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Development of a digital service for real estate transactions

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The majority of present-day aggregators of the Russian real estate market fail to meet modern requirements and trends. Currently, the information support of real estate valuation activities is generally assigned to individual valuers, rather than the valuation community as a whole. The absence, insufficiency, unreliability of the market information makes it difficult to determine the cadastral value of the properties as well fulfill the requirements prescribed by the existing methodological recommendations. The main problem in developing digital platforms is that the value of the digital platform proposition can only be adequately assessed by the platform developer, while the complexity of creating a quality digital platform may exceed the benefits for the developer. In this regard, we set a goal to analyze the aggregators of the real estate market in terms of the shortcomings, whose systematization is to lay the basis for a consolidated real estate market database of Russian Federation. In this article, selected digital platforms were analyzed with regards to meeting specified criteria using a multi-criterial rating system. The results of the study represent the necessary criteria, conclusions concerning compliance with certain criteria based on the analysis of classifieds, as well as recommendations for the use of innovative technologies to ensure the most advanced operation of real estate market aggregators. In addition, several forms of information exchange between market players and viable solutions to common problems are suggested. A method of developing a consolidated real estate market database was developed. It is based on innovative information technologies and the actionable way of implementing software solutions designated for automation and structuring of real estate data.

Keywords: *information systems, geographic information systems, digital platforms, open data, data aggregators, housing construction, housing market, cadastral valuation, real estate valuation*

Research relevance

The real estate market is often considered as a specific area of innovative economics [1]. Information opacity has existed in the recent history of the Russian real estate market, and it may cause analysts to use indirect and not always reliable information, develop and apply indirect sophisticated methods of data collection, processing, analysis and forecasting. For example, G.M. Sternik developed a schematic model of an information system. The model has the following components: “Information space” (databases and data processing blocks), “Consumers” (functional divisions, which may require the following information: Analytical Center — AC, Marketing Division — MD, Financial-economic Division — FED) [2].

Since the enactment of Federal law of the Russian Federation No. 221-FZ of 24.07.2007 “On the state of cadaster of real estate” owners hurried to have their property duly registered, since the unavailability of a cadastral passport made it impossible to perform any actions involving real property (registration of rights and encumbrances, sale, consolidation, transfer, etc.) [3]. Mandatory cadastral registration as one of the stages of accounting and registration of real estate will help to get the necessary information about the right holder and other equally important information about real estate facilities [4].

Currently, the information support of evaluation activities is actually delegated to each subject of evaluation activities, but not to the evaluation community as a whole. Everyone generates his/her own set of information available to a limited number of people, but there is no consolidated information platform [5]. The collection and comprehensive presentation of cadastral, urban planning, topographic, and thematic information using geoportal technologies is relevant for the development of the digital economy of the Russian Federation. At the same time, the main task is to provide individuals and legal entities with information about spatial structures and facilities. Therefore, the best solution is the development and operation of the geoportal maintained by the Federal Service of State Registration, Land Register and Mapping (“Rosreestr geoportal”) [6].

As a result, the relevance of the study of aggregators (classifieds) of the real estate market, as innovative programs, is due to modern changing conditions. The prevalence of innovative products, such as real estate market aggregators, has almost completely replaced the printed advertisements; however, digital platforms are currently not used in full, although they can solve a large number of problems on the real estate market, as well as streamline the state regulation of the real estate market. For example, the absence, insufficiency, unreliability of information makes it difficult to determine the cadastral value of real estate facilities; these factors make it impossible to meet the requirements established by the current methodological guidelines for the state cadastral valuation [7].

The basis for the implementation of machine processing of information flows between the system elements is the development of a database for an information system. The most promising and technically convenient sources of information, designated for the database, are regional multi-listing systems (hereinafter referred to as MLSs) available in the Internet. Although they still have some shortcomings inherent in periodicals, as a rule, MLSs, contain more structured and “noise-free” information. The analysis

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of the number and the intensity of offers, the composition of market players, the terms of display of real estate facilities allows to exclude inefficient (abandoned, or "noisy") MLSs [8]. Information sources may include offers, deals, and auctions from relevant real estate market aggregators.

The acceleration of information processing at the recognition and identification stage allows to conduct revaluation of real estate facilities in the real time mode [9]. However, the main problem is that the value of a product or a service based on a digital platform is visible only to developers, and the complexity of creating and using the platform significantly exceeds its benefits. The development and application of digital platforms in the field of trade and information are more successful. Companies like Ulmart and Ozon have already announced the development of cross-border trading platforms, which indicates their readiness to compete on the global market. Major companies, using digital platforms, include Avito, Price.ru, Torg@mail.ru (the Russian Internet portal owned by Mail.Ru Group) [10].

Therefore, we can formulate the purpose of the study as follows: we are going to analyze the aggregators of the real estate market in terms of the shortcomings that prevent the generation of a consolidated database of real estate items in the Russian Federation. We will identify and analyze the main shortcomings of market aggregators by selecting information platforms that provide information on real estate facilities mainly on the Russian Federation market. When identifying the main shortcomings, it is necessary to propose effective solutions aimed at their elimination, as well as to develop a methodology for implementing a consolidated digital platform that has no shortcomings.

The object of the study is real estate market data aggregators. The subject of the study is the shortcomings of existing real estate market data aggregators.

It is necessary to formulate the main criteria for the analysis of aggregators, analyze the classification data in terms of its compliance with the selected criteria, and develop recommendations for the use of innovative technologies to assure the most advanced operation of real estate market aggregators.

Research methods

The study was conducted on the basis of personal experience and professional opinions, the experience of performers in this field since the early 2000s.

The research methodology consists in the identification, analysis and comparison of certain shortcomings in order to provide full-fledged information on real estate facilities by selected aggregators on the real estate market.

In this study, the following market aggregators were analyzed:

- Bulletin Board "AVITO" (https://www.avito.ru/).
- Database of real estate "CIAN" (https://cian.ru/).
- Database of real estate "Domofond" (https://www.domofond.ru/).
- Database of real estate "MIRKVARTIR" (https://www.mirkvartir.ru/).
- Information portal "MOVE" (https://move.ru/).
- Database of Sberbank real estate "DOMCLICK" (https:// domclick.ru/).
- Real estate database "MLSN" (https://mlsn.ru/).
- Real estate database "TATRE" (https://www.tatre.ru/).
- Website "ONREALT" (https://onrealt.ru/).
- Bulletin Board "From hand to hand" (https://irr.ru/).
- American real estate database "ZILLOW" (https://www.zillow.com/).

The analysis of aggregators was carried out according to certain criteria. Selected platforms were ranked according to the ranking system. The information about the ranking system is provided below.

The co-authors have defined 7 evaluation criteria (see results and discussions); each criterion has a certain number of points from 1 to 10, where 10 is the maximum value, depending on its compliance with the selected criterion, since compliance is possible in the range of 0 to 100 %. Points were awarded in accordance with the objective opinion of researchers, based on the analysis of information about the market aggregators listed above.

Further, the percentage of compliance with the selected criteria was determined for each facility under research using the following formula:

$$CCP = TN/70 \cdot 100\ \%,$$

where CCP is the criteria compliance percentage, %; TN is total number of points according to the selected criteria; 70 is the maximum score.

Based on the results of the study, we can formulate the shortcomings of aggregators (classifieds) on the real estate market.

Study findings

We present the analysis of the aforementioned digital platforms in terms of information provision using the following criteria developed by the co-authors based on their professional opinion:

1. Correct classification of real estate. The lack of correct classification of real estate facilities is a consequence of the lack of the real estate market awareness, as well as the presence of various classifications, which may be misleading.

For example, if we address the website at https://www.avito.ru/ to search for a land plot for commercial and office purposes, we should choose "industrial land" in the item "category of land", after that we choose "settlement lands (private housing projects)", then the search engine shows land plots for individual housing construction, which makes it misleading and difficult to work with. The real estate database https://cian.ru/ has a separate filter for commercial land plots; however, commercial land plots differ in the type of permitted use. The concept of a "commercial land plot" can include both land plots for multi-store residential development, as well as land plots designated for the construction of a railway station.

Based on the analysis of literature, various Russian and international valuation standards, as well as the practice of real estate valuation, real estate facilities can be roughly classified in accordance with the following independent criteria [11]:

- nature;
- types of main element;
- presence or the absence of the main elements and their improvements;
- composition of the main elements;
- functionality;
- housing construction type;
- commercial construction type;
- specialization;
- profitability.

The aforementioned classification is correct; however, it can be used for the benefit of the real estate aggregator rather than the

main search engine. Based on the existing classification analysis performed by the co-authors, a simplified real estate filter can be as follows (Fig. 1) [12, 13]:

In the above classification, it is important to note that real estate facilities are divided by the type of functional purpose: residential and commercial real estate; types of permitted use, and the above list is not exhaustive. The following Fig. 2 also shows a variant of the extended search for land plots.

The search menu has:

1. Types of permitted use:
- individual housing construction;
- gardening;
- retail-office, near-road service;
- industrial (warehousing, bases etc.);
- low-, mid-rise housing;
- garage and parking;
- recreational facilities;
- agricultural use;
- other use.

2. Location relative to the road: 1st line, inside the block, near the road (but not on the first line), away from the road.

3. Utilities: on the site, on the border of the site, removed from the site (in this case, it displays the most complete information, so, for example, when the "gas" check mark is pressed, you can display more correct information about the presence of communications, which is important for users and analysts of the real estate market).

Also, this search is not limited to the criteria above, one can add such criteria as:
- the type of legal title: i.e. ownership, leasehold for 49 years, leasehold for up to 10 years (not shown in Fig. 2).

2. Identification of property by its cadastral number. Absence or partial absence of the cadastral number of the property.

If the property has a cadastral number, one can check it using the following parameters:
- information about encumbrances freely accessible on the Rosreestr website [14];
- the option to order an extract from the Unified State Register of Taxpayers to clarify the information about the owner (through the service of the personal account on the website of Rosreestr);
- check the location information on the cadastral map;
- find out information about the cadastral value and the property tax;
- analyze the history of the price of the real estate for a certain period of time.

The presence of a cadastral number of a real estate facility builds confidence and make a real estate item more popular on the

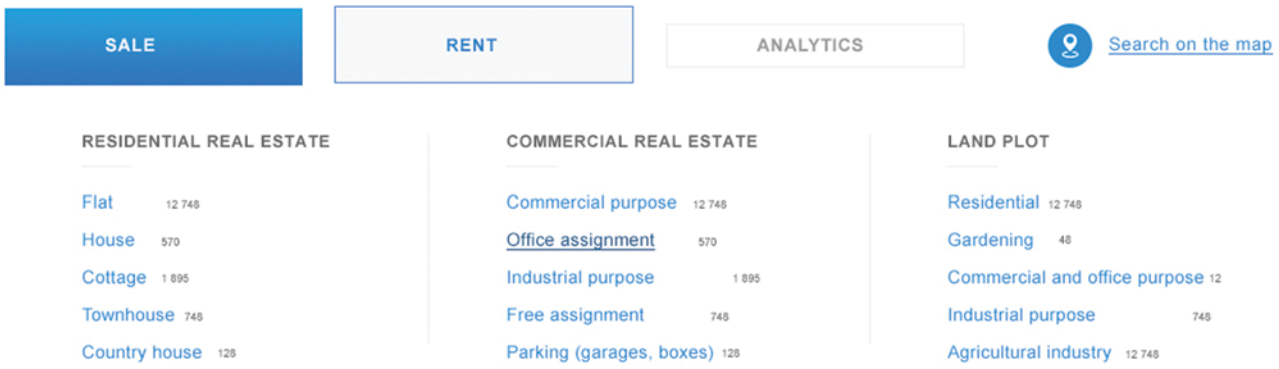

Fig. 1. The screenshot of a filter to be used by real estate aggregators. Source: the portal developed by the co-authors

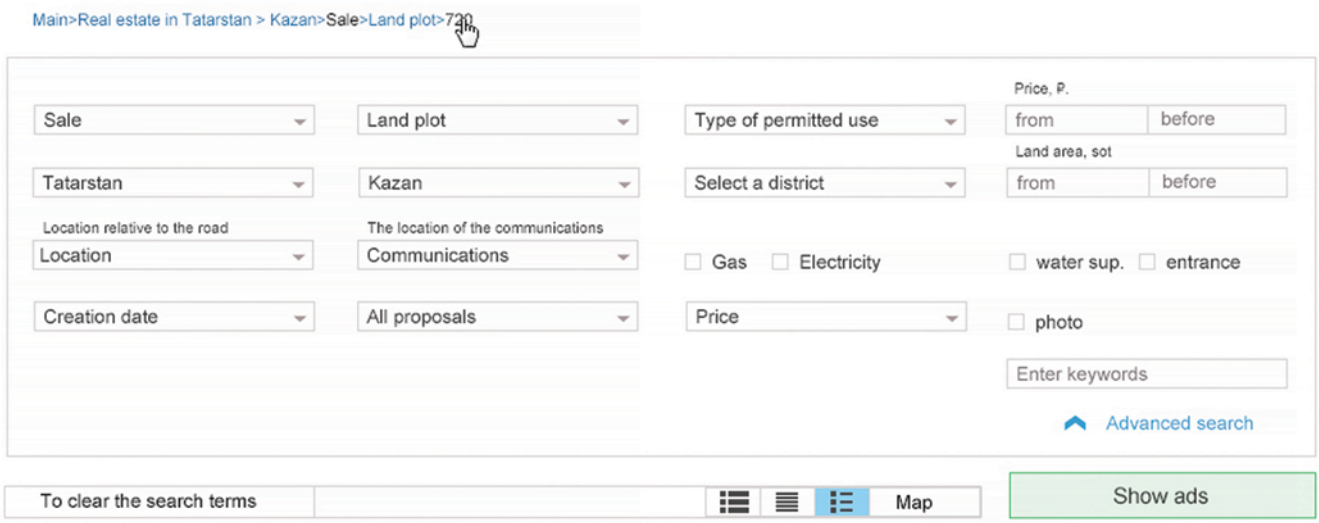

Fig. 2. A screenshot of an advanced land plot search option. Source: the portal developed by the co-authors

market, it can also be a tool regulating the relations between the owner and the state.

In this case, it is most optimal to consider attaching the advertisement to the cadastral number, and to permit automated data submission/update from the Rosreestr website to the aggregator's website.

Thus, it is possible to implement the relationship between the players that regulate property relations and ensure the presence of the most recent information about a particular facility, forming a property data entry.

3. Availability of geospatial modelling. Linking the location of a facility on the map with full information about the property, including the presence of the following layers on the map:

- town-planning regulations;
- satellite imagery;
- protective zones;
- construction facilities;
- boundaries and shapes of land plots;
- heat maps of supply and demand availability;
- spread of prices for real estate facilities;
- retrospective data layer;
- colored layer of data completeness;
- the map of traffic flows, pedestrian traffic, etc.

For example, the main function of GIS-based systems is the ability to use economic and cadastral information in coordination with other elements, such as physical factors, social factors, taxation, infrastructure, pollution and noise, economic and legal factors. Together, this can make it easier to assess the value of real estate [15].

GIS projects, can take advantage of map data from various WEB sources. For example, you can add Open Street Map base maps, National Geographic maps, etc. to an ArcGIS project[1]. The disadvantage of the current stage of development of multi-scale mapping is the lack of a unified methodology for creating a multi-scale cartographic framework, in most cases it is developed in accordance with the production requirements of individual enterprises [16].

Greek researchers used GIS toolkit to study the level of relationship between urban integration processes and housing market prices [17]. The researchers addressed the findings to the city authorities for the further adjustment of the municipal urban policy.

Finnish researchers, in our opinion, are the leaders in the study of cadastral information; they consider it as a sociotechnical system [18]. As part of the study, they divide it into urban and rural areas, predict integration with other information platforms, and forecast the development of cadastral information through 2035.

The platforms that have this parameter analyzed are limited, and there is practically no information about layers [19]. For some facilities, location does not correspond to reality, in particular, land plots without a cadastral number, as well as “garbage” information about the items that cannot be identified by their location.

An important area of application of geoinformation systems is the use of spatial data, primarily information about the value of the territory to assess real estate facilities (for taxation purposes) [20]. Researchers from Nizhnevartovsk have proposed their own approach to the use of geoinformation methods in real estate valuation. For the taxation system, the co-authors made maps of the city with the display of areas within walking distance of social facilities [21].

1 Rosreestr — Federal service for state registration, cadastre and cartography. State cadastral assessment data Fund. URL: https://rosreestr.ru/wps/portal/online_request/ (accessed: November 10, 2021).

Some researchers believe that the next stage in the development of GIS technologies is forecasting the cost of residential real estate and modeling the development of the market as a whole. Artificial intelligence, machine learning and augmented reality technologies will be involved. GIS, for example, will help to identify profitable segments of the residential real estate market that have been inadvertently overlooked in the past. Markets and locations where investments in residential real estate and infrastructure are relevant will be identified [22].

Romania is also working on a consolidated GIS that can collect all the data necessary for the assessment of a particular land plot, as well as correlate the characteristics of the plot with market prices and transfer them to the map [23].

Adding the selected layers, as well as developing and implementing new ones, can affect both the user's choice of property, as well as fill in the missing data in accordance with the selected goals. Also, this information will be relevant when a high-quality automated real estate monitoring system is developed.

4. Data availability. This criterion is highlighted separately, since according to the analysis of the selected aggregators, the free period of advertisements placement is limited to an average of 30 days (depending on the aggregator) [13]. However, for example, in the case of the implementation of a production facility and a warehouse, the dosplay period, which can last from 9 to 25 months, is not limited to 30 days, which means that the advertisement may be closed, but the property remains on display. It is also possible to change the offer price over time for a certain period.

According to the results of the study, it was revealed that although the majority of transactions in Russia get closed, the information about them is not published in open sources and is confidential [24].

In the co-authors’ opinion, it is necessary to add information about the exposure time of the property (when the property was offered for sale, the price change pattern, and other retrospective information that allows the user to be filled in to make a more educated decision).

The experience of Finnish researchers who studied the consequences of data disclosure in Helsinki is noteworthy [25]. In particular, a website with detailed information on individual housing transactions was launched in the country in 2007. In particular, the study allowed us to obtain the following main results:

- data openness has increased public awareness of property prices and real housing affordability (ultimately, this has affected acceleration of home purchase decisions);
- the impact of open-access information about transactions and real estate prices on the operation of the residential real estate market is also strong. For example, the appearance of open information was more valuable for sellers who underestimated the value of their property than sellers who overestimated the value of their property. Because of this asymmetry, information about housing prices boosted prices. In other words, open-access information affected different sellers in different ways [26];
- the results of the analysis of the price dynamics indicate that the increase in the amount of information about past transactions led not only to an increase in prices.

5. The availability of high-quality market monitoring information means the availability of high-quality market monitoring information in contrast to the correct classification of real estate facilities, including the analysis of the real estate market for a certain period,

the presence of links between markets, the dynamics of supply and demand, market capacity, information about the timing of exposure of similar real estate facilities.

This issue is most relevant during submission of advertisements and evaluation of real estate on inactive or closed markets, where there is almost no information and rare offers are available [27]. This problem is typical for scarcely populated communities.

Retrospective information, including the identification of a real estate facility, the availability of geospatial modeling and open-access data allow to solve the above-mentioned problem in an automated mode.

For example, this function is implemented in one of the software products developed by SRG group of companies (Fig. 3, 4) [13].

As you can see in the Fig. 3, 4, the number of advertisements submitted since 2015 is much higher than in 2019 (the search is shown for residential real estate). By using this function, you can monitor the market in the corresponding market segment, not only for a past date, but also in the real time, in conditions of limited sampling.

6. Using innovative platform technologies to present information in a comfortable way. This function of the aggregator is an opportunity to use innovative technologies to present the property to users, in particular the following services:

- the ability to publish real estate advertisements on multiple digital platforms by filling a single form (duplication of advertisements);
- conducting real estate auctions;
- property inspection online or using virtual reality glasses;
- use of software products to visit the property without a real estate agent;
- the relationship of banking institutions with the platform in order to use credit funds for transactions involving real estate facilities;
- automated property valuation;
- electronic registration of the title (use of electronic signature for online registration of ownership to real estate through the Rosreestr website);
- implementation of real estate transactions without intermediaries;
- artificial intelligence used to calculate the economic and technical parameters of a real estate facility to be constructed in a specific location;
- traffic analysis of retail, office premises, as well as premises related to the provision of services.

7. Interconnected "universe" of properties means lack of interconnection between digital platforms, real estate market participants, banking structures and property regulators.

In practice, the cadastral value of real estate may be overestimated, and it affects the interests of owners and tenants. However, sometimes the cadastral value is attached to a past date and the tax is calculated on the basis of the "outdated" estimate. For example, according to Report No. 2 (Rosreestr) dated 10.10.2014 on determining the cadastral value of capital construction facilities in the Republic of Tatarstan, the assessment was carried out as of January 1, 2014 (Rosreestr, 2014), and the amount of property tax was calculated based on the results of the above assessment. By the time of drafting this article (2020), 6 years had passed since then, and prices for capital construction projects had increased [28].

The data are submitted to digital platforms; however, tax authorities have no access to the results of assessments and credit

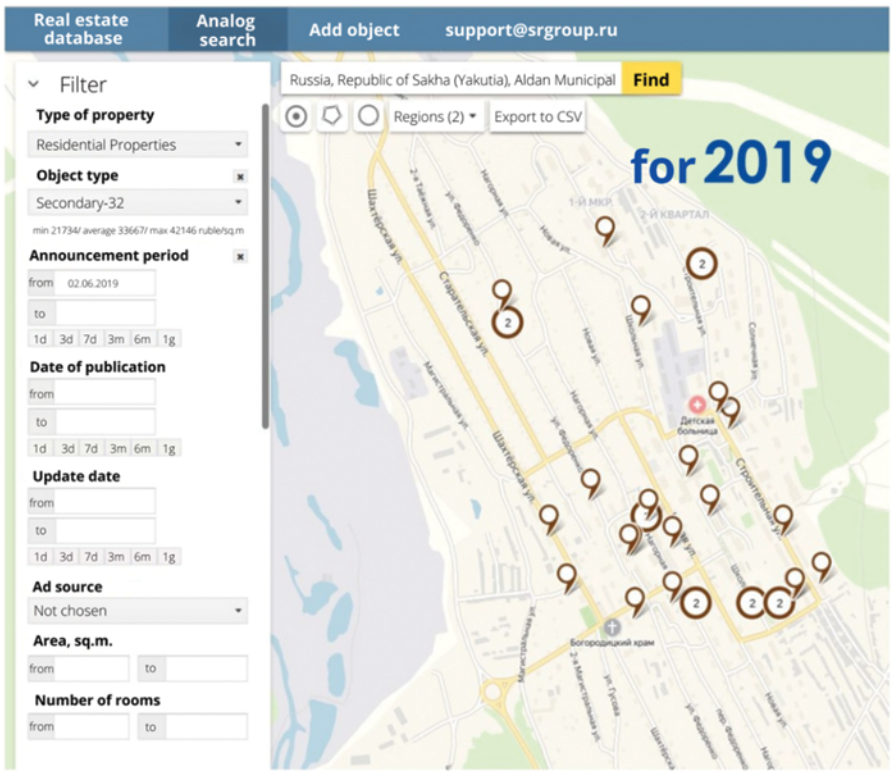

Fig. 3. Making a sample using historical data. Source: the co-authors [8]

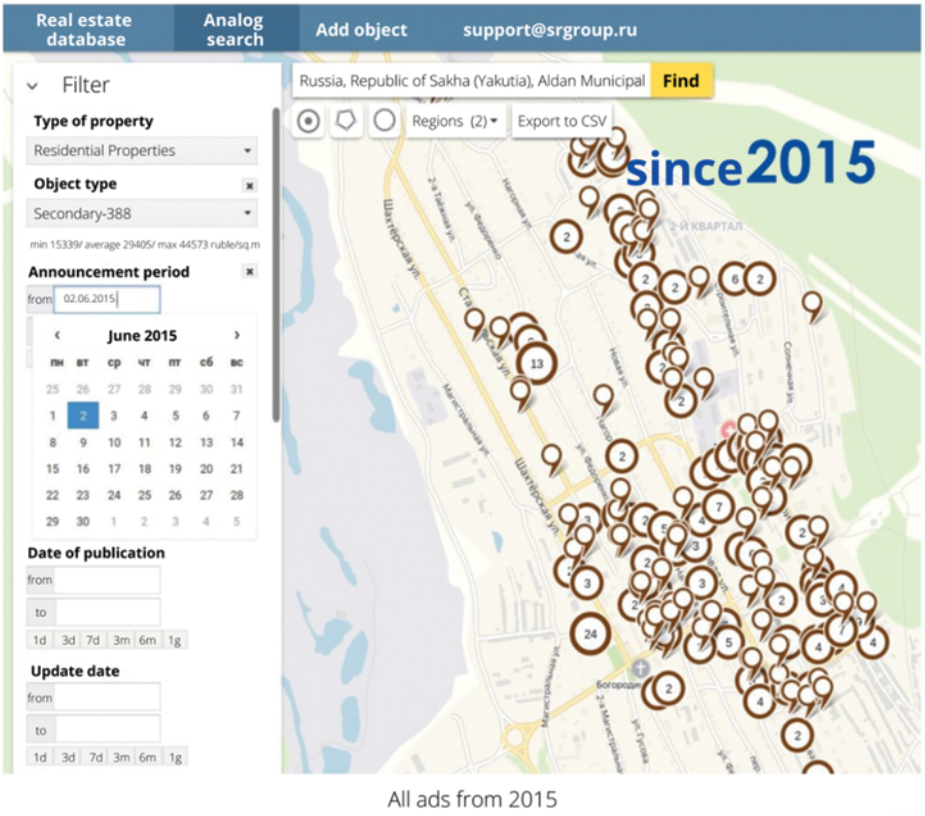

Fig. 4. Making a sample using historical data. Source: the co-authors [13]

obligations discharged by the customers. There are no data entries containing information about the offer price, transaction results over a selected period.

If we consider the international practice, in the USA, after the decision is made to value the property, the further work is done using the following sequence of actions:

1) planning, or staging of the project;

2) data collection (general as well as specific property-related data);

3) data assembly into the property database entry, which features property photos, its transaction history, including the prices, for which it was sold historically. Sketches of the property foundation are also placed into data entry. As a result, all changes that the property has undergone can be tracked and analyzed [29].

Tax assessors (further — assessors) are required by the law to undertake property valuation by its full and fair value as of the 1st of January of each year. As a result, assessors (the valuation division) analyze and confirm each sale-purchase transaction in order to determine whether it reflects the market value, which is done annually for residential, commercial or industrial real estate. For example, in the city of Boston there are roughly 11,000 land plots used for commercial / industrial purposes and 120,000 land plots used as residential real estate. Accounting and update of property information for the purposes of assessing its tax valuation are undertaken annually, which allows for the timely reflection of changes throughout the year, which may result from new construction, damages to properties caused by fires, other types of destruction and damages to properties and/or reconstruction efforts.

The interaction and direct relationships between real estate market institutions may lead to better cadastral value calculation, and boost the real estate market transparency in terms of the property information on the different stages of its lifecycle, which in turn may affect interests of all real estate market players.

Further we analyze real estate market aggregators using the aforementioned criteria. Due to large datasets involved, comparison between market data aggregators was done in terms of the presence or absence of the aforementioned parameters. The results, obtained in accordance with the method described above, are listed in the table below.

Discussion

As a result of the study, it was revealed that American portal ZILLOW most fully meets the identified market criteria. The major feature of this digital platform is the availability of the history of transactions related to the properties within this database. A user can find out the price at what the facility was sold for the first time, the buyer and the next transaction, the rent, as well as the tax rate.

Among domestic platforms, the platform developed by Sberbank PJSC is particularly noteworthy, it is available at https://kazan.domclick.ru/, which is a service designated for buying real property online, and this features makes this platform different from those launched by its competitors.

Other aggregators are seemingly mediocre in terms of the services that they provide, and they are focused on making revenues, although there is a market monitoring option present exclusively for residential real estate [11]. Innovative solutions and/or technologies are barely implemented [30].

Shortcomings of the majority of aggregators are firstly explained by the lack of the necessary level of information technologies, considerable costs of their implementation and the lack of market data.

Results of study of the real estate market aggregators

Item number	The main aggregators/criteria (number of criteria)	Correct classification of real estate objects	Identification of a real estate object by cadastral number	Availability of geospatial modeling	Data availability	Availability of high-quality market monitoring	Using innovative platform technologies to present information in a comfortable way	An interconnected "universe" of objects	Percentage of compliance with the criteria (CCP)	Percentage of compliance with the criteria Pcr, %
1	https://www.avito.ru/	4	2	2	0	0	1	0	9	12.86
2	https://cian.ru/	5	2	2	1	1	1	0	12	17.14
3	https://www.domofond.ru/	4	2	2	1	1	2	0	12	17.14
4	https://www.mirkvartir.ru/	4	2	1	0	1	1	0	9	12.86
5	https://move.ru/	5	2	0	0	0	0	0	7	10.00
6	https://kazan.domclick.ru/	5	2	2	1	1	4	1	16	22.86
7	https://mlsn.ru/	3	2	2	0	0	0	0	7	10.00
8	https://www.tatre.ru/	4	2	0	0	1	0	0	7	10.00
9	https://onrealt.ru/	4	2	2	0	0	0	0	8	11.43
10	https://irr.ru/	4	2	0	0	0	0	0	6	8.57
11	https://www.zillow.com/	5	10	2	10	10	3	10	50	71.43

Note. Source: the authors' analysis.

Secondly, one of significant factors affecting the level of services provided by the aggregators consists in the information interaction and exchange between market players and institutions, which also affect the pricing on the real estate market.

The application of innovative technologies to problems and shortcomings of real estate market data aggregators may affect not only the Russian real estate market, but also the economy of certain regions of Russia. Currently, the Russian digital economy is at the very beginning of its development, while in real estate data innovations may improve the overall system, make it more transparent and open for all real estate market players [31].

This study allows to demonstrate the opportunities of innovative technologies and software solutions for real estate market players, as most of the real estate market data aggregators cannot use them effectively. Their phased implementation in a digital environment, usage and correction of classifieds in accordance with the analyzed criteria will undoubtedly create a considerable competitive advantage for data providers, while the application of this tool as a cadastral value calculator may increase tax collection in the Russian Federation and its regions [10].

Therefore, we continue to develop a digital service for real estate transactions entitled KVADU.RU. This service represents a digital platform for real estate transactions, which has eliminated the prior shortcomings. It has integrated innovative technological solutions allowing its users to work with the real estate used as a collateral. In this project, new technologies will be implemented in terms of banking services and tools to assure better interaction between real estate market players (automatic verification and "express" valuation of real estate, a valuation database and a data processing toolkit).

This service is aimed at addressing the shortcomings of real estate market data aggregators (avito.ru, cian.ru and others); it entails the implementation and saturation of the real estate database with relevant property data entries, and it represents a systemic solution for providing easily accessible real estate market data and transactions. Also, this product facilitates the correct calculation of the cadastral value, facilitation of high quality real estate market monitoring, improving data "legitimacy" and reliability, increasing tax collection, reducing the number of disputed properties.

The digital platform has several blocks:

Block 1: visual representation of information in the form of a bulletin board:

- correct information and properties identification;
- presence of GIS with layer maps and filters;
- data availability;
- presence of real estate market monitoring in respective market segments and periods of time;
- use of innovative technologies to presents the information in a user-friendly format and a comfortable mode;
- an interconnected "universe" of properties (interaction between digital platforms, real estate market players, banking institutions and property relations regulators).

Block 2: the database (that contains automatically and manually collected information):

- database of offers (collection of information from various sources, parsing, real estate agencies, printed sources, etc.);
- database of transactions (rosreestr.ru, databases maintained by real estate agencies, fedresurs.ru, etc.);
- data about tenders and auctions (torgi.gov.ru, regional and municipal tenders);
- generation of the "property card", i.e. data entry (cadastral number, photo, technical data, GIS data, changes, data archive);

- database of printed classifieds in the electronic format.

Block 3: the implementation of research works using the collected data (computation and methodological part):

- data structuring (classification, price zoning using GIS, zoning in the time dimension);
- development of a calculation methodology and a mathematical model;
- presence and utilization of government standards, educational materials and publications, special requirements;
- database mergers, development of database, mathematical models, real estate valuation;
- open-access computational methodology, data verification;
- development of technical specifications and software solutions for focused tasks.

Block 4: a solution for data automation and structuring on the real estate market (a software product for the automation of operations):

- real estate valuation automatization;
- real estate transaction data synchronization;
- implementation of the system "bank-valuer-Rosreestr";
- online formation of property valuation reports;
- other services, related to property data provision and analysis (for example, analysis of pedestrian flows in terms of retail trade, office space, supply and demand for real estate, etc.).

Authors analyzed the following potential customers for the digital platform:

- banking sector;
- real estate valuers and experts;
- real estate agencies;
- users (both individual and corporate);
- business communities (builders, real estate developers etc.);
- municipal bodies;
- Rosreestr (Federal Service for State Registration, Cadastre and Cartography);
- scientific and research community.

Conclusions

The innovative nature of our proposal is manifested as follows:

1. Information interaction between various market players within the consolidation data sharing system is proposed;

2. A method for compiling a consolidated real estate market database using innovative information technologies is developed;

3. Actionable methods of problem resolution in the real estate market are proposed;

4. Opportunities of using innovative technologies for information provision to different customer segments are explored;

5. An advanced approach to the calculation of the cadastral value is proposed;

6. An actionable method for implementing software solutions aimed at automated structuring of the real estate information is developed.

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Разработка цифрового сервиса для проведения операций с объектами недвижимости

Современные агрегаторы рынка недвижимости Российской Федерации по большей степени не отвечают современным требованиям и тенденциям. Информационное обеспечение оценочной деятельности фактически возложено на каждого субъекта оценочной деятельности, но не на оценочное сообщество в целом. Отсутствие, недостаточность и недостоверность информации затрудняют определение кадастровой стоимости объектов недвижимости, а также не позволяют выполнить требования, которые установлены действующими методическими указаниями. Основная проблема состоит в том, что ценность продукта или услуги на базе цифровой платформы видна только разработчикам, а сложность создания и использования платформы существенно превышает выгоды от ее использования. В связи с этим нами поставлена цель по исследованию агрегаторов рынка недвижимости на предмет наличия недостатков, систематизация которых ляжет в основу разработки единой базы объектов недвижимости на рынке Российской Федерации. В данной статье были проанализированы выбранные цифровые платформы на предмет соответствия предъявляемым критериям с использованием многокритериальной рейтинговой системы. Результатами исследования являются формулировка необходимых критериев путем исследования и сравнения, выводы на предмет соответствия определенных критериев на базе анализа классифайдов, а также рекомендации по использованию инновационных технологий для наиболее расширенного функционирования агрегаторов рынка недвижимости. Предложены формы информационного взаимодействия участков рынка недвижимости и действенные методы для решения общих проблем. Разработаны методика реализации единой базы объектов недвижимости на базе инновационных технологий и действенный способ реализации программных продуктов для автоматизации и структурирования информации объектов недвижимости.

Ключевые слова: *информационные системы, геоинформационные системы, цифровые платформы, открытые данные, агрегаторы данных, жилищное строительство, рынок жилья, кадастровая оценка, оценка недвижимости*

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