Selection of Similar Objects While Valuation and Forensic Structural Engineering to Determine Market Value of Civil Buildings

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The article is devoted to problematic issues faced by forensic experts during evaluation of civil buildings with premises of various functional purposes. This article purpose is to determine essence, content, general methodological principles and specifics of a unified approach while determining market value of civil objects, including premises of various functional purposes. Attention is focused on the fact that usually forensic experts can use market and non-market types of values. Characteristics of consumer and exchange forms of manifestation of real estate value are given. Current National Property Valuation Standards are listed that are mandatory for appraisers to perform while appraising real estate of all forms of ownership and in all cases. A list of the main types of values and methodical approaches to evaluation of civil buildings with premises of various functional purposes is provided. In addition, the main types of free-standing buildings and the peculiarities of selecting analogues of buildings for sale including premises of various functional purposes, while determining their market value are outlined. Peculiarities of the application of the method of building identification according to the state classifier of buildings and structures: ДК 018-2000 and the algorithm of actions of forensic experts for selecting similar objects are highlighted with an illustrative example of its application.

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Research Problem Formulation

In criminal proceedings and other types of legal proceedings, assessment and forensic structural engineering is carried out as necessary to determine the amount of damage caused by offense; restoration cost determination of immovable property objects that have suffered significant damage and destruction, etc. Analysis of forensic expert practice indicates that number of real estate objects including premises of various functional purposes is constantly increasing. In practice of carrying out this type of forensic examinations and researches, forensic experts quite often face the issue of selecting similar objects for valuation of such buildings. Existence of gaps in theoretical and methodological developments in this type of valuation and forensic structural engineering necessitates the need to study this issue in order to develop a unified approach to determining market value of civil objects including premises of various functional purposes.

Analysis of recent researches and publications

Theoretical and methodological provisions of valuation and forensic structural engineering and evaluation activities in Ukraine are reflected in research papers of domestic scientists. For example, in his dissertation, Yu. O. Chechil outlined normative and theoretical principles of determining value of real estate at while criminal offense commission in criminal proceedings; determined peculiarities of initial data formation, identification and establishment of technical condition of immovable property while determination in criminal proceedings of its value while criminal offense commission and highlighted the basics of its determination methods.

N. B. Bashkirov and P. Yu. Baranov considered peculiarities of conducting forensic structural engineering (evaluation) researches related to review of reports on value evaluation of real estate objects. They note that in order to carry out a high-quality and thorough review of the real estate appraisal report, it is necessary to perform a decomposition into an exhaustive list of issues reflecting regulatory review requirements. It is emphasized that in order to make forensic expert conclusion about the fact of undervaluation or overvaluation of the object, it is necessary to investigate the impact of identified shortcomings on the object value for each of the questions.

Keywords: multifunctional building; comparison object; class; rooms; similar property.

1 Чечіль Ю. О. Визначення вартості нерухомого майна на час вчинення злочину у кримінальному провадженні : дис. ... д-ра філософії. Київ, 2021. 261 с.
In the article by V. V. Solska, main normative legal acts that regulate evaluating property of enterprises in Ukraine are analyzed; concept essence of appraisal of enterprise property is revealed; the cases when property appraisal is mandatory are summarized; as well as property valuation cases are given that make possible to more objectively draw conclusion about the volume and condition of property of enterprises. At the same time, the main and secondary legal documents, on which basis of property of enterprises in Ukraine are assessed, have been systematized.

Despite availability of a certain amount of scientific research in this area, the results of the analysis of current state of development of researched problems make it possible to note that the issue related to selection of analogue objects for valuation of buildings including premises of various functional purposes. This circumstance largely determines the need to analyze the current legislative acts, building codes and regulations and other normative documents to determine a unified approach during this type of examinations.

Research Methods

During research, both general research methods (dialectical, observation, description, analysis, synthesis, induction, deduction, modeling, etc.) special forensic and criminalistic methods were used.

Main Content Presentation

According to the Law of Ukraine: On Judicial Examination, forensic examination is a research based on specific expertise in the field of science, technology, art, crafts, etc., of objects, phenomena and processes with the aim of providing conclusion on issues that are or will be the topic of legal proceedings. In other words, valuation and forensic structural engineering based on specific expertise in the field of construction determines factual data and circumstances of the case (proceedings) that have evidentiary value for any type of legal proceedings. Valuation and forensic structural engineering in accordance with Instruction on appointment and conducting forensic examinations and researches is a separate type of forensic engineering.

The tasks of evaluation and forensic structural engineering are determination of various cost types of improvements to land plots (buildings and their parts, structures, objects of unfinished construction, transmission devices, etc.) and compliance of the performed evaluation of real estate with the requirements of normative legal
acts on property evaluation, methodology, methods, valuation procedures.

The objects of valuation and forensic structural engineering are tangible (materialized) objects or formations that are examined by forensic expert using certain methods and means in order to solve tasks (questions) based on specific expertise application within the scope of forensic research subject (i.e., buildings and structures). Buildings are structures containing load-bearing and enclosing or combined (load-bearing and enclosing) structures that form above-ground or underground premises intended for residence or stay of people, equipment location, animals, plants and objects. Buildings include residential buildings, dormitories, hotels, restaurants, commercial or industrial buildings, railway stations, buildings for public performances, medical and educational institutions, et. al.

All buildings are classified by functional purpose, according to which they are grouped into three groups: civil, industrial, and agricultural ones.

Civil buildings are buildings necessary to serve the general cultural and everyday needs of people (residential buildings, hospitals, shops, theaters, stations, offices, etc.). They can be residential or public (non-residential) ones, their classification is given in the Tab. 1.

Recently, the number of multifunctional buildings and complexes has been increasing connected with urbanization and the expansion of functional connections between residential and public elements of urban environment. They can include premises of various functions (administrative, credit and financial, catering, retail, entertainment, sports, etc.).

During its existence, functions and typology of building can change that leads to appearance of a typologically new building (for example, a typical residential five-story building may include not only residential premises, but offices, bank branch premises, shops, beauty salons, sports halls, hotel rooms, apartments, premises for working with children, etc.). Such buildings are gaining popularity as they try to combine several areas of use in one structure, including residential, hotel, commercial, cultural, entertainment, transport and parking ones.

Valuation and forensic structural engineering belong to procedural source of evidence in criminal proceedings and is an effective means of proof in civil, economic and administrative proceedings. Currently its objects are increasingly multi-purpose buildings. While conducting valuation and forensic structural engineering, forensic experts can determine market and non-market types of values. Market value is the value for which the appraised object can be sold in the market of similar property on the date of valuation according to the agreement concluded between the buyer and the seller, after conducting appropriate marketing, provided that each party acted with knowledge of the matter, judiciously and without coercion. Non-market types include reproduction value, residual replacement value (reproduction), value in use, consumer value, liquidation value, investment value, special value, liquidation value,


net realizable value, appraised value, etc., procedure for determining established by separate national standards. Non-market types of value as the basis of valuation are determined using methods and valuation procedures based on the results of analysis or purpose of the valuation object, as well as the study of the influence of use conditions or the alienation method of valuation object.

Table 1

<table>
<thead>
<tr>
<th>Classification of civil buildings</th>
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<tbody>
<tr>
<td><strong>Residential buildings</strong></td>
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<tr>
<td>Apartments, cottages, country and garden houses, dormitories, boarding houses, shelters, etc.</td>
</tr>
<tr>
<td><strong>Public (non-residential) buildings</strong></td>
</tr>
<tr>
<td>Commercial buildings (shopping centers, shops, department stores, covered markets, kiosks, etc.)</td>
</tr>
<tr>
<td>Public catering buildings (restaurants, bars, snack bars, cafes, buffets, canteens, etc.)</td>
</tr>
<tr>
<td>Hotel type buildings (hotels, motels, holiday homes, apartments, other buildings for temporary accommodation)</td>
</tr>
<tr>
<td>Buildings of State and local government bodies (financial service buildings, court bodies, administrative and household premises, etc.)</td>
</tr>
<tr>
<td>Transport and communication facilities (stations, airports, electric transport depots, hangars, lighthouses, garages, parking lots, parking lots, bicycle sheds, etc.)</td>
</tr>
<tr>
<td>Buildings for public performances (theaters, cinemas, circuses, museums, art galleries, concert halls, etc.)</td>
</tr>
<tr>
<td>Buildings of research institutions (preschool education buildings, institutions of general secondary education, higher educational institutions, research institutes, etc.)</td>
</tr>
<tr>
<td>Buildings of hospitals and health care institutions (hospitals, polyclinics, medical service points, dispensaries, boarding houses for the elderly and disabled, etc.)</td>
</tr>
<tr>
<td>Buildings for cult and religious activities (churches, cathedrals, mosques, synagogues, funeral buildings, ritual halls, etc.)</td>
</tr>
<tr>
<td>Multifunctional buildings and complexes containing premises of various purposes</td>
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8 Національний стандарт № 1 ... URL: https://zakon.rada.gov.ua/laws/show/1440-2003-%D0%B-F#Text (date accessed: 02.10.2023)
Real estate value (as well as the value of any product) has two forms of manifestation: consumer and exchange. Consumer value is determined by a set of natural and social properties of a real estate object from the point of view of specific consumer. In his reasoning, he proceeds from the option of using real estate that has developed, as well as its natural and social properties, determined by the level of technical development and social needs. Location of the land plot, quantitative and qualitative characteristics of buildings and structures, their uniqueness and durability, tastes and preferences of owner and many other factors form the consumer value of real estate. For example, architecturally and engineering obsolete residential building can have a high consumer value for a family due to historical or genealogical factors, but its exchange value can be insignificant. Exchange value arises in the process of exchanging real estate objects, whereas in commodity economy, the general equivalent of measurement is money. In a competitive market, price as a monetary expression of value is a factor that balances supply and demand. The form of exchange value manifestation is reflected in the value for a specific owner; this value is objective, independent of the wishes of individual co-owners and reflects real economic conditions prevailing in this market;
• liquidation value is the value under condition of a forced sale; the amount of money from the sale of the object in terms that are too short for adequate marketing;
• collateral value is the value of objects that creditor hopes to receive during a forced sale in the event of the borrower’s insolvency;
• insurance value is a type of value based on the reconstruction cost or the cost of replacing the object; on its basis, insurance sums, interest and payments are determined;
• rental value is the rental value with determination of starting rent, it is the balance sheet value on the last day of the month preceding the date of determination of the starting rent;
• utilization is the cost of processing using waste to obtain a useful product.

Value manifestation forms in use:
• investment value is the value of a real estate object for a specific investor, based on his investment requirements and preferences;
• book value is the value reflected on balance sheet of organizations and enterprises (the original value of real estate at the time of commissioning, adjusted during the revaluation of fixed assets taking into account accounting depreciation, as well as deducting the cost of improvements during operation period);
• value for tax purposes is the value determined on the basis of real estate tax regulations (in countries

9 Державний класифікатор будівель та споруд ... . URL: https://zakon.rada.gov.ua/rada/show/ va507565-00#Text (date accessed: 02.10.2023).
with economies in transition, this value corresponds to market value).

Each type of value has its limitations and field of application.

Nowadays, there are four national property valuation standards in force in Ukraine:

- National Standard № 1 General Principles of Valuation of Property and Property Rights that is mandatory during valuation of property and property rights by subjects of valuation activity, as well as for persons who, in accordance with the law, review property valuation reports;
- National Standard № 2 Real Estate valuation that is mandatory during appraisal of immovable property (real estate) by subjects of appraisal activity, as well as for persons who, in accordance with the law, review property appraisal reports and conduct state examination of reports from expert monetary evaluation of land plots of state and communal property in case of their sale;
- National Standard № 3 Evaluation of integral property complexes which is mandatory during evaluation of integral property complex of a business entity by subjects of evaluation activity, as well as for persons who review reports on valuation of an integral property complex;
- National standard № 4 Evaluation of property rights of intellectual property that is mandatory for subjects of evaluation activity during evaluation of property rights of intellectual property, as well as persons who, in accordance with the law, review valuation reports. The standard can be used to determine the amount of damages incurred in connection with the improper use of objects of intellectual property rights.

National standards contain definitions of concepts, valuation principles, methodological approaches and specifics of valuation of the relevant property depending on its purpose, requirements for the report content on valuation of the property and procedure for its review; cases of application and limitations regarding application of methodological approaches to determining non-market types of property value.

Provisions (national standards) of property valuation are mandatory for the subjects of valuation activities during their valuation of property of all forms.
of ownership and in any cases of its performance.

The following basic methodological approaches are used for property appraisal: cost, income, comparative or a combination of several of them (depending on valuation purpose).

The main elements in the case of applying comparative approach are characteristics of similar property in terms of its location, physical and functional specifics, terms of sale, etc., and comparison objects are similar properties selected for the application of the comparative approach.

Using a comparative approach to real estate valuation, it is necessary to take into account the results of analysis of sales prices and offers of such property with adjustments for differences between the comparison objects and the valuation object.

Forensic expert looks for sales offers of similar property, analyzes them and reaches certain conclusions. Information about property should meet real estate market requirements. Quite often it happens that it is extremely difficult to pick up analogues of property sales, especially if the buildings contain premises with three or more types of functional purpose.

In order to determine classification of buildings by functional purpose in Ukraine, they use State Classifier of Buildings and Structures (hereinafter referred to as SC BS).

The general structure of the SC BS digital code corresponds to the following scheme:

- **X section** (for example, buildings or engineering structures);
- **XX subsection** (for example, residential buildings, non-residential buildings, transport facilities, pipelines, communications and power lines, complex industrial facilities, other engineering facilities);
- **XXX group** (for example, buildings with one, two or more apartments; hotels, restaurants and similar buildings; dormitories; office or commercial buildings; buildings of transportation and means of communication; industrial buildings and warehouses; buildings for public performances; institutions of education, medical and recreational purposes; other non-residential buildings; highways, streets and roads; main pipelines, communications and power lines; local pipelines and communications; sports and entertainment buildings; other engineering structures, not previously classified);
- **XXXX class** (for example, single-apartment houses (detached residential houses; villas, dachas; houses for forestry personnel; blocked houses with separate apartments with their...
own entrance from the street); houses with two apartments; dormitories (in particular, houses for elderly and disabled people; buildings for collective accommodation of students, children, workers and other social groups); hotel buildings (hotels, motels, campsites, boarding houses, individual restaurants and bars); other buildings for temporary accommodation (tourist bases, mountain shelters, children’s and family holiday camps); office buildings (which are used as premises for office and administrative purposes, in particular, for industrial enterprises, banks, post offices, local governments, government and departmental departments, convention and conference centers, government buildings justice, parliamentary buildings); commercial buildings (shopping centers, arcades, department stores, specialized stores and pavilions; halls for fairs, auctions, exhibitions; covered markets; car service stations; enterprises and institutions of public catering: canteens, cafes, snack bars, etc.); train stations, air terminals, buildings of means of communication and related buildings (civil and military airports; urban electric transport; railway or bus stations; sea and river stations; funiculars; airplane hangars; telephone booths; lighthouses; air traffic control buildings); garages (ground or underground; covered car parks; sheds for bicycles); industrial buildings (covered industrial buildings; factories, workshops, slaughterhouses; breweries; assembly plants), tanks, silos and warehouses (for oil, gas, grain, cement, etc.; refrigerators and special warehouses; storage areas); buildings for public performances (cinemas, concert buildings, theaters; meeting halls and multi-purpose halls; casinos; circuses, music or dance halls and discotheques); museums and libraries, buildings of educational and research institutions (preschool, primary, secondary, professional, higher, inclusive education; music and sports schools for children and youth; research institutions, laboratories, etc.); buildings of hospitals and health facilities (facilities for providing medical assistance to sick and injured patients; sanatoriums, preventive clinics, specialized hospitals; psychiatric dispensaries; maternity homes; buildings used for thermal and salt treatment, functional rehabilitation; blood transfusion points, etc.); sports halls (for indoor sports games; courts, arenas, swimming pools, gymnasiums, ice rinks, etc.); agricultural, forestry and fishery buildings (cowsheds, piggeries, horse studs); buildings for cult and religious activities (churches, chapels, mosques, synagogues, cemeteries and funeral facilities, ritual halls, crematoriums); historical monuments and those protected by the state (ancient ruins; archaeological excavations; memorial, artistic and decorative buildings; statues); other buildings
not previously classified (bus stops, public toilets, laundries, baths, etc.); freeways (motorways and highways; traffic interchanges; lighting, signaling, security and parking devices); streets and roads (urban and rural streets; suburban roads; avenues; alleys; bypass and approach roads; squares; sidewalks and pedestrian zones; lighting, signaling, security and parking devices) 19;

- XXXXX subclass (for example, single-apartment houses of mass construction; one-apartment cottages and houses of increased comfort; manor-type houses; country and garden houses; two-apartment houses of mass construction, two-apartment cottages and houses, multi-apartment houses of mass construction; apartment houses of increased comfort; individual residential houses hotel-type; dormitories for workers and employees, students of higher education institutions; boarding houses for the elderly and disabled; children’s homes and orphanages; homes for refugees; shelters for the homeless; houses for collective living; hangars for airplanes, locomotives, wagons, tram and trolleybus depots; buildings of enterprises of machine-building and metalworking industry, ferrous metallurgy, chemical and petrochemical industry, light industry, food industry, medical and microbiological industry; forestry, woodworking and pulp and paper industry; construction industry, building materials; buildings for livestock, poultry, grain storage, silage and hay buildings; buildings for horticulture, viticulture and winemaking, greenhouses, fisheries, forestry and animal husbandry) 20.

Digital codes of SC BS, covering the classification grouping: section – class, fully correspond to the Eurostat Classification of Types of Constructions according to which the main purpose of multifunctional buildings should be determined according to the algorithm:

- calculating percentage ratio of the areas of different purposes of the premises in the total area, with the ratio of these areas according to their purpose and use;
- classifying (systematizing, group) by the top-to-bottom method (determining compliance of the building first to the section (one class of the code) covering all or most of its total area, then to subdivision (two classes of the code, residential or non-residential buildings) by the largest specific gravity of the area;
- determining the group (three digits of the code) by the largest part in the total area within the subdivision;
- determining the belonging of the building to the class (four digits of the code) by the largest part in the total area within the group 21.

19 Державний класифікатор будівель та споруд ... . URL: https://zakon.rada.gov.ua/rada/show/va507565-00#Text (date accessed: 02.10.2023).
20 Державний класифікатор будівель та споруд ....
21 Державний класифікатор будівель та споруд ... . URL: https://zakon.rada.gov.ua/rada/show/va507565-00#Text (date accessed: 02.10.2023).
For example, research object is a four-storey building with a total area of 1,200 m², which first floor there is a café (150 m²), hairdresser (50 m²) and a dental office (100 m²), on the second floor there is a center for preschool education and child development (300 m²), on the third there is dormitory for employees (300 m²), on the fourth there is a hostel (300 m²).

At the first stage, we determine the percentage ratio of areas: the café premises occupy 12.5 %, hairdresser: 4 %, dentist's office: 8.5 %, preschool center: 25 %, dormitory: 25 %, hostel: 25 % of the total building area.

At the level of two levels of the code, the building belongs to the non-residential category, since the premises of the café, hairdresser, dentist's office, preschool education center and hostel occupy 75 % of its total area.

At the level of three categories, research object belongs to buildings for public performances, educational, medical and recreational facilities, since the dental office and the preschool education center have the largest percentage (33.5 %). Finally, at the level of four categories, the building belongs to the class of buildings of preschool and after-school educational institutions, since the preschool education center has the largest percentage (25 %) within this group.

Therefore, object research should be classified as a non-residential building, class of preschool and extracurricular educational institutions.

After determining the main purpose of the building, it is necessary to analyze possible use of premises with a lower specific weight relative to the main purpose of the building, and then look for offers for the sale of similar property. At the same time, it is necessary to take into account all or the main principles of evaluation in order to obtain the most reliable and accurate valuation of research object value.

**Conclusions**

In default of single approach to solving issues related to the identification of similar objects during the evaluation and construction examination to determine the market value of civil buildings with premises of various functional purposes, it is proposed to choose an analogous object using the building identification method according to the State Classifier of Buildings and Structures: ДК 018-2000. An algorithm of actions of forensic experts for carrying out examinations of this type is proposed. Essence, content and approach to selecting similar objects when determining the market value of civil buildings including premises of various functional purposes are proposed.

Provisions of legislative acts, building codes and rules regarding market value determination of civil real estate objects including premises of various functional purposes, as well as the proposed algorithm for selecting similar objects during valuation and forensic structural engineering are given in the article can be used during conducting forensic examinations in this direction.
експерти під час проведення оціночно-будівельної експертизи з оцінювання цивільних будівель із приміщеннями різного функційного призначення. Мета статті — визначення сутності, змісту, загально-методичних засад і особливостей єдиного підходу під час визначення ринкової вартості цивільних об’єктів, до складу яких належать приміщення різного функційного призначення. Акцентовано увагу на тому, що зазвичай експерти можуть застосовувати ринкові та неринкові види вартостей. Надано характеристику споживчій та міновій формам прояву вартості нерухомості. Наведено чинні Національні стандарти оцінки майна, які є обов’язковими для виконання суб’єктами оцінної діяльності під час проведення оцінювання об’єктів нерухомості усіх форм власності та в будь-яких випадках. Надано перелік основних видів вартостей та методичні підходи підходи з оцінювання цивільних будівель із приміщеннями різного функційного призначення. До того ж обґрунтовано основні типи окремо стоячих будівель і особливості добирання аналогів будівель для продажу, до складу яких належать приміщення різного функційного призначення, під час визначення їхньої ринкової вартості. Виокремлено особливості застосування методу ідентифікації будівлі згідно з державним класифікатором будівель і споруд ДК 018-2000 та алгоритм дій судових експертів для добирання об’єктів-аналогів із наочним прикладом його застосування.

Ключові слова: багатофункційна будівля; об’єкт порівняння; клас; приміщення; подібне майно.

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