area. Balconies are becoming an enclosed space and living rooms that face south are popular.

3. Home Fitting out–the Existing Situation of Infill Supply

3.1 The SI Separation and Full Fitting Out

In China, fitting out the house is called "Jiazhuang" (home fitting out). At present, the most common form of multi-family housing is that sold directly without fitting out, which the occupants themselves fit out. Namely, the housing supply (Skeleton) and interior supply (infill) are separate in China. In addition, it is very popular to fit out after taking possession of a house. It is reported that about 10 percent of the approximately 120 million urban tenants carry out home fitting out every year. Recently, represented by Shanghai city, there is a new trend, and that is to provide occupants with fitting out. This kind of so-called "Quanzhuangxiu" (Home Full Fitting Out) is attracting more attention.

3.2 The SI Separation Form

In China, either "the administratively allocated housing for workers" or the present "commodity housing", are all houses without fitting out. The houses without fitting out are called "Qingshui Housing" or "Maopi Housing". At present, the Chinese residents' living standard and income are both increasing rapidly, so consumers pay more and more attention to home fitting out.

In China, "Commodity Housing" adopts the form of the SI separation, and the process of its supply is approximately as follows:
A. The "Structural Frame (skeleton)" construction stage, which is the responsibility of the developers. 
   (1) Project planning and architectural design:
   • to gain "use of land" (70 years) from the local authority,
   • to carry out the basic architectural design, obtain approval for urban planning, fireproofing design and so on and
   • to establish the housing sale contract. The first payment is generally 20~30% of the final house price.
B. The "Structural Frame" construction (equipment infrastructure work included).
C. Turnkey delivery

B. The home fitting out stage (infill work), which is
the responsibility of the occupant.
(4) Selection of fitting out company for interior design, cost estimate, contract and construction.
(5) Offentime supervision.

3.3 Full Fitting Out in Shanghai

In China the SI Separation Form is widely applied, but lately there is a new trend, and that is to provide fitted out occupant units. This is called "full fitting out". The relevant policy based on "the implement plan of the home full fitting out in commodity housing" was put forward by the Center for Housing Industrialization of the National Construction Ministry in May 2002. Shanghai city would implement the plan completely, and was preparing "the Guidance for Home Full Fitting out".

The Shanghai Ministry of Housing, Land and Resource Administration (the original Shanghai Housing Developing Bureau) assumes responsibility for the relevant administrative guidance and implementation. The Administration targeted "100 thousand units of full fitted out housing construction in 2004 (accounting for about half of the newly-built houses), and to completely full fitting out all newly-built houses in 2005".

There are two opposing attitudes; approval and disapproval regarding Full Fitting Out housing at the present time. For the moment, only in Shanghai is it suggested that full fitting out be fully implemented, no specific plans exist for other cities in this regard.

4. Field Survey Summary

4.1 Full Fitting Out in Shanghai

(1) The Summary

In Shanghai, the recent newly-built housing site area has reached 18 million square meters per year, while the second hand housing market is almost at the same scale. Housing prices are increasing, and have doubled in the last three years.

In 2001, the Shanghai government mandated 3,000 units of fully fitted out houses to the market (100 to 120 square meters). Based on this beginning, it has achieved 100 thousand units (accounting for approximately half of the newly-built houses in Shanghai city).

According to data provided by Professor Lai, housing prices and the unit price for the fitting out project are listed in Diagram 1. The home fitting out project includes decoration and the fitting of floor, walls, sunshade/ceiling, and installation of equipment. The characteristic of a fitting out project is a relatively lower expense to housing price. The housing purchasers pay much attention to the personality, price, and quality. With a view to full fitting out, the present prefabrication only accounts for one tenth, although at present it is proposed for industrialization and standardization.

| Housing price | Low-profit house | Ordinary house | High-grade house |
|---------------|-----------------|----------------|-----------------|
| Break down price for the House Fitting Out | 500~ | 800~–1,000 | 1,200~–1,500 |

(2) The home fitting out company Z in Shanghai

Z Company, which has a total of 200 employees, deals mainly with fitting out work as an interior design company. Work also includes construction, interior planning, equipment planning, drawing, procurement of infill components and materials for developers.

Fifty percent of the projects consist of home full fitting out. Their interior design for infill is based on the skeleton design. Normally one kind of fitting out plan can be provided for one kind of skeleton design. In other words, it is difficult to realize individualization and diversification with full fitting out at present.

Diagram 1. Housing Price and Break-down Price for the House Fitting Out in Shanghai (Unit: RMB/m²)

Fig.1. (a, b) A Full Fitting Out Housing Project in Shanghai, the Infill Work (b) was carried out Concurrently with Skeleton Construction
A full fitting out construction site, which was investigated was a 33 storey residential building in the Pudong area. The project was an invited bidding by a Singapore company. Shanghai's 4th Construction Company won the bid. The price for 4 LDK units with an area of 130 m2 is 12,000 RMB/m2, and the breakdown price for house fitting out is 2000 RMB per square meter.

Fig.1. (a, b) A full fitting out housing project in Shanghai, the infill work (b) was carried out concurrently with skeleton construction.

4.2 The Home Fitting Out Company F in Nanjing

The mainstream of housing Supply in Nanjing is still SI separation. In 2002, the company opened a "fitting out cultural gallery", which showed customers details of interior fitting parts and methods of assembled works. They based them on the principle of Customer Satisfaction (CS).

The manager of F Company publicizes the prices on the web to gain the trust of customers. Additionally, designers receive two months of training in design skill, communication ability and work ethics, as most customers do not normally trust the fitting out industry.

Besides 50 designers, 30 project managers, and 20 managers in the affairs department there are another 1,000 workers who carry out 50 projects worth two million RMB every month. The workers who belong to the construction department (contracted on a year by year basis) are divided into 19 project groups. They are forbidden to carry out projects for other companies. There is also a material department which supplies materials to the 19 groups. Furthermore, an after-service department has been established to complete the entire service for customers.

F Company acts as a loan financing agent for fitting out work and carries out procedures on behalf of customers. The period of loan for fitting out is 3~5 years.

5. Problems Regarding Infill Supply in China

5.1 Characters and Problems of SI Separation

The mainstream of modern housing in China is SI separation. Infill supply is separated from main skeleton construction and sales. The work is carried out by small companies with individual and diverse working methods. From this point of view, this is similar to the way of Japanese detached housing. Thus, customers, companies and government administration bear the risks separately.

5.2 The Risks Imposed on the Customers (Owner-Occupiers)

(1) The deficiency of Design Information Prepared for Infill Supply

Since detailed design information concerning such things as electrical or equipment design is unavailable, unreasonable conditions, such as re-measurement, re-design, re-estimation, re-making and bad work will occur. The intention of skeleton design and building performance data cannot be communicated well at this infill working stage.

(2) The Risk in Selecting a Contractor.

Owners often are unknowingly engaged in using unethical contractors. The lack of stringent laws governing contracting work further puts owners at risk. When dealing with a financially weak contractor, recourse for unfinished and bad work will be impossible when bankruptcy occurs.

(3) Reasons for Owners to Buy Infill Materials for Themselves

Fig.2. (a, b) An SI Housing Project in Nanjing, the Occupants Endeavor to Procure Fitting out (b)
Contracts are often lacking in thorough details, allowing disputes to arise concerning the choice and quality of materials between owner and contractor, when owners decide to purchase the materials themselves.

(4) Imperfect Inspection System

There is a lack of professional supervision over construction and its process.

As there is no independent inspection, clients worry about the quality of hidden items like piping work and whether detailed works are correctly completed. Besides buying materials themselves, clients take on supervision work as well. Changes in design may occur, and work delayed.

5.3 Risks to Fitting Out Companies

(1) Risks of Design, Quality and Schedule

As skeleton design information for clients is on the whole deficient, there is a risk that clients may not pay when the construction results are not up to expectation, due to deficient information. Particularly nowadays, when the seller's market is changing to a buyer's market, the demand for quality and competition between companies becomes more fierce and the risk of payment and conflicts increases. In addition, if the users buy materials for themselves, the quality of the work may be affected. Changes to the design may create trouble in management, resulting in further changes and postponement of the working schedule.

(2) Risks Relevant to the Users' Payment Abilities

Skeleton is sold for an ownership period of 70 years, which causes relative problems in infill supply. Because financing and mortgage corresponding to infill supply have not been fully systemized, there are risks related to the owner's ability to pay.

5.4 Risks of Administration

(1) Risks in the Government Housing Administration

To the administration, the current SI separation pattern, which is based on the supervision of housing construction and sales, has many problems. It is difficult for government authorities to assure the fairness of contracts, and the quality and security of projects. Additionally, problems exist concerning the quality of infill work, cost effectiveness, and the cultivation of relevant industries and services.

What's more, laws related to both public and private space are unclear, so there are some problems concerning infill and the use of public space.

(2) Risks of Municipal and Building Administration

As it is impossible to control fitting out work, many risks exist, such as the prevention of disasters in applying the SI separation pattern.

5.5 Risks to Developers and "Wuye" (Property Management)

The developers carry out planning, design, construction and the sale of buildings, and are basically responsible for housing skeleton construction (design and quality etc.). Although work problems related to infill are mainly solved by the property management and users, changes in the skeleton structures and equipment devices may emerge due to the unclear management system.

6. Proposal for the Chinese House Infill Supply System, Applying Construction Inspection and Escrow Service

6.1 Similarities between the Chinese Home Fitting Out Project and the Japanese Reform Project

Except in the skeleton supply of housing, a fitting out company assumes responsibility from infill design to construction. Its services are quite similar to a Japanese reform project or single family detached housing supply where the individual client can benefit from customized design.

The reasons why this paper compares the SI housing in China and detached houses in Japan are listed below:

1) SI housing in China means that unit owners procure fitting out after buying from the developers without the fitting out.
2) Such fitting out marketing is similar to the single family detached housing markets in Japan, which belong to individual, dispersed, and custom design-and-built markets.
3) Of course, they both have similar problems for the stakeholders, including housing quality for the owner, payment for the infill supplier and so on.
4) One of the purposes of the paper is to discuss if the system of Japanese newly built housing supply, which combines incremental inspection with escrow service, could be adopted in the Chinese infill (fitting out) system, so as to avoid risks.

One thing to point out is that although we simply call the current housing supply pattern in China the "SI" pattern, it is more of a two-stage realization of the skeleton supply and infill supply.

Like the Japanese counterpart, the choice of an efficient fitting out company should be made on the basis of:

1) Ability concerning the design proposal
2) Ability concerning construction engineering
3) Ability concerning financing

Our research shows that the fitting out companies place priority on these abilities.

As discussed above, if either stage in the two-stage realization has not been integrated, risks arise for the unit owners, company and authorities respectively. Thus the infill supply pattern when combined with construction result inspection and escrow service, will be reliable. The construction result inspection is ensured by pre-confirmation of the design specification and its realization. In addition, escrow service can ensure payment for the infill work at the same time as the inspection. This pattern has had its first effect in the Japanese newly-built detached housing market.
6.2 Possibility of Escrow Service in China

The escrow service in Japan originated from single-family detached house development, and has not been carried out in the reform field. In this proposal, therefore, it is necessary to pay attention to the improvement of this issue.

Truly speaking, besides clearing up the definitions of each element, which need inspection concerning infill work, the necessity of payment for the result of work in a relatively short period of time, such as one month, or so, procedures such as the definition of items in the contract and of the escrow service agent also need to be completed.

In addition, Japan and China differ significantly in the comprehension of the housing loan from a financial perspective. Housing finance in Japan evaluates the land after it has been guaranteed. If the reform projects are for infill work, no guarantee is attached to the loan. Even so, if one has ownership of the land, the financing institutes will evaluate it by adopting the guarantee potential of land corresponding to the loan, and then conduct financing and other estimation. In China however, because the owner controls the use of land, infill becomes their private possession. Based on this, financial guarantee of the house infilling can only be granted once it is completed. Along with the passing of time, if the land use value depreciates constantly, the infill will hardly retain its own value. Therefore, the potential of a financial guarantee in China is quite low.

If England is taken as an example to predicate the housing loan in China, it is feasible to provide a loan to buy the skeleton part of a house, which is equivalent to the land use value, with a long-term limit of 30 years for repayment. On the other hand, the infill and skeleton of the building are taken together as a loan object in England. While housing loans in China correspond to the Chinese housing system and are separated from the skeleton of the building and the land use value. Thus, Chinese housing loans are unique in that they are based on the premise of a short-term repayment period limit, such as 3–5 years. Loans of this kind, as mentioned above, are not required as collateral, like the reform loan in Japan, but are short-term loans, which are judged by the borrower's ability to repay them.

What are mentioned above are all the premises of a loan. Now let's discuss from the consumers' point of view, whether there exists the need to confirm reasonability of the independent inspection and payment for work.

Both the two companies investigated in this research are enterprises that have capable leaders, excellent designers and workers. Even so, there exist many problems, for instance:

• In the fitting out process, treatment regarding penetrating work through the skeleton(such as a beam) and the choice of its location, have not been fully studied.

• In both design and construction, studies concerning insulation and air condition are not sufficient.

• In the treatment of water supply and drainage, and the electrical cable system, long-term designs are not adopted according to their respective performance.

From the above, we can ascertain the possibility of improving work quality via the inspection and escrow service.

In addition, the treatment of used materials generated during the building reform process and the treatment of waste building materials has to be studied and handled seriously. In actual house infill work, the user is responsible for buying the building materials, while the fitting out companies are only responsible for the construction itself. This phenomenon happens quite often. However, one problem exists in this regard, if a mistake arises regarding the quality of the construction, there is a need to judge if such mistake was caused by the materials or by the construction.

Furthermore, China is in a period of high economic development and high product sales, which will definitely not continue forever, and which will absolutely be influenced by more market economy and mechanism, resulting in a change in the economic trend. If change does occur, the financing and collecting problems which are not clear at the moment, will surely become clearer. It is therefore necessary to combine proper construction with a correct payment method. Taking into account the work period, the correct paying method would not be a one-off payment after the completion of work, but would distinguish different types of work and pay the professionals in each type of work directly. If this process is considered from the point of view of a correct payment based on the escrow system, a service such as the Construction Management (CM) will become more and more necessary.

Objectively, the Chinese escrow service, when adopting the independent inspection has to consider the consumers' needs for improving the above problems.

What's more, as is shown in the Nanjing case, what is required are clear, open and correct prices in the construction field. It is important to put the escrow service between the infill work company and the client, to ensure that such prices are appropriate. In Japan, the effect of this policy is highly valued.

Above all, it is necessary to set up the following systems:

1) Selection of infill work items to be inspected.

2) In terms of guarantee of quality, the escrow service should be carried out regarding work approval and the basis of payment.

3) Before the infill loan is granted, the project should obtain a bridge loan.

4) Standards of design specification and a price system should be set up and inspection institutes established.
5) A guarantee system should be established based on the separation of materials and work.
6) The unifying of terms that can be used by the industry correctly.

7. Conclusion
The above discussion shows that infill supply is separated from the house skeleton supply in China, which has formed a two-stage supply trend in the process of marketisation. This brings risks to house users, developers, infill suppliers and authorities. In order to avoid such risks, this paper demonstrates the efficiency of a Japanese supply pattern involving single family detached housing, which not only encourages house users to participate in the design process, but also integrates quality inspection and payment with the escrow service. However, what should also be mentioned is that the infill work is similar to reform work, and there are many problems to be solved such as construction time. In addition, it is necessary to adapt the property management laws and flexibly grasp the financial systems.

Notes:

i The fitting out work of public buildings is called "Gongzhuang" (public fitting out), and the fitting out work of housing is called "Jiazhuang" (house fitting out).
ii According to the results of an investigation of "The First Decoration and Ornament Industry Forum in China".
iii According to information and data provided by the Pro. Lai Zengxiang Group from Tongji University.
iv Special Welfare Housing for low income residents.