LAND MANAGEMENT AND GEODESY

EVALUATION OF INDICATORS OF CADASTRAL ASSESSMENT

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ABSTRACT

To justify the importance of the indicators affecting the cadastral value, surveys were carried out, by help of which opinions of different respondent groups were summarized. The interviewed respondent groups were real property specialists of municipalities and experts. The thematic blocks of the questions included in the questionnaires are designed with the aim to clarify the quality of the indicators of cadastral assessment models, as well as their significance. The paper summarizes the survey findings about the correspondence and significance of the indicators of cadastral assessment models of land as evaluated by municipality specialists, as well as the assessment and solutions to actual problems are offered. Based on the findings of the municipality specialists' survey and the research results, the indicators for the improvement of cadastral assessment models of building land and rural land offered to the experts' assessment are summarized and evaluated.

Key words: cadastral assessment, cadastral assessment models, indicators of cadastral assessment models, building land, rural land.

INTRODUCTION

Cadastral assessment is a systematic assessment of property groups on a particular date, performing the assessment according to a standardized procedure (Nekustamā…, 2005). Cadastral assessment in Latvia is mainly used for calculating the real property tax.

The value determination models, using the real property data for calculations, explain the value of the property. These models were designed based on the costs, revenue and deals comparison methods. For the cadastral assessment to be implemented, the country should have accumulated stored computerized information about objects and their indicators, the information about real property market deals should be summarized, the assessment procedure and calculation models should be provided by the legislation (Baumane, Parsova 2010).

Due to the limitations of the scientific research the authors have studied improvement opportunities for the assessment models of building land and rural land in their paper from the aspect of the indicators affecting them.

Recogniscating research (Baumane, 2010; Baumane, 2012) developed a basis for the following hypothesis - the most important indicators provide objective cadastral assessment.

According to the hypothesis, the goal of the paper is to analyze and evaluate indicators for cadastral assessment models. To attain the goal, the following objectives were set:

- evaluate the indicators of cadastral assessment models as assessed by municipality specialists;
- evaluate the indicators of cadastral assessment models as assessed by experts.

MATERIALS AND METHODS

In the study regulatory acts were used, where indicators for cadastral assessment are determined (Kadastrālās..., 2006).

A questionnaire was designed and real property specialists of municipalities were interviewed. The survey was designed to implement a questionnaire about the influencing indicators of the cadastral assessment. The questionnaire included unstructured answer questions and structured answer questions. The questionnaire was implemented with the most widely used electronic questionnaire method. The questionnaire respondents were chosen and inquiry forms were sent to real property specialists of 110 municipalities.

It was necessary to obtain the questionnaire data to be attributable to the respondent groups for determining the sample size. A simple selection case without repetitions can be used, the calculation formula (Krastiņš, Ciemiņa, 2003):

$$n = \frac{t^2 N \upsilon(1-\upsilon)}{t^2 \upsilon(1-\upsilon) + \Delta_\upsilon^2 N}$$

where:

n - selection volume;

Δ_υ - relative frequency of random error, or permissible level of materiality;

t - probability coefficient;

N - number of respondents;
υ - relative frequency in selections.

Therefore, the necessary number of respondents was calculated in the selection that the questionnaire obtained would be applicable to the general group. In total 87 respondents were interviewed, that draw up 80% from the total number of municipalities.
The study used expert experience, and in the result processing the American scientist's T.Saaty hierarchical analysis method was applied (Saaty, 1981). Experts included high-level practitioners, experienced specialists and scientists.
Expert assessment of the rural land and building land cadastral valuation model improvement possibilities with the authors' developed algorithm of the hierarchical analysis method, where used for assessment of the influencing indicators of rural land and building land cadastral assessment. The expert working process was based on the authors' matrices. Each pair evaluation for matrices was calculated in special vectors groups, and then the results normalized to 1, so the priority vectors were obtained for the indicators of cadastral evaluation.

RESULTS AND DISCUSSION

The main indicators that characterize the qualitative situation of land are the area of land useful for agriculture (arable land, meadows, pastureland, and orchards) and its amelioration situation. The survey results indicated that actual information on agricultural use of the land is not available in municipality villages or municipalities.
Assessing the correspondence of the qualitative assessment of the useful land (Fig.1), it can be concluded that there is a significant number of municipalities where the qualitative assessment of agriculture use of the land has decreased, but not more than by 5 points, and there are municipalities where the qualitative assessment of agricultural use of the land has decreased by 5 – 10 points.
To improve the data quality of agricultural use of the land qualitative assessment, when summarizing the specialists' opinions, it can be concluded that a large complex of measures should be taken on the state scale, as a result of which the qualitative assessment of the land useful for agriculture would be actualized, as well as the meliorated areas and their functional situation would be recognized.
Whereas, before starting building a complex assessment of the territory should be performed, including the assessment of the geological situation. Geological research is also necessary due to the existence of such geological formations as caving falls and the increase of new territories they occupy. The survey findings indicated that 9% of the municipalities face this problem, but 37% indicated that the municipality does not have information about the existence of caving falls.

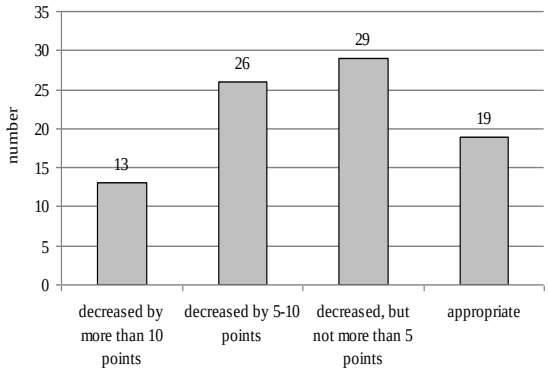

Figure 1. Respondents' assessment of the correspondence of the qualitative assessment of the agricultural use of the land (Source: authors' research assessing every case n=87)

Most of the respondents admit that geological research should be performed with a complex of state level activities (Fig.2), whereas, a similar distribution of answers is observed for the other types of the suggested answer choices. 25 respondents consider that geological research is not necessary and 23 respondents consider that geological research is necessary but only upon the initiative of the owner of the real property.

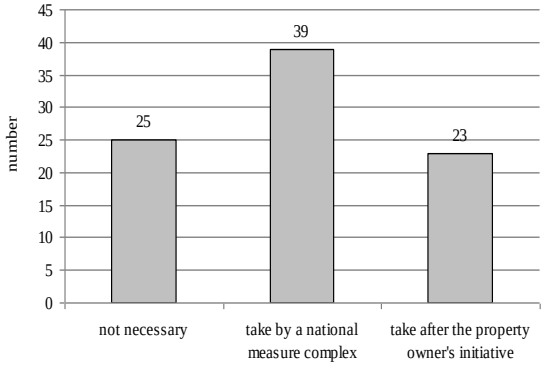

Figure 2. Respondents' assessment about the need of geological research (Source: authors' research assessing every case n=87)

According to laws and regulations, the purposes of use of real property are determined for the purposes of cadastral assessment, therefore, the determined purpose of use of real property should correspond to its actual purpose of use. When assessing the respondents' opinion about the determined purpose of use of real property and their correspondence to the actual use (Fig.3), 44 respondents indicate that the purposes of use determined in their municipalities fully correspond to their actual or perspective use and 35 respondents admit that the determined purposes of use of real property

correspond to the actual use, only with few exceptions, which increases the cadastral assessment.

As the base value has been determined for every group of the purposes of use of real property, to calculate an objective cadastral value, it is very important to determine a correct purpose of use for the real property and its objects, therefore, in some situations it is necessary to propose a change of the purpose of use of real property to a purpose that corresponds to the actual use of the real property.

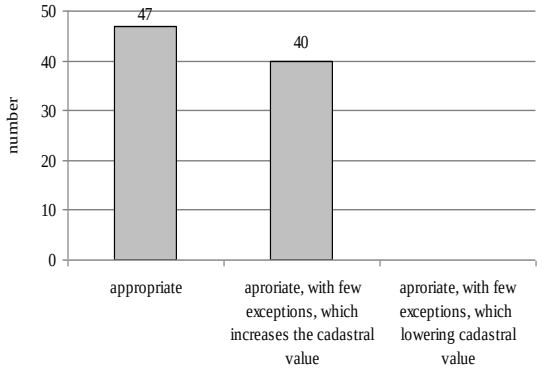

Figure 3. Respondents' assessment of the determined purposes of use of real property (Source: authors' research assessing every case n=87)

The indicators characterizing the cadastral assessment models of building land (Fig.4) and rural land (Fig.5) were offered to the real property specialists of municipalities to assess the significance of these indicators.

Assessing the indicator "purposes of use of building land", 99% of the respondents admitted that this indicator has a very significant impact on the calculation of the cadastral value and only 1% of the respondents admitted that this indicator only partly affects the cadastral value. 69 respondents, or 79%, admitted that the indicator "encumbrances" has a significant impact on the calculation of the cadastral value and 18 respondents (21%) admitted that this indicator partly affects the cadastral value. 17% of the respondents assessed that the indicator "pollution" has a significant impact on the calculation of the cadastral value, but 71% of the respondents indicated that this indicator partly affects the cadastral value. 86% of the respondents evaluated the indicator "supply with engineering communications" as significant and 14% of the respondents admitted that this indicator only partly affects the cadastral value. 60% of the respondents admitted that the indicator "geological situation" has a significant impact in the calculation of the cadastral value, but 40% of the respondents admitted that this indicator only partly affects the cadastral value but it has to be taken into consideration. Only 3% of the respondents admitted that the indicator "social infrastructure" has a significant impact on the calculation of the cadastral value and 37% of the respondents admitted that this indicator partly affects the cadastral value but it has to be taken into consideration, but 60% of the respondents admitted that this indicator partly affects the cadastral value and it does not have to be taken into consideration. 59% of the respondents indicated that the indicator "real property market situation" has a significant impact on the calculation of the cadastral value and 40% of the respondents admitted that this indicator partly affects the cadastral value but it has to be taken into consideration, but only 1% of the respondents admitted that this indicator partly affects the cadastral value and does not have to be taken into consideration.

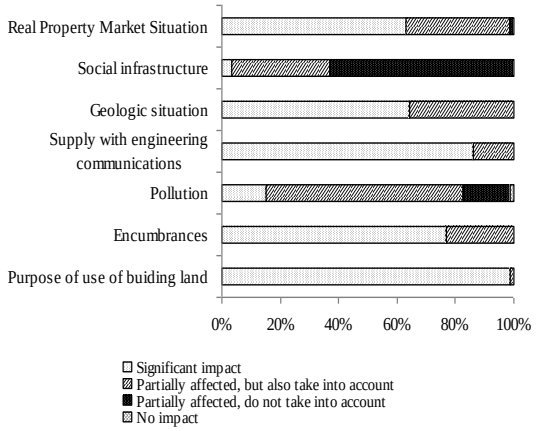

Figure 4. Respondents' assessment of the indicators of cadastral assessment of building land (Source: authors' research assessing every case n=87)

According to the assessment of the real property specialists of municipalities of the significance of the cadastral assessment model of building land, it can be concluded that the least significant indicator that does not affect the cadastral assessment of land is "social infrastructure", but the most significant indicators are "purpose of use of building land", "encumbrances", "provision with engineering communications" and "geological situation". These are significant indicators and they have to be taken into consideration when improving the cadastral assessment model of building land.

When assessing the significance of cadastral assessment models of rural land, the respondents evaluated equally the indicators "agriculture use of the land qualitative assessment" and "qualitative assessment of forest land", 97% and 98% respectively admitted that these indicators have a significant impact on the calculation of the cadastral value.

63% of the respondents assessed that the indicator "encumbrances" has a significant impact on the calculation of the cadastral value but only 2% or the respondents admitted that this indicator partly

affects the cadastral value but it has to be taken into consideration.

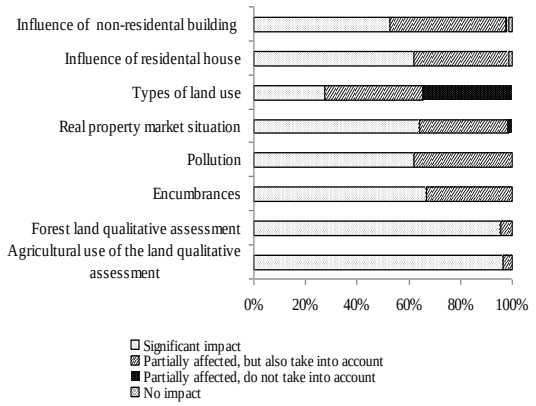

Figure 5. Respondents' assessment of the indicators of cadastral assessment of rural land (Source: authors' research assessing every case n=87)

Whereas, 58% of the respondents admitted that the indicator "pollution" has a very significant impact on the calculation of the cadastral value, but 42% of the respondents admitted that this indicator partly affects the cadastral value but it has to be taken into consideration. 61% of the respondents admitted that the indicator "real property market situation" has a significant impact on the calculation of the cadastral value, but 38% of the respondents admitted that this indicator partly affects the cadastral value but it has to be taken into consideration and 1 respondent, which corresponds to 1%, admitted that this indicator partly affects the cadastral value and it does not have to be taken into consideration. 20% of the respondents admitted that the indicator "types of land use" has a significant impact on the calculation of the cadastral value, 42% of the respondents admitted that the indicator partly affects the calculation of the cadastral value but it has to be taken into consideration, 38% of the respondents admitted that the indicator partly affects the cadastral value and it does not have to be taken into consideration. 58% of the respondents admitted that the indicator "influence of the residential house" has a significant impact, 41% of the respondents admitted that this indicator partly affects the cadastral value but it has to be taken into consideration, but 1 respondent admitted that this indicator does not at all affect the cadastral value. 48% of the respondents admitted that the indicator "influence of the non-residential building" has a significant impact on the calculation of the cadastral value, 50% of the respondents admitted that this indicator partly affects the cadastral value but it has to be taken into consideration, 1 respondent, which constitutes 1%, admitted that this indicator partly affects the cadastral value and does not have to be taken into consideration and 1 admitted that this indicator does not at all affect the cadastral assessment.

The analysis of the survey findings allows concluding that the least significant indicator that partly affects the cadastral assessment of rural land, according to the respondents' assessment, is "types of land use", but the most significant indicators are "agriculture use of the land qualitative assessment", "qualitative assessment of forest land" and "encumbrances". In this case all selected indicators have received a significant recognition; therefore, these indicators should be taken into consideration when elaborating the cadastral assessment model of rural land.

In the research the experts' experience was also used, and to process the results, the American scientist T. Saaty's hierarchy analysis method was applied. The experts performed the assessment of the elaboration opportunities of the cadastral assessment models of rural land and building land with the algorithm of the hierarchy analysis method developed by the authors, using the information about the main indicators affecting the cadastral value of rural land and building land. To improve the cadastral assessment model of rural land the following criteria were selected for the experts' assessment: agricultural use of the land quality assessment; assessment of the quality of forest land; influence of the non-residential building; influence of the residential house; encumbrances; pollution; real property market.

The experts' assessment of the cadastral value model of rural land for the above characterized groups reflects sharper differences of the experts' opinions (Fig.6), but yet most of the experts admit that agricultural use of the land qualitative assessment has more significance. The experts have also emphasized land pollution as a very significant indicator, which largely affects the agricultural use of the land. The experts have prioritized the offered indicators in the following order: agricultural use of the land quality assessment; pollution; assessment of the quality of forest land; real property market situation; influence of the non-residential building; influence of the residential house.

To improve the cadastral assessment model of building land the experts were asked to assess the following criteria: purpose of use of the building land; encumbrances; pollution; supply with engineering communications; geological situation; level of social infrastructure; real property market.

The experts' assessment of the above characterized groups of the cadastral assessment model of building land reflects differences in the experts' opinions; however, most of the experts admit, that the purpose of use of real property with a code from 06 till 12 has a more significant role in the calculation of the cadastral value of building land. 4 experts have also emphasized the geological situation as a very significant indicator. The

experts' opinion about the significance of the real property market indicator approves that too much attention is paid to real property market during the cadastral assessment process, not to the data characterizing each property.

The experts have prioritized the offered indicators in the following order (Fig. 7): purpose of use of the building land; supply with engineering communications; encumbrances; geological situation; pollution; level of social infrastructure; real property market situation

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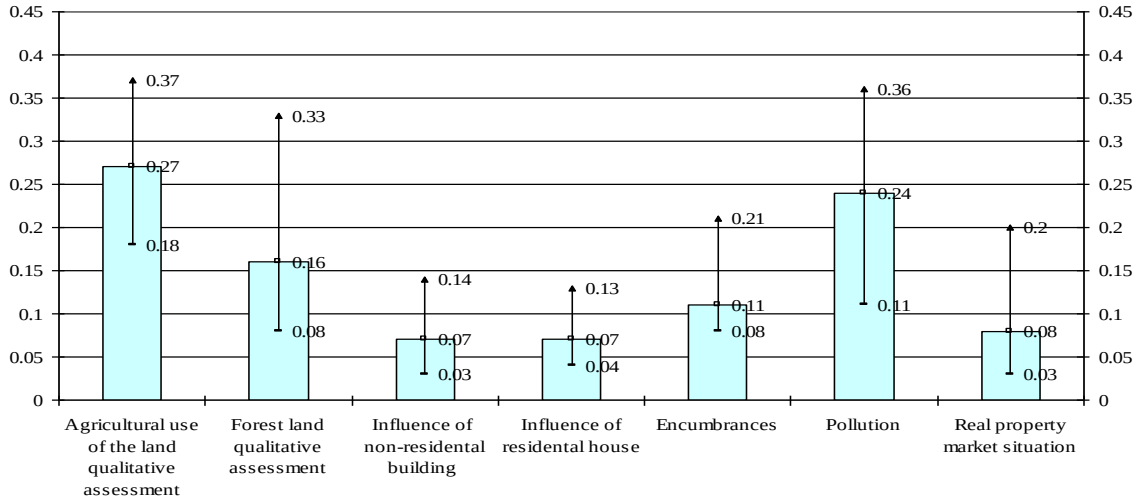

Figure 6. Priorities for elaboration of the cadastral assessment model of rural land (Source: authors' calculations)

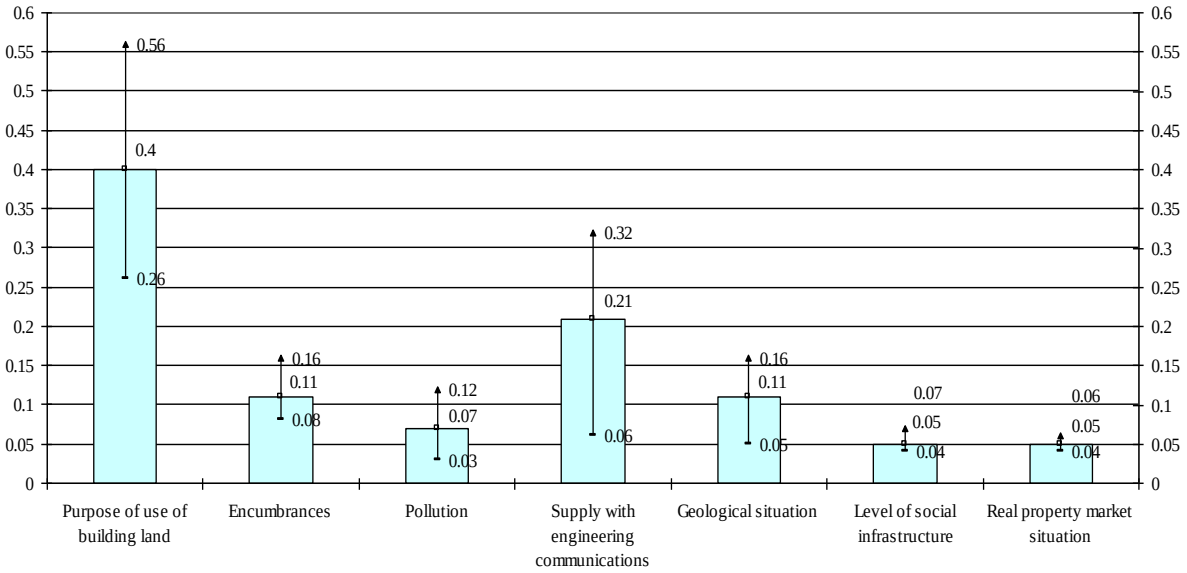

Figure 7. Priority of elaboration of the cadastral assessment model of building land (Source: authors' calculations)

Summarizing the research results and experts' opinion about the opportunities for the improvement of cadastral assessment models of building land, it can be concluded that the assessment model should comprise correction coefficients that will characterize the existence of engineering communications, as well as geological conditions, alongside with the elaboration of the data storage system.

CONCLUSIONS

1. The findings of the municipality specialists' survey allow concluding that a large complex of activities should be implemented on the state scale, in the result of which the qualitative assessment of the agricultural use of the land would be actualized, the meliorated areas and their functional situation would be acknowledged; geological research information is very necessary and its acquisition is possible implementing the complex of state-scale measures.
2. Based on the experts' assessment of the improvement opportunities for the cadastral assessment model of building land, it can be concluded that the assessment model should include correction coefficients that will characterize the existence of engineering communications, as well as the geological situation, alongside with improving the data storage system, but after the assessment of the improvement opportunities for the cadastral assessment model of rural land, it can be concluded that qualitative data about the quality of soils and pollution are necessary.

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