Thus, the abovementioned evaluation methods of efficiency of human capital use of the modern organization, namely, of intellectual employees as its basic part, their special features and the complexities caused by these features, testify to the necessity of further research of this problem to update the evaluation methods and to maintain more successful functioning of the organizations at the expense of effective use of their human capital.

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COST ESTIMATION INFORMATION SYSTEM OF APARTMENTS AT SECONDARY HOUSING MARKET AS A MANAGEMENT INVESTMENT TOOL

The aspects of objects' investments appeal are studied. The basic estimation methods of the real estate market are analyzed. A method of information system construction objects' cost estimation of investment is proposed.

Keywords: investments, information systems, modeling, estimation of real estate cost.

The main goal of the research is to study the database management for selling one-bedroom apartments in Krasnoyarsk, to estimate the objects' cost in real estate market, and to create competent investment capital.

The most consistent definition for investment is a long-term placement for the investor's future welfare. The main purpose of investing is seen as an attempt to achieve a final result (welfare), expressed in monetary terms.

In other words, the degree of investment efficiency is determined by the comparison of resource flows expressed in the form of cash and results of its use.

This process of comparison in general economic practice is called investment analysis or the analysis of investment effectiveness.

The process of analyzing investments is typically devoted to the following objectives:

– identification of economic investment feasibility, i.e. the identification of the absolute excess of the nested resource results;

– identification of the most effecient alternative investments;

– identification the most efficient portfolio.

In the majority of cases, to analyze the investment means to justify the investment decision, to be taken by the investor.

The advantages of real estate investing. According to the information provided by VCIOM, most inhabitants of Russia (51 %) deem to think that the best investments are in real estate purchase. This leaves behind the acquisitioning of gold and jewels – 19 % and money deposits in SberBank (17 %). Even during the financial crisis, the Russian real estate market was least exposed to devaluation. Investment in real property is always investment in real assets.

The term "investment (placements) in real estate" is often understood as the acquisition of finished residential or nonresidential facilities that are bought for the resale purposes. This definition does not include real estate, bought for immediate use by the buyer, for example, for housing or business (with the exception of rent).

In addition the acquisition of unfinished projects isn't an investment in real estate, in this case it's investment in construction. Advantages of investment in real estate for clarity will be given in comparison with bank deposits and securities, such as shares in companies, mutual funds, etc.

The main and indisputable advantage of investment in real estate is its reliability. A bank may be ruined; a company's purchased shares can fail. Real estate risks are significantly less. It is impossible to lose, it can not be stolen, defaults and other economic shocks can only slightly change its price, which is usually temporarily. It is subject to risks, caused by natural disasters; is also at risk by recent judicial proceedings, involving environmental legislation violations (in greater extent this applies to houses).

Another fact, which makes investment in real estate attractive as a possibility of savings, is an extremely rapid increase in its value or, as experts say – rapid capitalization. What was bought last year, today costs half, and sometimes twice as expensive, depending on the location. The analysis of the price of a housing square meter in major cities shows that the capitalization of urban apartments has an average of 65 % per year increase. Not all successful companies can boast about such income increase. It is also important not to forget that real estate may bring an additional stable income, for example, if it is being leased. Resource increase in rental rates is

sufficiently larger. However, we can ask a question of what is better in real estate investing?

The definition of object investment attractiveness for the real estate market. Investment attractiveness of property is determined by the ratio of investment and the market value of an object (the price for which the object can be sold is understood as the investment cost dependence).

The attractiveness of property is affected by the following factors: risks, which are to be faced, the level of demand, the ratio of projected outcomes and costs, the level of competition, the duration of the project, as well as the needs for capital.

Several other factors directly affect the investment value of the object. First is the location parameter, which determines the degree of relevance of the building pillar in the future. It includes:

– prestige of the district;
– social environment;
– infrastructure: transport and social facilities;
– ecological situation in the region.

There are also some more important factors such as architecture, design and space planning solutions, as well as the technical condition of the building and characteristics relevant to the object itself, for example, the house and an apartment:

– architecture and specialness of the project;
– external attractiveness of the building;
– apartment planning;
– ceiling height;
– number and size of apartments in the house, on a floor;
– technology of the construction;
– materials bearing and protecting designs;
– finishing of the facade and public areas;
– house engineering: plumbing and electrical equipment, waste disposal, air conditioning, air ventilation, elevators;
– home infrastructure: size, landscaping and fencing area, security, parking lot, social infrastructure, service components, the condition of the entrance;
– physical wear and tear of the house, noise, clean air and water;
– characteristics of the apartment windows;
– presence of loggias, balconies in the apartment;
– the stage of construction, completion [1].

The factors aforementioned will determine the investment attractiveness of the property value.

The main methods of investment project evaluation. In world practice, the methods generally used for assessing housing are based on economical factors (personal income, population, the state securities market, etc.), as well as on the technical features of the object itself (conditions of windows, doors, the house in general, etc.). Recently for the residents of more developed cities have been effected by the location factor, this says that the dispersion of prices in the markets of primary and secondary housing market in one area is not great. Ten years ago, researches in the Krasnoyarsk region have shown the importance in assessing the value of the apartment.

Generally there are three approaches, to obtain results of the object value.

The cost approach is based on the principle that an informed buyer would pay a price greater than the cost of rebuilding the property having a value, which is the same for the property being under consideration. This approach requires the definition of several types of the estimated assets wear: physical, functional and wear and tear, received as a result of external influence or economic obsolescence. Also, the calculation with "model" estimates, SNIP, etc. taking into account all the actual additional costs, determined as a composite demand of the building in general and isolating the cost per unit area of the apartment leading to a large error in calculations.

The comparative approach is based on the principle that a well-informed costumer does not pay for the property more than the purchase price of another property which has equal value. This approach serves to assess the market value of the project volume, based on the data from the market transactions. Comparable objects, which were sold or at least, offered for sale, are considered. After that, adjustments which are made for differences – so-called corrections, which exist between the assessed and comparable objects, are to be made. An adjusted price allows to determining of the most probable selling price for the estimated object as if it was offered in an open and competitive market.

In a "passive" sales market, some conclusions can be drawn from the information of price proposals, which characterize the existence of the markets, offering such facilities.

The main problem of the comparative approach is the difficulty in obtaining necessary information, the choice of an analogue, which is adequate in assessing the object, taking in account the mismatch degrees and the numerical values of the analogue characteristics and estimated objects. If sufficient information is accessible, it is efficient in the framework of this method to justify by the construction and the use of a statistical model or parametric pricing models, expression-mental dependence of the average price of the object on the composition and values of its technical characteristics.

The income approach can define the cost of income-producing property by means of calculating the amount, quality and duration of benefits' receipt so, that this facility will bring over the forecast period. As a result of expected future income from property analysis and the income from sales at the end of the projection period, the valuation date to the current value is discounted. The income approach is based on the expectations principle, according to which the potential purchaser concludes the property value, depending on the expected returns, which can be obtained in the future from the property ownership. This approach analyzes the possibility of real estates to generate some income, which is usually expressed in the form of income from exploitation and income from a possible sale at the end of the ownership period. In relation to the object of evaluation it could hypothetically suggest that it is not acquired as an "apartment for living", but as an object for profit retrieval by putting it in the lease and subsequent (possible) sale [2].

The incorrectness of the income approach is primarily detected by the fact that the apartment will be used exclusively for residential purposes, so the future owner does not plan zero tolerance to lease it for profit. Lease Agreements, in the vast quantity of cases are not registered

anywhere; payments is made in such payments, which are not considered as a monetary transaction by the government, making it difficult to gather reliable information on the amount of rent and rental rates for similar objects.

In this study we have constructed models based on the method of sales comparison.

Developing an information system for evaluating investment objects. The main objective of the research is the calculation automation of single room apartment's evaluation in Krasnoyarsk.

The housing market of Krasnoyarsk was chosen as a substantive research field. We have studied only one-bedroom apartments at the secondary housing market due to the extremely large issue.

Despite the fact that housing markets vary depending on their geographic location, the general idea of modeling can be used for different cities. We must keep in mind that each city should be separately studied.

The cost analysis of one-bedroom apartments selling in January of 2009 showed that the distribution is close to normal, while there is the presence of right-sided asymmetry (the right branch of the maximum ordinate longer than the left). This means that there are apartments, with both high and low values with a homogeneous market.

Most of the apartments' prices vary from 1,150 to 1,850 thousand rubles. This shows that the bulk of the market furnished apartments is less than the average value of 1,681 thousand rubles. Usually the reasons for this are differences in location. Only a small share of the market accounted for residential facilities, designed to meet high customer demands and apartments that have low consumer properties. These apartments are large and are situated in elite parts of the city.

To calculate the cost of apartments in January 2009, we need to build models with the application of regression analysis to determine the significance of parameters.

We have adapted three models, used in world practice:

The additive model:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 +$$
$$+ b_8 X_8 + b_9 X_9 + b_{10} X_{10} + b_{11} X_{11} + b_{12} X_{12}. \qquad (1)$$

The multiplicative model:

$$Y = b_0 \cdot X_1^{b_1} \cdot X_2^{b_2} \cdot X_3^{b_3} \cdot X_4^{b_4} \cdot X_5^{b_5} \cdot X_6^{b_6} \times$$
$$\times X_7^{b_7} \cdot X_8^{b_8} \cdot X_9^{b_9} \cdot X_{10}^{b_{10}} \cdot X_{11}^{b_{11}} \cdot X_{12}^{b_{12}}. \qquad (2)$$

The combination model:

$$Y = X_1^{b_1} + b_0 \cdot X_2^{b_2} \cdot X_3^{b_3} \cdot X_4^{b_4} \cdot X_5^{b_5} \times$$
$$\times X_6^{b_6} \cdot X_7^{b_7} \cdot X_8^{b_8} \cdot X_9^{b_9} \cdot X_{10}^{b_{10}} \cdot X_{11}^{b_{11}} \cdot X_{12}^{b_{12}}, \qquad (3)$$

where X_1 is the prestige factor of the area. Possible values are represented in table [1].

X_2 is the apartment planning. Values of a variable defined for the apartment type "khrushevka" ($X_2 = 1$), "leningradka" ($X_2 = 2$), "improved planning" ($X_2 = 3$), "stalinka" ($X_2 = 4$), "new planning" ($X_2 = 5$), "individual planning" ($X_2 = 6$).

X_3 is the variable for the material out o which walls are built. The samples included apartments, the wall material from a monoblock piece ($X_3 = 3$), concrete panel ($X_3 = 1$), and brick ($X_3 = 2$).

X_4 – the floor. We used two groups of apartments, depending on the floor – apartments on the first floor and those on the top ($X_4 = 0$), as well as apartments on the other floors ($X_4 = 1$).

X_5 – amount of stories.

X_6 – the total area in m^2.

X_7 – living space (living rooms, bedrooms) in m^2.

X_8 – kitchen space in m^2.

X_9 – presence of a telephone line. If there is one – $X_9 = 1$, if not – $X_9 = 0$.

X_{10} – water closet. Combined – $X_{10} = 1$, separate – $X_{10} = 2$.

X_{11} – balcony/loggia. If there is a balcony and a loggia – $X_{11} = 3$, only a loggia – $X_{11} = 2$, only a balcony – $X_{11} = 1$, neither are present – $X_{11} = 0$.

X_{12} – cooker. Electric – $X_{12} = 2$, gas – $X_{12} = 1$, none – $X_{12} = 0$.

Y – apartment price in thousands of rubles.

$b_0 ... b_{12}$ – coefficients of regression.

We have obtained these results, using the given information:

For the additive model:

$$Y = 153{,}308 + 47{,}699 X_1 + 59{,}832 X_3 + 27{,}947 X_6 + 23{,}236 X_8 + 99{,}695 X_{12}.$$
$$\quad (64{,}000) \quad (3{,}530) \quad (18{,}145) \quad (2{,}366) \quad (7{,}400) \quad (10{,}171) \qquad (4)$$

For the multiplicative model:

Coefficients of prestige of districts

Rank	Name of district	X_1
1	Akademgorodok	7.68
2	Center – Severniy – Kopylova St. – Zheleznodorozhnikov St.	7.09
3	Vzletka	6.07
4	Studgorodok – Predmostnaya Sg. – cinema "Yubileiniy"	5.19
5	Vetluzhanka	3.87
6	Kosmos – L. Ketshoveli St. – Krasnomoskovskaya St.	3.54
7	Regional hospital – BSMP	3
8	Svobodniy	2.71
9	Zelenaya Roscha – Solnechniy	2.73
10	Zaton – Pokrovka	2.41
11	Kalinina St. – Severo-Zapadniy – Pashenniy	2.04
12	Torgoviy center – Rodina – TUZ – Sputnik – Ocean – Badgey	1.42
13	Cinema "Enisey" – "Enisey" station	0.93
14	Pervomayskiy – Zlobino	0.8
15	KrasTEC	0.25
16	Vodniki	−1.11
17	Cheremushki – Energetiki – Shinniki	−1.98

$$Y = 119,845 \cdot X_1^{0,033} \cdot X_3^{0,080} \cdot X_6^{0,617} \cdot X_8^{0,144} \cdot X_{10}^{0,051} \cdot X_{12}^{0,082}. \quad (5)$$
$$(17,195) \quad (0,004) \quad (0,017) \quad (0,052) \quad (0,039) \quad (0,021) \quad (0,011)$$

For the combined (mixed model):

$$Y = 46,846 \cdot X_1 + 98,379 \cdot X_3^{0,062} \cdot X_4^{0,039} \cdot X_6^{0,671} \cdot X_8^{0,114} \cdot X_{12}^{0,117}. \quad (6)$$
$$(3,540) \quad (14,719) \quad (0,017) \quad (0,019) \quad (0,055) \quad (0,039) \quad (0,012)$$

The data for single room apartments in Krasnoyarsk was obtained from sites of real estate companies in the city (URL: http://gilcom.ru/objects/sale?page=6; http://www.profdom.ru/search_variants). This was a compilation sample file in Microsoft Office Excel, containing information of about 2,000 apartments. For data processing an application in Visual Basic had been made. This program removed all incorrect data from the initial table. So, the study involved 1,060 one-room apartments in Krasnoyarsk. The developed program can also convert qualitative data into quantitative.

A regression analysis was conducted, using computer programs STATISTICA 6,0 and EViews 5,1 determined the factor significance.

An adequacy check for each regression equation was performed; it included:
– calculation of the F-statistic (the Fisher criterion);
– calculation of the determination coefficient, R-square;
– checking the conditions of the Gauss–Markov.

The studies have shown that the most appropriate and relevant models, which have unbiased estimates of the coefficients, are the additive and combined models. The most significant factors effecting the price of the apartment are:
– the coefficient of district prestige – it is always the most important factor;
– the construction materials (quality of the property);
– the total area of the apartment;
– the kitchen area;
– the cooker type – a factor, effecting the apartment safety.

The regression model results have shown that there were parameters excluded from the features of objects, such as the apartment planning and living space because of their insignificance.

The Informative System "Apartments" had been created, allowing the automation of calculating the cost of an apartment in the selected model evaluation.

Its main advantage is the interaction between developed applications with software products such as STATISTICA and EViews. It improves the accuracy of the calculations, and furthermore eliminates the need for users to understand the interface of statistical analysis.

The program has the following structure of referenced data:
– general directories that contain the numeric equivalents of apartment qualitative parameters. Data from these same directories was used in the calculations.
– Directories containing the model for calculating the housing prices.

Applications automate the management and data processing. This way it is possible to isolate and refine the two function subsets: implementing the service functions and implement the basic functions of information processing.

Services include:
– user authentication;
– maintaining of the calendar, which is used when creating reports.

The main functions include:
– maintenance of manuals;
– options to edit the database, including entering and deleting information;
– searching;
– sorting;
– creating a report in the calculation of the cost;
– exporting of the database into Excel.

If it is necessary the user can add other options in the directory (the variables in the model), pre-coded qualitative information into numerical values. Simulation will take place on the same principle.

The main advantage of IS "Apartments" is an opportunity to recalculate the model, as well as user-defined factors influencing the value of the property, based on available databases.

Cost-effectiveness from the use of IS «Apartments» reduces the annual market-rate of work factor to 98,7 %. Payback period for implementation is 9,5 months [2].

The results can be used by realtors agencies, professional real estate assessment, City Department of Real Estate, tax authorities and individual citizens.

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