Analysis of tendencies and direction of declination of the cost of wooden housing construction

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Abstract. analysis of modern tendencies of construction activity shows particular urgency of the wooden housing construction direction. In the article author analyzes content of wooden housing construction, reasons for such construction, factors which have an influence on cost. Routine calculation of cost of the typical wooden house was made for possibility of assessment of the cost structure for such a building. Methods for support of the development of wooden housing construction are shown.

1. Introduction
At the very beginning of 2017 Ministry of Construction of the Russian Federation announced that special conditions for increase of the demand for houses built with wood will be created. Administration makes appropriate changes in design standards, and makes previously approved building regulations actual. According to the approved plan on development of wooden housing construction, development and amendments to design standards of buildings with application of new materials on the base of wood with more than three floors with low energy consumption, and total characteristics, which meet the requirements of "green building" are being performed.

In 2016 Ministry of Construction of the Russian Federation developed new codes of rules "Wooden structures with knots on screws. Design rules" and "One-apartment residential buildings with wooden frame. Rules of Design and Construction". for preparation of grounds for development of new directions in construction. Documents establish requirements for calculation and design of compounds of elements of wooden constructions, which are made with usage of screws and set screws, which are made from carbon and stainless steel and the rules for designing and building of newly constructed and reconstructed free standing one-apartment residential buildings with wooden frame of buildings. Currently, these rules are on technical editing in the Federal Autonomous Institution "Federal Center of technical regulation, standardization and conformity assessment in construction".

Besides, Order of the Ministry of Construction of Russia approved a change to the set of rules 64.13330.2011 "SNiP II-25-80 Wooden structures", which aimed at reliability growth and accuracy of calculations of building structures constructed from wood and materials based on it.

According to the plan, standards will be also developed for new types of wood-based materials and structures from them for buildings and structures and regulatory and technical documents on fire safety. They will contain requirements for fire resistance and fire safety of building structures of buildings, including wooden ones. In particular, methods of calculation of fire resistance of building structures for rate setting with consideration of internal and external conflagrations of the housing units with application of wood structures, etc.
System of normative and technical regulation of wooden housing construction will allow to create conditions for increase of the demand for wooden house building products at the construction of capital construction projects. In this regard, consideration of issues of realization of wooden housing construction and possibilities of enterprises on reclamation of such a prospective direction becomes relevant.

2. Materials and Methods
The main advantage of wooden housing for commercial sales is: firstly, relatively low price; secondly trust of citizens to such objects because of their environmental friendliness. Modern enterprises, which are anxious for success, can not neglect questions on the development of proven price policy. Correct formation of pricing allows enterprise to be competitive, to perform an efficient activity, and receive the maximum profit. Besides, price on the production determines amount of demand and its permanence, which provides financial stability. At that, it is necessary to consider that demand and its parameters, including the level of incomes of potential buyers; presence / absence of seasonality, in turn, have a reverse effect on the formation of finished products cost.

Attention is also paid to price policy, inflation, competitors, and state regulation of prices at the price formation. Costs of production, enterprise strategies, life cycle of production, etc. are being assessed. So, level of prices is determined not only with the market, but with a complex of factors, which have an influence on the cost of manufacturing and goods implementation features.

As it appears from the activity of the Ministry of Construction of the Russian Federation, creation of powerful wooden house building industry on the qualitatively new level is a priority for development of the housing construction industry in the Russian Federation, which is also significant for the economy of a country as a whole. Changes which have occurred in the Russian economic environment over the past few years have led to increase in demand for wooden houses, and, consequently, to increase in the amount of their construction. But nowadays native timber processing complex is not able to meet the needs of construction industry at the expense of cheap and qualitative production of its own manufacture. The reason is low technological level of manufacturing capacities and unjustified pricing [1].

Price of a wooden house depends on many factors. The first factor which influences on its cost is the material from which the house will be built. The most expensive types of wood are larch and cedar. Spruce and pine have similar characteristics. But their cost is much lower. The main difference between these species from cedar and larch in their texture and lifespan. It is few years less.

Correctly organized planning is also influences on the cost of construction of a wooden house. Well-designed plan should contain architectural, design, engineering solutions, specification of materials, which allows to make preliminary calculation of the cost of works, optimize the housing construction costs and increase security of building. It concerns both standard and individual construction, but it must be considered that the price of individual project will be higher. Absence of the project document can lead to increased construction costs due to unforeseen situations [2]. Besides, it is necessary to consider that any project must undergo a long reconciliation procedure, otherwise building may be recognized as self-construct. And it may not exist in official registries. Reconciliation procedure may take several months. If this is not considered, it will lead to additional temporary and financial costs.

Location of house under construction, namely, development of infrastructure in selected area, availability of transport hubs, ecological situation has big importance for market of wooden housing construction. For example, distance from the MRHW and the nearest major highways plays a big role for formation of value of the house in the Moscow region.

It is necessary to consider influence of macroeconomic factors on the development of the industry. For example, crisis of the year 2008 has had a very ambiguous impact on the wooden housing market. On the one hand, consumer purchasing power has fallen. On the other hand, economic instability caused many people decide on low-rise construction. It has lower cost and shorter deadlines in comparison with skyscrapers. Besides, deliberately inefficient enterprises often created for temporary purposes were removed from the market [3].

Proceeding from the above, it would be useful to formulate methods with the help of which
enterprises can promote wood construction on the market. As a result, consider real demand and to be on the rising wave of business activity.

Firstly, methods for selection of efficient wood species and structures from them are necessary. For this purpose, it is possible to refer to specialized laboratories which can provide the results of analysis of properties of various types of wood, their correlation, etc.

Secondly, well-established methodological approach of documentation of organization of construction and bring it to the operational stage is necessary. This requires formation of competencies of the own employees of the enterprise.

Thirdly, it is necessary to monitor the approval time frames. In this regard, monitor the activities on the level of Ministry of Construction of the Russian Federation, which provide different measures of administrative support.

Fourthly, application of methods for selection of effective location are required. Various geoinformational technologies which consider transport and streams of people in the region, logistic channels, and resource potential can help.

Fifthly, methods of macroeconomic situation forecasting are in demand. Increase or decrease in purchasing power leads to justification of choice of one or another type of wood.

Detailed analysis of the construction cost structure should be performed for assessment of various effects from application of the methods which were shown above. It must show the structure of cost on various stages of construction.

On an example of the project we will show fragment of decomposition of the stage of cost formation. Let us calculate cost of a house made from glued laminated lumber in Nizhny Novgorod and regions (table 1).

Square of the house: 205 m²;
Cross-section of beam: 165x165 mm.

| Table 1. Cost of house made of glued laminated lumber |
|------------------------------------------------------|
| House kit                                           |
| Minimal kit                                         | 1 905 395,65 |
| joinery                                             | 499,631,46   |
| Finishing products                                  | 505,396,89   |
| **Total:**                                          | **2 910 424,00** |
| Cost of foundation establishment                     |
| Works                                               | 160,000,00   |
| Materials with delivery                             | 260,000,00   |
| **Total:**                                          | **420,000,00** |
| Cost of house assemblage                            |
| Cost of a house kit                                 | 2 910 424,00 |
| Cost of assemblage                                  | 35%          |
| **Total:**                                          | **1 020 000,00** |
| Cost of materials                                   |
| Roof drainage system                                | 150,000,00   |
| Thermal insulation                                  | 110,000,00   |
| **Total:**                                          | **260,000,00** |
| Cost of engineering and finishing works             |
| Cost of a house kit                                 | 2 910 424,00 |
| Cost of engineering and finishing works             | 20%          |
| **Total:**                                          | **582,000,00** |
| **Total price:**                                    | **5 192 424,00** |

The price stated above does not include purchase costs for:
- materials for internal wiring of electric, water supply, sewage and heating nets are about 85,000 rubles;
- bathroom equipment (bathtubs, sinks, toilet sinks, mixer taps) is about 50,000 rubles;
- radiators and heating boiler are about 130,000 rubles;
- illuminators and electrical switches, prices for which are different;
- tiles and utility cores on kitchen, prices for which are different [4].

Following the calculations, cost of construction of the wooden house is quite high nowadays In this case, magnitude of the cost doesn't allow talk about the mass availability of wooden housing construction Even if square of the house could be reduced to 100 sq. m. and all costs could be reduced
on a half, price more than 2 million rub. is not acceptable.

Development of the formulary, which were mentioned above allows to use houses with more than three floors in mass construction. Enlargement of altitude can really lead to the reduction in the cost of the house. In this case share of the cast of the substructure, roof, and land appears lower from the cost for the common living area of the building. Thus, construction companies are recommended to address to the similar study of new opportunities of construction of multi-storey residential houses. It is one of the most important directions of the declination of the cost of wooden houses and increasing of their availability.

Usage of mechanisms of more accurate valuation of construction resources is the other way to decline costs. In conditions of development of information technologies, Ministry of Construction of the Russian Federation realizes system of operational monitoring for cost of the construction resources which are analyzed taking further new approaches into account:

- Firstly, this is the application of territorial zoning, where 150 zones are foreseen. It allows to have price offers with very high territorial breakdown, which has not been until the present time:

- Secondly, this is the fixation of prices just for the manufacturers, but not the prices on the dealers' market. As it known, dealer margin ranges from 20 to 50%. Ministry of Construction of the Russian Federation gets the opportunity to clarify prices from the first hand in the case of realization of the informational system. Thus, developer gets the opportunity of deeper analysis of the basis for the price of resources and application of organizational approaches to it's significant declination. More reasonable program of negotiations with dealer or independent entry to the manufacturers' factories with such an opportunity can be applicable here. Changing of traditional territories of deliveries for manufacturer is also considered.

3. Results

Nowadays, basic index method of calculation of estimates is mainly used, in which budget-normative base of the year of 2001 (updated version of 2014) and indexes for transferring to current prices are used. But this method gives a significant error in calculations. If Ministry of Construction of the Russian Federation launches automated information system for automated collection of information on the cost of resources on 150 zones of the territory of the country, it allows to use resource calculation method on high qualitative level. It gives lower margin of error in the assessment of the cost and allows to compare different price models for construction of the wooden house faster.

Other result which can be achieved through the modern actions of the Ministry of Construction of the Russian Federation is more effective participation in the state priority project "Creation of the comfortable City Environment". Prepared object with consideration of criteria of the green building truly allows to have positive results at participation in state tenders for construction. Favorable factor is the existence of common approved rules of this construction, following which declines risks of realization of own visions of designers. Receipt of public finance also allows to reduce final costs for the buyer of the corresponding real estate areas.

Finally, one more important result of modern innovations is increasing of government attention to the ecology of the area of residence of citizens. State program "Digital economy" foresees management of "Smart cities" with the help of different communicational technologies, Internet things. There mustn't be any problems with environment in the "Smart" city. Unified standards and technical requirements for the environmental monitoring system will be implemented in 2019, and unified standard for the quality of the urban environment will be approved in 2020. System of the complex, operational and automated monitoring of the condition of the environment will be implemented in the 20 pilot cities to 2021. Construction of the wooden houses on such territories able to attract more attention of the city authorities and buyers.

4. Discussion

Federal State Information System for Pricing in Construction (FGIS CS) should start functioning from September 30, 2017 [5]. It should allow to receive urgent information on cost of building resources
throughout the country. In particular, this law is aimed on the creation of condition for application of resource method for determination of cost of construction. There is a risk that on the stage of the launching the system into commercial operation incoming information won't be fully accurate and sufficient. In this regard, government bodies should use additional ways to encourage manufacturers to cooperation and realize other measures to collect information. Construction companies should understand and take into account these risks. It provides launch of monitoring of the market value of construction resources in regions. Monitoring is necessary for the development of estimates on the basis of market prices and allows to consider regional characteristics in the formation of prices of construction correctly. Information on prices for building materials will arrive in electronic database through quarterly monitoring of producers prices [6].

At the same time, it should be noted that active development of wooden housing construction requires a set of specific information and activities of the Ministry of Construction of the Russian Federation (FGIS CS) may not allow to get exhaustive amount of information sought. If industrial governance body does not start a separate work in the area of expansion of the information space on the wooden housing construction, than only independent initiative of construction companies will not allow to get the made growth of business activity.

5. Conclusions
Prospects for wooden housing construction in the Russian Federation are really good. Large territory of the country makes it possible to use not dense development and implement dispersed construction actively. State focuses on such areas of construction and regularly prepares a legal environment. Analysis of the already implemented measures showed that there is not enough attention which is paid to the issues of information support of this direction of construction. Highlighting of the foreground task of low-rise construction and targeted support from the state in those areas where private business does not have competencies is an important strategic target.

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