Design of the Construction Plan of the House Crowdfunding

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Abstract. Crowdfunding is a new real estate form in the Internet age. There is a planning scheme of public-funded housing, which needs to consider many factors, such as floor area ratio, development cost, tax rate, expected revenue and so on. According to the national policy, the requirements of floor area ratio, development cost and development cost are different. This paper will calculate the cost, income, floor area ratio and value-added tax of the scheme and gives the design and construction plan.

Keywords: Amount of Deductible Item, Rate of Return, LINGO, Volume Rate

In response to question 1, the key is to determine the amount of deductible item in the value-added tax, and then we can calculate the amount of the value-added tax, the amount of the revenue and the amount of the cost according to the amount of deductible item, the amount of land appreciation, the value-added tax, and the income. So to determine the amount of deductible item, we must consider the amount paid by the Land tenure, real estate development costs, real estate development costs, taxes related to the transfer of real estate, and other deductions. According to the definition of income in Annex 3, that is, the final income is equal to the gross proceeds from the sale of housing minus the cost of the input and the National Levy of value-added tax [1]. The total income is the product of the number of housing units, per square meter sales price, and housing area. The cost input includes the amount of land payment, real estate development costs, and real estate transfer related taxes and real estate development costs. The value-added tax calculates the tax rate of the value-added tax by determining the value added and deducting the project amount, and calculating the ratio between the value added and the deducting project amount. The final calculation is the value-added tax. The floor area ratio is calculated according to the ratio of the total floor area proposed in Annex 3 to the total area of the project. According to the requirements in Annex 1-1, room type 9, room type 10 and room type 11 do not participate in the calculation of floor area ratio. After calculating the above data, the cost of the scheme 1 is 2,484,163,079.70 yuan, the benefit is 604,277,141.95 yuan, the value added is 158,279,778.35 yuan, the volume ratio is 2.275 [2-4].

1. Calculate the amount of deductible item in value-added tax
   (1) The income amount of the room type I is $R_i = M_i \times N_i \times P_i$, the total income amount of the room type I is $R = \sum_{i=1}^{11} R_i$.
(2) The land payment amount of the room type I is 
\[ T = \frac{11}{G} \sum_{i=1}^{11} T_i \]
the total land payment amount of the room type I is 
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\[ T = \frac{11}{G} \sum_{i=1}^{11} T_i \]

(3) The development cost of the room type I is 
\[ K_i = M_i \times N_i \times k_i \]
the development cost of various types of housing is 
\[ K = \sum_{i=1}^{11} K_i \]
the development cost of various types of housing is 
\[ K = \sum_{i=1}^{11} K_i \]

(4) The real estate development cost is 
\[ Y_i = (T_i + K_i) \times 10% \]
then the development cost of various types of housing is 
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(5) The taxes related to the real estate transfer of the room type I are 
\[ S_i = R_i \times 5.65% \]
taxes related to the real estate transfer of the various types of housing is 
\[ S = \sum_{i=1}^{11} S_i \]
taxes related to the real estate transfer of the various types of housing is 
\[ S = \sum_{i=1}^{11} S_i \]

(6) Other deductible items of the room type I are 
\[ X_i = (T_i + K_i) \times 20% \]
other deductible items of the various types of housing are 
\[ X = \sum_{i=1}^{11} X_i \]
other deductible items of the various types of housing are 
\[ X = \sum_{i=1}^{11} X_i \]

(7) The amount of deductible item of the room type I is 
\[ J_i = T_i + K_i + Y_i + S_i + X_i \]
the amount of deductible item of various types of housing is 
\[ J = \sum_{i=1}^{11} J_i \]
the amount of deductible item of various types of housing is 
\[ J = \sum_{i=1}^{11} J_i \]

According to schedule 1 and schedule 2's data, we can calculate the amount of deductible item in value-added tax [5-8].

2. Calculate value-added tax
(1) The value-added of room type I is 
\[ A_i = R_i - J_i \]
the value-added of various types of housing is 
\[ A = \sum_{i=1}^{11} A_i \]
the value-added of various types of housing is 
\[ A = \sum_{i=1}^{11} A_i \]

(2) The ratio of value-added of the room type I to the deductible item is 
\[ b_i = \frac{A_i}{J_i} \]
the ratio of value-added of the room type I to the deductible item is 
\[ b_i = \frac{A_i}{J_i} \]

(3) The value-added tax of room type I is 
\[ Z_i = \begin{cases} A_i \times 30%, & b_i \leq 50% \\ A_i \times 40% - J_i \times 5%, & 50% < b_i \leq 100% \\ A_i \times 50% - J_i \times 15%, & 100% < b_i \leq 200% \\ \end{cases} \]
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\[ Z_i = \begin{cases} A_i \times 30%, & b_i \leq 50% \\ A_i \times 40% - J_i \times 5%, & 50% < b_i \leq 100% \\ A_i \times 50% - J_i \times 15%, & 100% < b_i \leq 200% \\ \end{cases} \]
then the total value-added tax is 
\[ Z = \sum_{i=1}^{11} Z_i \]
then the total value-added tax is 
\[ Z = \sum_{i=1}^{11} Z_i \]

Because type 8 and type 9 housing belong to other types, in the final calculation of value-added tax, we should make allocation calculation according to the floor-area ratio of existing ordinary house and non-ordinary house:

\[ B = \frac{\text{ordinaryhouse}}{\text{non-ordinaryhouse}} = \frac{M_1 \times N_1 + M_2 \times N_2 + M_3 \times N_3}{M_1 \times N_1 + M_5 \times N_5 + M_6 \times N_6 + M_7 \times N_7 + M_8 \times N_8 + M_{11} \times N_{11}} \]
\[ B = \frac{\text{ordinaryhouse}}{\text{non-ordinaryhouse}} = \frac{M_1 \times N_1 + M_2 \times N_2 + M_3 \times N_3}{M_1 \times N_1 + M_5 \times N_5 + M_6 \times N_6 + M_7 \times N_7 + M_8 \times N_8 + M_{11} \times N_{11}} \]

Namely, for room type 9 and 10, we should calculate value-added tax based on 25% of the ordinary housing price or 75% of the non-ordinary housing price. The type 2 housing is ordinary standard house, and it meets the condition that the value added does not exceed 20% of the deductible item amount, we can use the tax incentives for building a ordinary standard house, that is, type 2 housing is exempt from land value-added tax [9, 10].

3. Calculate benefits and costs
According to Annex 3, the ultimate revenue=total income - total cost - value added tax 
\[ Q = R - C - Z \]
The total cost includes the amount paid for the acquisition of land, the total cost of real estate development, the total expense of real estate development and the total tax related to the transfer of real estate, namely 
\[ C = T + K + Y + S \]
4. Calculate floor area ratio and rate of return

According to the ratio of the total floor area (G) to the total land area (d) proposed in Annex 3, we can calculate the floor area ratio \( L = \frac{G}{D} = 2.275 \), \( G = \sum_{i=1}^{11} M_i \times N_i \) \( D = 102077.6 \)

For the second problem, according to the construction constraints of each room type and the satisfaction ratio of each room type, the linear programming model is established as:

By using LINGO, we can calculate the number of building sets for each room type is 50,50,50,150,284,350,450,100,50,50,50,50. The purpose of this article is to redesign the construction plan mainly based on the participants' willingness to purchase 11 types of houses and information in schedule 3. To satisfy the satisfaction of the crowd-funded people, we build a mathematical model on the basis of the mathematical model of the first problem.

Suppose that \( n \) is the housing units of this room type, \( m \) is the housing satisfaction of this room type 2.27 < \( L \) < 2.28.

Objective function: \( \max = \frac{\sum_{i=1}^{11} n_i \times m_i}{\sum_{i=1}^{11} n_i} \);

Constraints:
\[
\begin{align*}
\begin{cases}
2.27 < M_1 \times n_1 + M_2 \times n_2 + M_3 \times n_3 + M_4 \times n_4 + M_5 \times n_5 + M_6 \times n_6 + M_7 \times n_7 + M_8 \times n_8 < 2.28 \\
50 \leq n_1 \leq 450 \\
50 \leq n_2 \leq 500 \\
50 \leq n_3 \leq 300 \\
150 \leq n_4 \leq 500 \\
100 \leq n_5 \leq 550 \\
150 \leq n_6 \leq 350 \\
50 \leq n_7 \leq 450 \\
100 \leq n_8 \leq 250 \\
50 \leq n_9 \leq 350 \\
50 \leq n_{10} \leq 400 \\
50 \leq n_{11} \leq 250
\end{cases}
\end{align*}
\]

For the model above, the LINGO programming is used to calculate the number of houses for each type. The room types obtained are brought into the problem 1 model to obtain the cost, the benefit, the volume ratio, the value-added tax and satisfaction degree of the Construction Plan 2.

The method of the model is intuitionistic and easy to understand. It can be solved by integer programming with software to save manpower and time. The model we built can be widely applied to life, but also can be extended to other areas, such as community construction planning. In this paper, we assume that the real estate market is stable during this period, and the government has no new policies to deal with it. Suppose that the cost of real estate development is deducted by 10% of the sum of the Land tenure and the cost of real estate. And the estimated price of old houses and buildings is not considered. The valuation of real estate is based on the principles of fairness, clarity and legitimacy. In addition, all the attachments and data of this article are from the 2015 National College Student Modeling Contest.
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