

Investigating of the using of new computer technologies based on mathematical economic models of property valuations

Saltanat Kenzhebaevna Baydybekova, Zhupargul Shaylasovna Abdykalieva, Farruh Allahverdievich Gadzhiev, Meruert Ibragimovna Kaseinova, Zhanna Imashevna Assanova

Zhetysu State University named after I. Zhansugurov, Zhansugurov Street, 187A, Taldykorgan, 040000, Republic of Kazakhstan

Abstract. Nowadays, computers are increasingly used in the organization of evaluation activity. For example, for the organization of the database storage and management, market research and analysis of multivariate solutions for the calculation of the value of property using the sales comparison, income and cost approach, analyzing the relative performance cost, use of the database in the annual update value of the property; achieve high performance quality evaluation at low unit costs; reporting valuation of property of legal entities and individuals; implementation of planning arrangements and processing of textual information.

[Baydybekova S.K., Abdykalieva Z.S., Gadzhiev F.A., Kaseinova M.I., Assanova Z.I. **Investigating of the using of new computer technologies based on mathematical economic models of property valuations.** *Life Sci J* 2014;11(7s):273-278] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 56

Keywords: evaluation, model of real estate, real estate market, economic and mathematical modeling

Introduction

Real estate appraisal is one of the most popular and one of the most complex challenges in the market of intelligent systems for the assessment and decision-making.

The difficulty is, first, in a large number of factors affecting the assessment. Secondly, the character of the factors represents a significant problem, some of them quite difficult to formalize (eg "level of prestige of the area of the object", "appearance of the object," about the history of the object evaluation, analysis and location of the object, etc.). Third, the real estate market is quite dynamic, which implies a high rate of change of the parameters estimates over time. Fourthly, we have to use the experience of different appraisers, which can lead to conflicting decisions to form the training samples and knowledge bases to form the training samples and knowledge bases to form the training samples and knowledge bases [1].

The aim of the research is to study the process of using new computer technology based on economic and mathematical models of real estate valuation, as well as an automated system of real estate valuation.

Actual task is to improve the work of valuation firms and companies at the present stage of social development is the use of new computer technologies based on economic- mathematical models of real estate appraisal. The task of evaluating is complicated by the specifics of market development in the Republic of Kazakhstan, multifactorial and multicriteria decision-making, with the uncertainty of a number of information and with

the random nature of a number of factors. This sets the objective necessity of the use of modern econometric models and algorithms for problems, as well as software in the real estate appraisal.

Research methods

The main method of research is the unit of economic-mathematical modeling, mathematical statistics, econometrics, factor, cluster analysis and elements of economic analysis in the course of work.

For the mathematical description of the development of the real estate market in the applied model used in the theory of automatic control systems to describe transient, which was subsequently introduced to the theory of the real estate market research.

This model is used to determine the reliability of the description of housing market development. Based on the regression analysis of the dynamics of the cost of 1 sq. km. meters of housing in the secondary market in accordance with the identified stages of organizational development itself shows that in periods of growth (decline) in the housing market authenticity describing the dynamics of prices by means of mathematical models is significantly higher than in stages relative price stability. It is desirable to use heuristics forecast of periods of relative price stability in the market [2].

Principles expounded in the paper can be used as subjects in management of real estate market, as well as in activities related to the research and analysis of the real estate market.

Important role in the study of self-organization processes of socio-economic systems,

information security subjects plays the real estate market with reliable information about the internal state of the system and the process of its operation, as well as external influences on the system. Specific objectives of the study of real estate market are different and depend on the purpose of the analysis and forecast [3].

Market analysis can be carried out within the framework of marketing research for the following purposes:

- promotion of goods or services in the market;
- determination of the market value (valuation) of a particular object;
- evaluating the effectiveness or justify investment decisions;
- develop strategic solutions for the development of business and other purposes.

Objects of analysis real estate market are now:

- the price situation on the real estate market, including the cost of concrete objects;
- conditions of supply and demand in the market, the volume of transactions on the market;
- the activity of buyers and sellers;
- liquidity facilities;
- the status of demand, the availability of real estate and investment efficiency (including project-specific).

Development of price dynamics in the housing market may have three ways: growth, stability and decline. Since self-organization implies an evolutionary development of the system, from that point of view it is possible to estimate listed the development of self-organization of the whole system [4].

Main

For today processing capabilities of historical data using specialized software systems of information processing can not only collect, organize and summarize the empirical evidence to explain the relationships of various processes, but also to formulate assumptions about the nature and structure of economic phenomena, to evaluate their properties and future the likelihood of new phenomena.

The proposed approach has both advantages and disadvantages. The advantages of this approach include the fact that it reflects the essence of self-organization of the housing market, the probabilistic nature of its development, and the shortcomings that the beginning of the next stage should be clearly allocated, and for the selection of model parameters required minimum phase duration - 4 months [5].

We brought it to general formula as a separate parameter is difficult, so the approximation

error was chosen initially at the level of $\pm 5\%$ in the calculations.

Regression analysis of self-organization stages of development of residential real estate market has shown that at the stages of stable growth (or decline) of the dynamics of prices in the housing market (3rd and 5th stage) development of a system can be quite reliably described using mathematical models, and as phases of relative stability in the housing market, in these periods the accuracy of the mathematical description of the dynamics of development is greatly reduced.

We consider that at the stages of growth (or decline) of average prices of accommodation in the real estate market system is not so much of a qualitative change, change in the functional structure as quantitative growth (or "compression") functioning processes, expansion of existing relationships. Moreover, such a high accuracy mathematical description of the development of the price situation in the housing market may indicate that at these stages the primary role in the development of internal interactions play in the system, the internal information [6].

As for those stages when the price situation in the housing market is relatively stable, the system real estate market is in a stage of qualitative changes in the functional structure, changes to existing relationships, the search for further development. During these periods, even a small external influence leads to a change in the dynamics of prices - there is some growth, then a slight decline.

It can also be said about the cases where the housing market is a significant external impact (including regulatory) if it took place on the stage of growth of the system, its effect, in our opinion, will be weakened by internal interactions in the system, and if does it happen at the stage of price stability, its effects are much more significant impact on the further development of the system [7].

Thus, the identified phenomena can justify the administrative aspect of research: depending on which stage (growth or stability) is a real estate market, its subjects can target their actions or the quantitative expansion of its activities or on the qualitative changes within their organizations and search for new external relationships.

We believe it possible to use heuristics particular, to solve the problem of forecasting the development of the housing market on the stages of price stability, as well as to search for the bifurcation and the subsequent development of the system.

In favor of the use of heuristics is the fact that malnutrition and inadequate information about the state of the environment in which it will continue to develop the housing market, its stochastic nature,

impose restrictions on the possibility of a complete mathematical formalization, especially in moments of bifurcations.

Nevertheless, the level of uncertainty in decision-making entities of real estate market and construction market can be reduced through the use of judgment and ability of human experts to make rational decisions under conditions of incomplete formalization. Experience, understanding of the problem, a sense of perspective and intuition help professionals in situations of uncertainty to evaluate the significance of alternative outcomes of a situation and choose the most likely [8].

Thus, we can assume that, along with trend models constructed on the basis of analysis of the dynamics of indicators reflecting the development of self-organization, their regression analysis and other mathematical methods (due to the simplicity of their implementation) in identifying trends in housing market development should be used and treatment opinions qualified experts. Any mathematical model can not cover all aspects of the process of self-organization of the housing market and failing to consider the impact of all factors on price indicators studied. Opinions of specialists and experts help further analyze the possible course of development of the situation in the housing market, and the simulation result based on expert judgment should not be the only option, and some variation of zone forecasts. In particular, only the opinions of experts will help predict the outcome of a particular external influence on the housing market.

Based on the above analysis and synthesis of information about the housing market, construction of mathematical models of housing market development, as well as considering the views of experts in terms of the further development of the housing market, we believe that the influence of the factors shaping trends in the housing market cycles, as in fact, they reflect the interaction of the subsystems of the investigated market. One or the other factor (or group of factors) begins to act on the general price trend in the housing market in a period of time. Exposure may emerge in synergetic effect and strengthen both upward, so theoretically, and downward influence of factors on prices. Over time, matter and energy flow information, supply dries these factors, the period is the current development trend of refraction, at the peak of the wave comes bifurcation point.

System housing market can change the trend of development in this period. Further development of the price dynamics can occur in a dynamic equilibrium state, and can go to the state of growth.

The real estate market is the mechanism by which the interests and rights are connected, set real

estate prices. The real estate market and the level of development characterize the development of the national economy. Since the real estate market in Kazakhstan has been studied a little and today the importance of its studying does not only remain, but also increases, because of substantial changes in the economic, political and social development of the state [9].

Formation and development of real estate market in the Republic of Kazakhstan in the changing economic structure demonstrates that the right of ownership of real estate is one of the most important factors affecting human well-being. The sufficiently rapid involvement in the market turnover of property (apartments in apartment buildings, individual houses, cottages), the slower involvement of commercial real estate (trade facilities, offices, hotels, motels, holiday homes, business centers, restaurants, service) industrial Estate (factory premises, garages, offices, warehouses, premises research organizations), real estate social and cultural facilities (hospitals, clinics, schools, buildings, governmental and administrative institutions, churches, monasteries and other religious buildings), difficult and controversial involvement land become an important element in the development of the national economy of Kazakhstan [10].

Companies operating in the residential market, have lagged behind in the using of marketing techniques from consumer companies. It is connected with the fact that the housing market was a seller's market when real estate developers operated their activity based on the production and marketing concept with minimal focus on the end user.

Despite on the need of using of marketing techniques and the integration of the consumer in the value creation process, the questions of theoretical understanding and practical implementation of the marketing approach to project management in the conditions of the Kazakhstan real estate market have remained insufficiently.

Real estate development is crucial to improve the overall economic situation in the country at present. In the development of the real estate market are activated factors contributing to lower inflation, the growth of real investment and savings increase in the gross national product.

Compared with other markets (stock, commodity), this sector to the greatest extent in develops illegal and semi-legal forms. Various public authorities divide among themselves the authority in the management of the market, but none of them really is not interested in becoming a full-fledged market economy. The rapid growth of the secondary real estate market has necessitated the development

of its market infrastructure sphere notary, legal, mediation, etc., including evaluation services of real estate.

Despite the scientific developments in the study of markets, some provisions need to develop new methods for assessing the market value of housing and real estate market analysis [11].

The urgency of this problem determines the choice of topics, the study of its structure and main directions.

The appraiser activity is connected with constant searching and processing information. It is inconceivable nowadays such activities without the Internet. It has been done for the development of information technologies in the evaluation activity in recent years. Need to develop a dedicated website for the effective evaluation of companies, where would be reflected all the necessary information about the real estate market. This site would be a great retrieval system, where the specified parameters can find real estate appraisers. All available information on the site and selling of leased facilities must be updated constantly, which would more accurately study the real estate market and as a result make a better assessment. This website is useful not only for professional real estate market participants, but also for ordinary users [12].

Scientific novelty of the research is to assess the status and development prospects of identifying real estate appraisal in Kazakhstan, based on the use of economic-mathematical methods and models, as well as advanced computer information processing technology.

The practical significance of the work lies in the fact that the proposed technique can be applied in conducting a comprehensive analysis of the state and the development and improvement of real estate valuation in Kazakhstan.

The recommendations of the research on the use of economic-mathematical methods and models for the prediction of basic indicators can be used in the activities of commercial structures of enterprises and organizations in the development of business strategies and the calculation of financial indicators.

It should be noted the program ValMaster analyzing information technology (IT) used in the Republic of Kazakhstan. With the introduction of a similar program in the Republic of Kazakhstan, we can talk about automating model calculations to assess the value of the property. You can also automatically generate reports in accordance with valuation standards with this program. Implementation of specialized programs will allow:

- increase the speed of calculation and evaluation reports;
- improve the quality of their assessment;

- standardized assessment reports;
- accelerate the examination of assessment reports;
- facilitate the work of appraisers.

Creating such programs more necessary for evaluating of standard, typical real estate. However, as most of the information is required for evaluation of the typical real property, the invention of more sophisticated software products should contribute to a significant reduction in labor costs as a result of appraisers and increase productivity [13].

However, such programs have drawbacks. Evaluation program works in two directions - easier in their own object-based counterparts, which is necessary to form personally. Forming a base can be manually selecting objects independently of the proposed analogs currently on the market, with the help of paid real estate database is updated daily, with enough generate a report on the desired segment of the real estate filtering some false sentences with unnatural prices (too high or low).

The second direction is more complicated, because the program works together with the "search engines" of the Internet itself and tries to discover analogs real estate criteria. Search criteria can be different, for example - direction highway, distance, area, purpose and scope of even value This more complex method of independent search analogues is still in its infancy and therefore often produces significant errors. The search engine sees only clearly defined criteria and cannot enter into the position of each analog, where is not obvious to many variables for it. For example, the postscript is in the burden as high-voltage power lines, or to long-term lease, which ends and possibly extend the lease, etc [14].

All these nuances weakness programs significantly increase the assessment of the property, that is to the appraiser has to manually change some value added coefficients.

Nevertheless, these drawbacks relate more to comparative evaluation method. Profitable and costly methods in software products are more versatile and are much less variable, which may arise in the process of real estate valuation. These programs allow you to use the software only partially hoping they separate methods, where few variables and a lot of reference material. Everything depends on the evaluator.

The positive aspect is the fact that such programs do not allow typos - the eternal problem of not very attentive appraisers and appraiser in a typical facility will miss three minutes to calculate, for example, the cost method.

Using these programs will be useful even for the most selective appraisers. No doubt, it also will be advantageous to use such software, as the user of

the product may add in its sole discretion, edit, delete in assessing any sections, placing them instead of other input, which in the opinion more suitable.

Software for evaluation of transport are well established in the Republic of Kazakhstan in assessing the damages in accidents (RTA), where the program really does almost everything for the appraiser. It's enough to enter all the data on the machine and damage, click and get ready printed report with a market value assessment of the accident.

To date, real estate appraisal is considered to be a report made in the "manual" more quality work, ie finding analogues and their analysis, personally an expert appraiser [15].

Nevertheless, the information technology (IT), which have already appeared in the markets of Kazakhstan greatly facilitated the evaluation process. If previously objects, analogues were taken from newspapers and information quickly becomes outdated, but now with the advent of specialized websites and databases greatly expanded opportunities appraisers.

There is a necessity in the software product that reason, that you can use would be automatically on the specified criteria to analyze the real estate market, to build the necessary graphics and output coefficients, or to find a suitable analogue.

Conclusion

It can be concluded, noting the strengths and weaknesses of programs for real estate appraisal, that they are necessary, but it all depends on the cost of developing these products, that is to be a major factor constraining the development of IT in the evaluation of real estate in the Republic of Kazakhstan.

In general, in the Republic of computerization market valuation services based on modern economic and mathematical models and algorithms for problems of valuation of property is in its infancy. No complex software tools that provide automation of production evaluations in interactive mode. No common information base, as well as the relevant technology of collection and processing, which hinders introduction of the most adapted to market conditions assessment work methods comparable sales (income).

The study laid down the principles for calculation of various coefficients and mathematical models assessing the cost characteristics of real estate, which defines the set of scientific novelty of the study. In general, by the authors was made the following work:

- there were identified trends in the development of the housing market using the proposed system of indicators, including the addition

to the traditional, such as satisfaction with housing conditions, consumer indicators of housing quality;

- the development of new methods of analysis residential real estate market, the main stage of which is to estimate the value of real estate;

- the development of methodology for assessing the value of residential real estate objects, supplemented by the introduction of weighting factors of significance based on peer review of specialists;

- there was worked out the evaluation model of the cost of housing, expressed by a power function, which allowed identifying a quantitative measure of the cost of housing, depending on the economic, social and geographic factors of influence.

Corresponding Author:

Dr. Baydybekova Saltanat Kenzhebaevna
Zhetysu State University named after I. Zhansugurov
Zhansugurov Street, 187A, Taldykorgan, 040000,
Republic of Kazakhstan

References

1. Avelino, J.G. and L.O. Raymond, 1992. A case-based reasoning approach to real estate property appraisal. *Expert Systems with Applications*, 4. Date Views 11.04.2014 www.sciencedirect.com., Pages 229–246
2. Krause, A.L. and C. Bitter, 2012. Spatial econometrics, land values and sustainability: Trends in real estate valuation research. *Cities*, 29. Date Views December 2012 www.sciencedirect.com., Pages S19–S25
3. Veselskaya, N.R., 2009. Methodology and expert evaluation of objects in real estate. *Bulletin Treasury. Economic series*, #6: P23-28.
4. Kontrimas, V. and A. Verikas, 2011. The mass appraisal of the real estate by computational intelligence. *Applied Soft Computing*, 11. Date Views January 2011 www.sciencedirect.com., Pages 443–448
5. Novoselov, N.N., 2011. Investigation of the basic conditions and directions of formation of an effective regional management. *Engineering Don Gazette (e-zine)*, 3. Date Views 11.04.2014 www.ivdon.ru. - 0.4 t.p.
6. Askarov, D., 2008. Estate Market: theoretical foundations and methods of regulation. *Bulletin Treasury. A series of economic*, #3: P 111 -114.
7. Gavius, I. and Y. Parmet, 2010. Do private firm valuations contain incremental information content over routine analyst valuations?. *Research in International Business and Finance*, 24. Date Views 10.04.2014 www.sciencedirect.com., P 223–234

8. Richardson, D.H., 1992. On the use of grouping methods in the analysis of residential housing markets. *Regional Science and Urban Economics*, 12. Date Views 10.04.2014 www.sciencedirect.com. P 285–304
9. Waggle, D. and D.T. Johnson, 2009. An analysis of the impact of timberland, farmland and commercial real estate in the asset allocation decisions of institutional investors. *Review of Financial Economics*, 18. Date Views April 2013 www.sciencedirect.com., P 90–96 *Real Estate — Real Estate*
10. Ryspekova, M.O., 2009. Analysis of property values in the Republic of Kazakhstan, *Kazakh Academy of Education*. - P139 -143
11. Graznova, A.G. and M.A. Fedotov, 2004. *Real Estate Appraisal*. Moscow: Finance and Statistics, p: 58p.
12. Asabere, P.K., 1993. The value of a neighborhood street with reference to cul-de-sac. *Journal of Real Estate Finance and Economics*, #3. Date Views 10.04.2014 www.sciencedirect.com. P. 185–193
13. Nurgaliyev, K.R. and P.A. Penkov, 2009. Some features of assessment practices in the EU countries and their integration into valuation practice in Kazakhstan. *Bulletin Treasury. A series of economic*, #2: P 129-133.
14. Vincent, L., January 1999. The information content of funds from operations (FFO) for real estate investment trusts (REITs). *Journal of Accounting and Economics*, 26. Date Views 10.04.2014 www.sciencedirect.com., P 69–104
15. Ahn, J.J., H.W. Byun, K.J. Oh and T.Y. Kim, July 2012. Using ridge regression with genetic algorithm to enhance real estate appraisal forecasting. *Expert Systems with Applications*, 39. Date Views 10.04.2014 www.sciencedirect.com. P. 8369–8379.

5/8/2014