



## INCREASING EFFICIENCY OF MULTIPLE LISTING SERVICE SYSTEMS APPLYING WEB-BASED DECISION SUPPORT SYSTEM FOR REAL ESTATE

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**Abstract.** One of the major problems in Multiple Listing Service Systems is to find what you want. Number of real estate alternatives on the Internet is thousands. How can customers find the rational alternative on the Internet? Once real estate is found, the customer usually wants to compare alternatives. There are five types of aids to comparison shopping: search on hypertext files by agents, search alternatives on databases, alternative search and tabular comparison, comparison of alternative products and services from multiple malls, search and multiple criteria decision-making. Therefore, the efficiency of Multiple Listing Service Systems may be increased by applying multiple criteria decision support systems developed by authors. The authors have developed Web-based Decision Support System for Real Estate (DSS-RE). Proposed DSS-RE can create value in next important ways: help customers assess their needs, identify suitable real estate to fulfil needs, compare and evaluate real estate, help customers evaluate the usefulness of the real estate in the after-purchase evaluation stage, etc.

**Keywords:** Multiple Listing Service Systems, Web-based Decision Support System for Real Estate, Multiple Criteria Analysis.

### 1. Introduction

The property Multiple Listing Service (MLS) system was introduced at the end of the last century in the US; afterwards it has been extended to the most of the countries in which the free real estate market exists. The MLS enables introducing complex services on the local real estate markets, linking brokers operating on this market. The development of the MLS can improve functioning of real estate markets that raise the standards of the services offered and reduce the costs of conducting the promotional and sales activities (remaining at the market fully professional companies) [1].

A multiple listing service benefits both the buyers who have access to the maximum numbers of listings and the sellers, who are assured the maximum number of potential customers, according to real estate officials.

The brokerage is processed in two layers for efficient linking between buyers and sellers: the competition layer and the constraint satisfaction layer [2]. The basic advantage of the Multiple Listing Service is the increase of sale possibilities through offering real estate to the clients of other brokers, what allows to reduce the costs of reaching the client interested in specific offer and to shorten the time of closing the transaction. Dividing the commission between the agencies or brokers representing the parties of the transaction is the obligatory

principle. So the agency fee or the broker fee is taken only from the owner of the real estate. It forces the agencies to strive for continuous development of the quality of their services [1].

All parts in the housing market are typically required to enter their listings into the MLS systems within a short period of time [3].

Changing the information structure of real estate decision systems could change system dynamics and improve allocative efficiency [4].

The paper is structured as follows. Following this introduction, Chapter 2 outlines Multiple Listing Service definitions. Experience of development of MLS in Poland and St Petersburg is introduced in Chapter 3. Web-based Decision Support System for Real Estate developed by the authors is presented in Chapter 4. Chapter 5 includes conclusions.

### 2. Multiple Listing Service definitions

Different MLS definitions are used in real estate sector:

- A service created and run by real estate professionals which gathers all of the property listings into a single place so that purchasers may review all available properties from one source. The MLS also deals

with commission splitting and other relations between brokers and agents [5].

- A service providing member real estate licensees with information about properties listed for sale or lease [6].
- A service operated by a (sometimes privately operated) board of REALTORS® in which members offer cooperation and compensation to other brokers on their listed properties [7].
- A system that provides to its members a detailed information about properties for sale [8].
- An association of real estate brokers that agrees to work together, pooling their data and cooperating to sell the group's listings [9].
- A computer-based resource used by real estate agents that lists and contains descriptions of houses that are for sale in a particular area [10].
- A service that combines listings of all available homes in an area into one directory or database, with the exception of for sale by owner properties [11].
- A networking system, frequently on computer, in which a number of real estate firms share information about their clients' houses that are for sale [12].
- The multiple listing service, or MLS, is a local database that lists homes for sale. Member real estate agents can access the MLS and show listed homes to potential buyers [13].
- An index listing all available properties in a given area; listing information includes asking price, type of property, tax amounts, etc [14].
- The multiple listing service, or MLS, is a local database that lists homes for sale. Member real estate agents can access the MLS and show listed homes to potential buyers [15].
- An arrangement among real estate board members or exchange members whereby brokers bring their listing to the attention of the other members so that all members' listings are exposed to the market, resulting in better exposure of the seller's property [16].
- A marketing organisation composed of real estate brokers who agree to share their listing agreements [17].
- A system that provides to its members detailed information about various properties that have sold [18].
- An organised system (computer) by which members share information about listed properties [19].
- Service combining the listings, in one database, of all the available homes, except those being sold by the owner, in a specific area [20].
- A system that provides its members detailed information about properties for sale [21].
- An agreement whereby brokers pool their listings and offer to cooperate and compensate other brokers and in some cases buyer's brokers [22].

- An arrangement among real estate practitioners, usually local real estate board members, whereby each agent presents his/her listings to the other members who may negotiate the transactions. If a sale results, the commission is divided between the seller's agent bringing the listing and the agent making the sale [23].
- A service of a local Real Estate Board which publishes and exchanges details of properties registered with them. While this used to be for the exclusive use of registered Realtors, it is now possible for a private individual to "list" a property without committing to pay a Realtor a "listing commission" if the property sells. The majority of properties sold in Canada are sold through the local MLS [24].

Majority of MLS contains data on various types of real property objects, offered for sale and lease. The MLS may increase efficiency of business of the MLS members, allow the MLS members to occupy a special place on the market, assist to realtors in search of information about sale of compatible facilities, accelerate and facilitate purchase and sale of property by customers, provide precise statistical data about the market and information on the trends and become a valuable source of income for the association [25].

### 3. Experience of development of MLS in Poland and St Petersburg

Creating the MLS, the Warsaw Broker Real Estate Association (WSPON) took as an example the MLS systems in the US. The rules of functioning the MLS have been adapted to the Polish conditions and legislation. In the Mazowieckie Voivodship MLS - the "multiple listing service" has been operating already since 2002. The system can be implemented by agencies and brokers who accept the equal rules of participation and conducting professional activity, determined in the regulations. The most important rules of conducting professional activity by the agency entering the MLS system are as follows [1]:

- All operations in the system can be conducted only by a person who holds the license, or under the supervision of such a person.
- System includes only the exclusive rights agreement offers.
- The property offers a database, in which the property is offered by real estate agencies and brokers to other system participants on the exclusive rights principle is the basis of the operation of the system.
- The database includes offers belonging to the following categories: apartments (flats), houses, land parcels (plots), commercial properties, for sale, rent or lease.
- The exclusive rights agreement signed with the owner of the property gives the broker a guarantee (confidence) that his activities and work contribu-

tion will be paid for so it is an incentive to increase the efforts to finalise the transaction.

- The MLS gives the broker the possibility to reach considerably greater number of potential clients interested in offered properties through making the offer available to all brokers belonging to the system and to their clients.

Basic principles of development St Petersburg MLS are as follows: split of data bases as contractual (Listing) and operational (Fence-newspaper); connection of any realty company complying with Regulations is possible; close co-operation with front-rank mass media; sale of advertising to mass media via the MLS; development of own Internet-resources; co-operation with leading Internet resources as Russian as well as international ones. Trends of development for the St Petersburg MLS are as follows: within recent 6 months subscribers increasing by 15 %; real provision of the object exclusivity and the principle 1 customer 1 agent; coverage of more than 60 % of market of the municipal objects; coverage of more than 60 % realtors, working on the Sankt-Petersburg market; creation of unique municipal data base of exclusive objects that enables the MLS to adjourn from “closed” information system (working only with the market professionals) to wide advertising of these facilities advertising campaign of the St Petersburg MLS; advertising in any mass media is performed by indication of names and phones of realty companies that facilitates attraction of customers in them; a possibility emerges to create “package” proposals for advertising exclusive facilities of various printed mass media + various Internet-resources; exclusivity warranties allow realty companies to invest money in high-technology means of advertising, such as virtual tours. In such a way the MLS promotes increase of amounts and means of advertising and, as a consequence, increase of income for their subscribers [25].

The participants of the Polish MLS system have the access to the archive data. In the archival database there is such a detailed information about the closed transactions: real estate purchase price, source of financing the purchase, the offered property listing period. The access to the Polish MLS archival database enables the broker to have a better appraisal of property, more precise recognition of the local market and the trends appearing on it. Within next years, the founders and participants of the Polish MLS system intend to channel the majority of transactions on the real estate market through the MLS system. The currently ongoing integration of the regional MLS's into the over-regional net would allow, thanks to the increase of the database offer, strengthening the position of the MLS system and its participants on the Polish real estate market. Moreover, the integration would also enable unification of the standards of broker professional service and the development of the unified standards of cooperation between real estate agencies associated until now within different MLS systems [1].

The efficiency of Multiple Listing Service Systems may be increased by applying multiple criteria decision support systems developed by the authors. They have developed Web-based Decision Support System for Real Estate (DSS-RE).

#### 4. Web-based Decision Support System for Real Estate

##### 4.1. Background

With the prevalence of the Web, most decision-makers are likely to use the Web to support their decision-making. Web-based technologies are leading the major stream of researching decision support systems [26].

Web DSS approach can provide an effective decision support mechanism for customers in the Real Estate [27].

The Web-based DSS systems consist of a web-based interface, a client side editor and an application server [28]. Researchers and application programmers at Vilnius Gediminas Technical University have developed this prototype Web-based Decision Support System for Real Estate (DSS-RE) for searching the real estate alternatives, determining them and making the initial comparative table, also for determining priority, utility degree and market value of the analysed real estate alternatives [29]. The analysis of real estate is being performed by taking into account economic, qualitative (architectural, aesthetic, comfort), infrastructural, technical, legal, technological, social and other factors [30].

At the moment the developed DSS-RE allows performance of the following functions: search for real estate, finding out the alternatives and making the comparative tables, multiple criteria analysis of alternatives [31].

Real estate brokers wishing to present information on their objects must receive the permission from DSS-RE administrator. Having the permission the broker inserts all necessary information about real estate objects under sale in the DSS-RE databases according to the system requirements (system of criteria, values and weights of criteria). Access to the databases developed personally by brokers is provided only to the broker and to the DSS-RE administrator.

##### 4.2. Using the DSS

The RE-DSS is a web-based application and can be found on the following web address: <http://dss.vtu.lt/realestate>. Once the website has been loaded, the following will be seen (Fig 1).

The DSS-RE will reason the decisions on what type of real estate you wish to analyse. At the moment these databases are developed: dwelling real estate (apartments in houses with few flats, apartments in blocks of flats

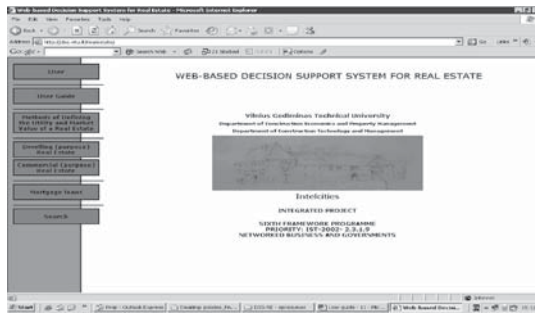


Fig 1. Start-up screen



Fig 4. Presentation of information on Private house

(single-room, 2-rooms, 3-rooms, 4-rooms, 5-rooms), garden houses, farmsteads, cottages, private houses) and commercial real estate (premises, buildings) (Figs 2 and 3).

By clicking the link “Expert and quantitative description of the variants” (Fig 4), the expert and quantitative description of the private houses alternatives is presented (Fig 5). Each alternative described by the quantitative information (system of criteria, weights of criteria and values) has a number (Fig 5) that coincides with the verbal and photographic information describing the mentioned alternative (Fig 4).

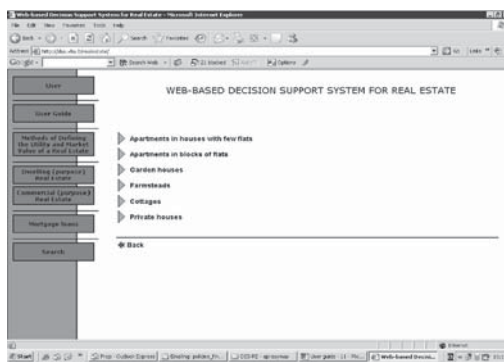


Fig 2. Links to dwelling real estate (apartments in houses with few flats, apartments in blocks of flats (single-room, 2-rooms, 3-rooms, 4-rooms, 5-rooms), garden houses, farmsteads, cottages, private houses)

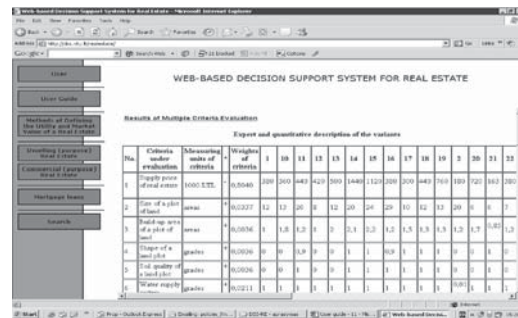


Fig 5. Expert and quantitative description of the private house alternatives

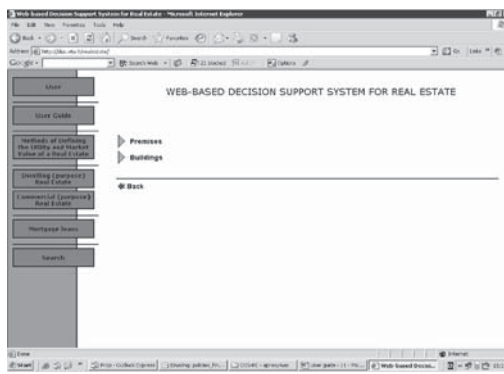


Fig 3. Links to commercial real estate (premises and buildings)

As an example, the Private house is shortly analysed hereafter. Search for alternatives and analysis of other real estate is performed analogously. Following the link “Private house“, the alternatives currently existing in the database are presented in words and photos (Fig 4). These alternatives can also be presented in other forms (virtual: video; graphical: schemes, graphs, diagrams, drawings, etc) [31].

Clicking the link ”Results of Multiple Criteria Evaluation” (Fig 5), the results of multiple criteria evaluation of the private house alternatives are demonstrated (Fig 6).

In the lower part of the obtained results’ matrix, the calculated significance of the private house alternatives, their priority and utility degree are presented (Fig 6b). The upper part of the obtained results’ matrix shows the numbering of the private house alternatives (Fig 6a). By clicking these blue underlined numbers it is possible to calculate the market value of a certain alternative (Fig 7). The table presented in Fig 7a shows the iterations made during the calculation of real estate market value. The same information only in graphical form is presented in Fig 7b. Moving a mouse above any column of the graphical part, the numerical value of the column is shown. For example, the market value of the eighth alternative was calculated making 15 iterations (Fig 7). Setting a mouse to the first column of the graphical part, we can see that intermediate market value during the first iteration was equal to 498,977 thousand Litass (Fig 7b).

A user may perform a search for alternatives from databases of different brokers (Fig 8). It is possible as



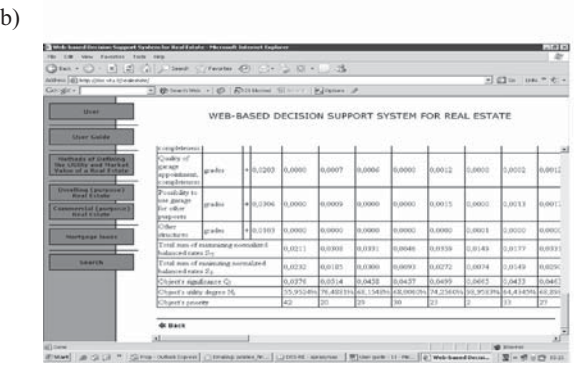
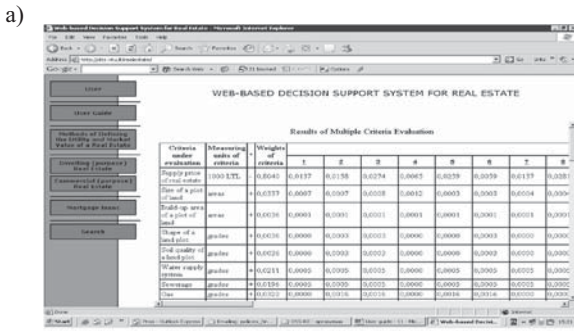


Fig 6. Results of multiple criteria evaluation of the private house alternatives:

- a) Upper part of the matrix for obtained results;
- b) Lower part of the matrix for obtained results

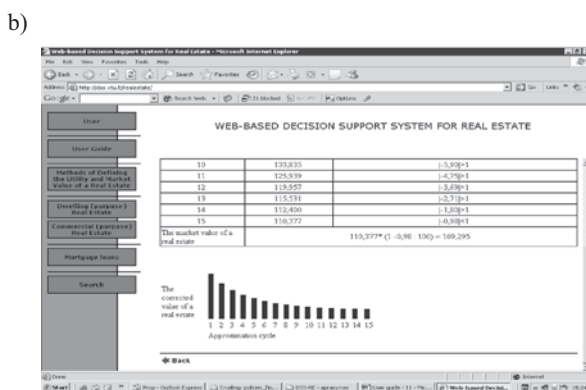
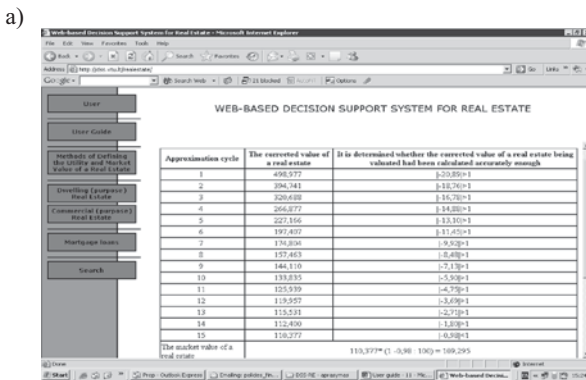


Fig 7. Calculation of market value. Presentation of the market value calculations:

- a) in a numerical form
- b) in a graphical form

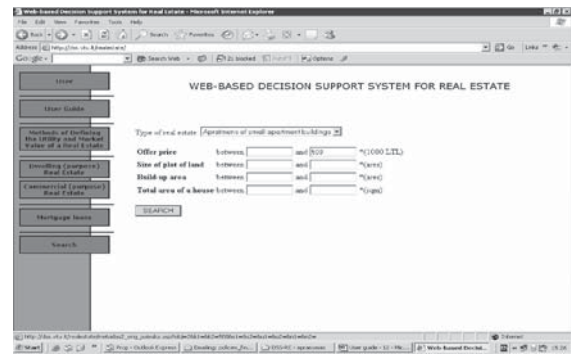


Fig 8. A user may perform a search for alternatives from databases of different brokers

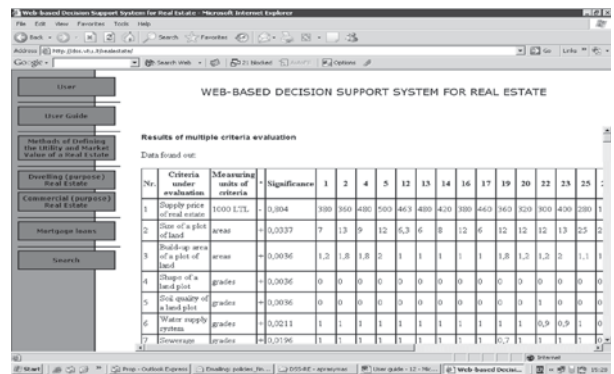


Fig 9. Finding out the real estate alternatives and making the comparative tables

the forms of data submission are standardised on a specific level. Such standardisation creates the conditions to apply special intelligent agents performing search for the required real estate in various databases, and gathering information about them.

Users specify requirements and constraints and the system queries the information on a specific real estate from a number of online brokers. The system performs the tedious, time-consuming, and repetitive tasks of searching databases, retrieving and filtering information, and delivering it back to the user. Results of search for a specific real estate are submitted in tables (Fig 9), which may include direct links to a Web page of brokers. By submission such a display, the multiple criteria comparisons can become more effectively supported.

While going through the purchasing decision process, a customer must examine a large number of alternatives, each of which is accompanied by a considerable amount of information (economic, qualitative: architectural, aesthetic, comfort; infrastructural, technical, legal, technological, and other factors) [30]. Following the gathered information, the multiple criteria analysis is being carried out. Capabilities to apply the Web-based DSS for Real Estate in the stage of multiple criteria analysis of alternatives are:

- Determination of priority, significance and utility degree of the analysed real estate alternatives (Fig 6).

- Determination of the market value of the analysed real estate alternatives (Fig 7).

In order to analyse the real estate offered by certain brokers, it is possible to click the type of real estate and the names of certain brokers appear on the screen (Fig 10). By selecting the name of a broker the real estate offered by him appears (Fig 11). Further on, the real estate of a certain broker may be analysed in the same way as in the above mentioned cases.

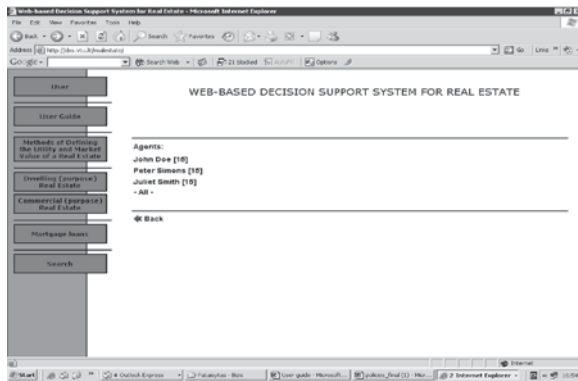


Fig 10. Analysis of the brokers of a certain real estate

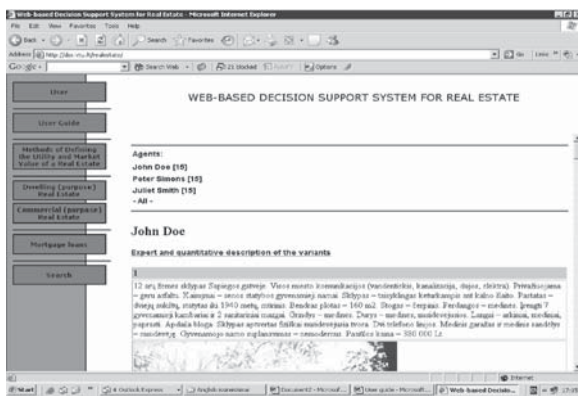


Fig 11. Analysis of the real estate offered by certain brokers

## 5. Conclusions

Many Multiple Listing Service systems are processing and submitting only economic information for decisions. Alternatives under consideration have to be evaluated not only from the economic position, but take into consideration qualitative, technical and other characteristics. Therefore, the efficiency of Multiple Listing Service may be increased by applying multiple criteria decision support systems. The suggested system is a better online system to others, because the modules of model-base management system are here compared to a number of alternatives and different parameters. By applying Web-based Decision Support System for Real Estate (DSS-RE) it is possible to obtain quantitative and con-

ceptual information that describes real estate from various aspects. The more alternatives are investigated, the greater is the possibility to achieve a more rational end result. Strong and weak sides of investigated alternatives are given in the analysis. Facts of why and by what degree one version is better than the other one are also established. All this is done basing oneself on conceptual and quantitative information. For example, following such information and with the assistance of the DSS-RE, the user is able to perform the following: real estate valuation in different aspects, eg determination of market value, value in use, investment value, the valuation of special factors affecting value of real estate (for example, valuation of real estate location, and real estate depreciation) and the multiple criteria analysis of alternatives and selection of the most efficient ones.

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## NAUDOJIMOSI NEKILNOJAMOJO TURTO AGENTŲ DUOMENŲ BAZĖMIS EFEKTYVUMO DIDINIMAS TAIKANT INTERNETINĘ NEKILNOJAMOJO TURTO SPRENDIMŲ PARAMOS SISTEMĄ

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Santrauka

Autoriai atliko pasaulyje naudojamų nekilnojamojo turto agentų duomenų bazių apibrėžimų apžvalgą ir išnagrinėjo Lenkijoje ir Rusijoje sukurtas nekilnojamojo turto agentų duomenų bazes. Remiantis šių duomenų bazių analize, siekiant padidinti naudojimosi jomis efektyvumą, sukurta internetinė nekilnojamojo turto vertinimo daugiakriterinė sistema. Internetinėje nekilnojamojo turto vertinimo daugiakriterinėje sistemoje realizuota daugiakriterinė alternatyvų analizės sistema, leidžianti vartotojui išsirinktus nekilnojamojo turto objektus lyginti remiantis kiekybiniais ir kokybiniais kriterijais. Sistema atlieka alternatyvų paiešką bei daugiakriterinę analizę nustatant alternatyvų prioritetiškumą, naudingumo laipsnį bei rinkos vertę.

**Raktažodžiai:** nekilnojamojo turto agentų duomenų bazės, internetinė nekilnojamojo turto sprendimų paramos sistema, daugiakriterinis įvertinimas.

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