

REVIEW ARTICLE

Cadaster and land register harmonization in Poland and Ukraine

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Abstract

This study presents an analysis of the functioning of real estate data registration systems in Poland and Ukraine, with a particular focus on the registration of property rights. It examines the historical development of these systems, their current structures, and the existing mechanisms for data exchange between them. The analysis also identifies key challenges related to interoperability and data consistency.

The investigation revealed that in Poland, the real estate cadastre and the land register operate as separate systems under the authority of different institutions, despite recording overlapping information. To address issues of data integration, the Integrated Real Estate Information System was introduced to enable the exchange and verification of data between these registers and other public databases. In Ukraine, three independent systems manage real estate data: the State Land Cadastre, the State Register of Real Rights, and the archival records maintained by the Bureau of Technical Inventory (BTI). This fragmentation undermines the completeness and reliability of real estate information, complicating administrative procedures.

The findings of this study highlight the urgent need to develop comprehensive legal frameworks and implement advanced technical solutions in both countries to reconcile discrepancies across real estate registers. The research also points to the substantial potential of integrated information systems to deliver accurate, consistent, and up-to-date property data. Empowering such systems with appropriate legal authority and functional capabilities would significantly improve the reliability, transparency, and efficiency of real estate information management.

Key words: state land cadastre, real estate cadastre, land register, property registration system, integrated real estate information system

1 Introduction

The proper functioning of society and the economy depends on the efficient allocation and optimal use of land. Over the past 35 years, Poland and Ukraine have followed their own paths in transforming land relations. In Poland, the starting point for land reform varied from the situation in most of the other study countries because, throughout the socialist era, as much as 75% of the agricultural land remained in private ownership, as well as in private use, in the form of individual family farms (Zadura et al., 2008).

In Ukraine, land reform started in 1990, with the following ex-

pectations: denationalization and privatization of the land of former collective farms, establishment of different forms of ownership and farming on the land, ensuring equitable development of the land, introduction of the market of agricultural land, and increased level of efficient exploitation of agricultural land, creating an efficient mechanism for the improvement of natural conditions and protection of agricultural areas (Kuryltsiv et al., 2018). As a result of land reform, nearly 7 million Ukrainians became landowners, gaining the legal right to possess, manage, and use their land. This has created the need to improve processes related to the assessment

of both quantitative and qualitative land characteristics, as well as their legal status.

This has undoubtedly had a significant impact on the development of land information systems, particularly in terms of maintaining the land cadastre and clarifying the legal status of cadastral data. It has also emphasized the importance of ensuring the accuracy and completeness of existing land cadastre information, as well as advancing the automation of cadastral procedures and the digitalization of cadastral services.

A Cadastre is normally a parcel-based, up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, the ownership or control of those interests, and often the value of the parcel and its improvements (International Federation of Surveyors, 1995).

A well-functioning cadastre guarantees property, reduces land conflict, supports real estate taxation, ensures loan security, protects land sources, monitors the environment and ameliorates urban planning and infrastructural development (Yomralioglu and McLaughlin, 2017).

Land has been individualized through its division into distinct property units, enabling the assignment of ownership rights and other legal relationships to specific parcels. This, in turn, necessitates the harmonization of the cadastre and land registry systems to ensure consistency between physical land attributes and legal records.

The issue of land cadastre and land registers is particularly important, especially in the aspect of creating a real estate cadastre, in which both the land cadastre system and the land registers system will play a leading role (Hycner and Mika, 2020; Mika, 2002).

In this regard, the concept of data harmonization, as defined in Article 2, point 16 of the 1989 Act, is especially relevant. It refers to “actions of a legal, technical, and organizational nature aimed at achieving mutual consistency of datasets and adapting them for joint and integrated use” (Act, 1989). Applying this definition to the harmonization of the real estate cadastre and land register systems suggests that integration efforts must address not only technical compatibility but also institutional and legal coherence.

2 Legal definition of cadastre and real estate property

2.1 Legal definition of real estate cadastre and real estate property in Poland

In Poland, the definition of land and buildings records (real estate cadastre) can be found in art. 2 point 8 (Act, 1989), according to which “it means an information system ensuring the collection, updating and making available, in a uniform manner for the country, information on land, buildings and premises, their owners and other entities owning or managing these lands, buildings or premises”.

Therefore, it is an information system that must be built in such a way that it enables the collection, updating and sharing of data that is subject to registration. It is to be uniform for the country, within the meaning of, among others: legal provisions in force in this area (including Act, 1989; Regulation, 2021), as well as technical guidelines for systems for keeping records of land and buildings, prepared by the Central Office of Geodesy and Cartography, in connection with the construction of the Integrated Real Estate Information System (ZSIN), which will be discussed later in the article.

As stipulated in art. 53a (Act, 1989), until the land and building register is transformed into a real estate cadastre, the term “cadaster” used in this act means this register. Therefore, the terms are used interchangeably. As indicated by Wilkowska-Kotakowska (2022), “such a provision has negative effects resulting in the use of

conceptual dualism in many created and amended acts”.

In Poland, in accordance with § 11.5 (Regulation, 2021), the records include data on, among others: owners or independent holders, a description of the ownership rights or ownership status of these persons and the size of their shares in the ownership rights, the date of acquisition of these rights and information about the documents that formed the basis for the description of the ownership rights or ownership status. In addition to data regarding owners or independent holders, the register also includes data regarding: perpetual usufructuaries of land, organizational units managing or permanently managing real estate, state legal persons to whom the State Treasury has entrusted the exercise of ownership rights or other property rights in relation to its real estate, public administration bodies that manage real estate included in the real estate resources of the State Treasury and municipal, poviast and voivodeship real estate resources, users of state and local government land (Regulation, 2021).

Therefore, the records include data regarding, among others: cadastral plots, buildings and premises as well as data regarding the entity.

The definition of a cadastral plot can be found in § 7.1 (Regulation, 2021), according to which a “cadastral plot is a continuous area of land, located within one cadastral district, legally homogeneous, separated from the surroundings by the boundaries of cadastral plots”.

Pursuant to art. 143 (Act, 1964), “within the limits determined by the socio-economic purpose of the land, the ownership of the land extends to the space above and below its surface”. The above-mentioned provision does not prejudice the provisions regulating water rights (among others, Act, 2017).

In Poland, in the land and building register, information about the entity (legal status) comes from the land register, if it is established for real estate. Pursuant to art. 25.1 (Act, 1964), land registers are kept in an IT system.

The concept of real estate is defined in art. 46. § 1 (Act, 1964), according to which “real estate includes parts of the earth’s surface constituting a separate object of ownership (land), as well as buildings permanently attached to the land or parts of such buildings if, under specific provisions, they constitute an object of ownership separate from the land”. Taking into account the above definition, we can distinguish three types of real estate: land, buildings and premises.

As stipulated in art. 48 (Act, 1964), the components of land include buildings and other facilities permanently attached to the land, trees and other plants from the moment of planting or sowing (with exceptions resulting from the Act of 1964).

In the case of the transfer of ownership of real estate, the agreement should be concluded in the form of a notarial deed.

2.2 Legal definition of land cadastre and real estate property in Ukraine

In Ukraine, the State Land Cadastre is considered to be a unified state geoinformation system containing information about lands located within the state border of Ukraine, their designated purpose, restrictions on their use, as well as data on the quantitative and qualitative characteristics of the lands, their assessment, the distribution of lands among owners and users, and information about reclamation networks and their components (Act, 2003c).

In Ukraine’s national legislation, land is considered a principal national asset, which is under special protection by the state (Act, 1996). The land plot, according to current legislation, is defined as a part of the earth’s surface with established boundaries, a specific location, and defined rights associated with it. A land plot can be an object of civil rights only from the moment of its formation. The formation of a land plot as an object of civil rights involves determining its area, boundaries, and entering information about it into the State Land Cadastre (Act, 2001).

The right of ownership to a land plot extends within its bound-

aries to the surface (soil) layer, as well as to water bodies, forests, and perennial plantings located on it. It also includes the space above and below the surface of the plot to a height and depth necessary for the construction of residential, industrial, and other buildings and structures (Act, 2001).

According to Part 1 of Article 181 of the Civil Code of Ukraine, real estate includes land plots, as well as objects located on a land plot, the removal of which is impossible without diminishing their value and altering their purpose (Act, 2003b). Examples of real estate may include land plots, unified property complexes, buildings, structures (or their individual parts), residential and non-residential premises, and unfinished construction projects.

According to Article 182 of the Civil Code of Ukraine, property rights and other real rights to immovable property, as well as the restrictions of these rights, their emergence, transfer, and termination, are subject to state registration. Only the presence of state registration creates a presumption of the legality of the right to immovable property for the right holder. Without such registration, relationships related to the circulation of land plots in Ukraine are not recognized by the state and are outside the scope of legal regulation (Act, 2003b).

3 Development of the land cadastre and real estate registration system

3.1 Development of the real estate cadastre, land register and Integrated Real Estate Information System (ZSIN) in Poland

Many authors have written about the history of the real estate cadastre in Poland, including Wilkowski (2005); Hopfer and Wilkowski (2007); Mika (2010). Important dates and legal regulations in force at that time, which are important in the development of the Polish real estate cadastre, are indicated by Mika (2010). The legal provision that formulated the assumptions of the uniform register of land and buildings was the Decree of 1955 (Decree, 1955). According to its provisions, data on land and buildings serving as the basis for making entries in the land register could only be based on the records. At that time, the records included data regarding the owner and other persons who owned the land or building. These entities were obliged to report changes to the data included in the records. Similarly, courts and state notarial offices were obliged to send copies of final judgments or copies of prepared notarial deeds to the authority keeping records.

The ordinance in force since 1969 (Order, 1969) introduced a provision stating that the register had to include the name of the owner and the "possessor" who actually possesses the land. If the owner was unknown, only the possessor should be provided. The provision of paragraph 2.4 of the aforementioned order states that "possession of land shall concern:

- i. independent possession, i.e. actual possession of land as an owner,
- ii. in relation to state land and land owned by socialized economy units or other social organizations, also land use, and
- iii. in relation only to state land – additionally: perpetual usufruct and management of the property".

Therefore, the cadastre also recorded other rights listed above.

In 1989, the Geodetic and Cartographic Law (Act, 1989) came into force, which introduced the concept of land and building records used interchangeably with the concept of real estate cadaster (until the land and building records are transformed into a real estate cadastre). In 1996, the Regulation (1996) came into force, which clarified, among other things, the issues of maintaining land and building records and the scope of recorded data. In 2001, another Regulation (2001b) came into force, and twenty years later, the current applicable (Regulation, 2021).

The land and building register is maintained in an IT system

that includes spatial data sets from the spatial information infrastructure. Each database object is assigned, among other things, a spatial information infrastructure identifier. The specification of the conceptual data model for the register is included in Annex 6 to the Regulation (2021). It consists of a UML application schema for land and building register data, where individual diagrams depict the attributes of various object types and their interrelationships. In addition to the databases maintained using the IT system, collections of documents justifying entries are also collected. This is reflected in the databases, where each object is associated with information about the document based on which it was entered or modified.

Paper land registers divided into four sections were already in operation when the Decree (1946) was in force. Previously, these were paper mortgage registers. Land registers, in which each section consists of columns with the possibility of being maintained using an IT computer program, were introduced (Regulation, 2001a). The process of transferring the content of paper land registers to the structure of the land register maintained in the IT system was initiated in 2003 as a result of the provisions of Act (2003a); Regulation (2003b,a). It was defined as a migration process. The principles and procedure for the migration of the land register and the tasks of district courts during the migration were specified in the Act (2003a).

Currently, pursuant to Article 25 (Act, 1982), land registers are established and maintained in an IT system. Pursuant to Article 25.1 of the aforementioned Act, they contain the following four sections:

- Section I:
 - I-O (real estate designation)
 - I-Sp (list of rights related to ownership)
- Section II (entries regarding ownership and perpetual usufruct)
- Section III (entries regarding limited property rights, excluding mortgages, entries of restrictions on the disposal of real estate or perpetual usufruct, and entries of other rights and claims, excluding mortgage claims)
- Section IV (entries regarding mortgages).

As stipulated in Article 25.1 (Act, 1982), land registers are maintained according to established templates, encompassing individual sections of the land register. Detailed rules for maintaining and establishing land registers in an IT system, their structure, and the scope of recorded data are specified in the Regulation (2016). Pursuant to Article 3.1 of the aforementioned Regulation, the land register contains four sections, divided into sections and fields. Sections and fields may, in turn, be divided into subsections and subfields, respectively. Each land register is accompanied by land register files, which contain papers and documents concerning the property (Act, 1982). These documents include, among others, notarial deeds, land register extracts, and maps with property division plans. In accordance with the principles set out in the Act (1982), land register files are kept in court and may be inspected in the presence of a court employee, a person with a legal interest or a notary.

In the case of the legal status shown in the land register, the principle of public faith warranty applies. According to art. 5 of the Act (1982) "in the event of a discrepancy between the legal status of real estate disclosed in the land register and the actual legal status, the content of the register shall decide in favor of the person who, through a legal transaction with a person authorized according to the content of the register, acquired ownership or another property right (public faith warranty of land registers)". As stated in art. 6 of the Act (1982), public faith warranty "does not protect gratuitous dispositions or those made in favor of a purchaser acting in bad faith". The provision of art. 7 of the aforementioned act states the rights against which the public faith warranty does not apply. If a land register is established, the legal status shown in the real estate cadastre is based on it. In turn, according to art. 26.1 of the Act (1982), the basis for the design-

nation of real estate in the land register is the real estate cadastre data. Based on art. 27.1, in the event of a discrepancy between the real estate cadastre data and the real estate designation shown in the land register, the district court shall rectify the real estate designation based on the real estate cadastre data. This rectification is made at the request of the owner or perpetual user, and may also be made ex officio.

Taking into account the provisions analyzed above (Act, 1982), consistency must be ensured between the I-O section of the land register and the land and buildings records in this regard. Pursuant to the Regulation (2016), the I-O section of the land register contains a section (1.6) titled "Compatibility with land and building records data." This section is divided into three fields. The first field, 1.6.0.1 "Compatibility" is a check mark for data entered in the I-O section of the land register with data contained in the land and buildings records, where the letters denote: Z – compliant, N – non-compliant, B – inability to verify compliance. The second field, 1.6.0.2 "Verification time" contains information about the date, time, and minute of the last verification of data contained in the land register with data from the land and buildings records. The third field, 1.6.0.3 "EGiB database version", informs about the date of the last update of the land and buildings records database, which is used to verify the data entered in section I-O of the land register (see § 23 of the Regulation, 2016).

Given the fact that two separate systems are operated by different authorities and, in the scope discussed, the same data are registered together, discrepancies may occur.

Taking into account the above analyses, the real estate cadastre and land registers in Poland are kept in completely different systems, whose different database structures limit the possibilities of automatic data synchronization between these systems.

A solution that, in Poland, would contribute to the detection of, among others, discrepancies in the data contained in the real estate cadastre and land registers is the creation of the Integrated Real Estate Information System (ZSIN). This system has been written about, among others, in Karabin-Zych and Karabin (2015); Konieczna (2017); Nogalski et al. (2022); Karabin and Łuczyński (2022).

This system is created and maintained by the National Surveyor General in cooperation with starostas, voivodes and voivodeship marshals as well as the Minister of Justice, the minister responsible for computerization, the minister responsible for internal affairs, the minister responsible for public finances, the minister responsible for environment, the minister responsible for climate, the President of the Central Statistical Office and the President of the Agency for Restructuring and Modernization of Agriculture.

ZSIN is an IT system which, in accordance with Art. 24 b. 1. Act (1989), enables in particular:

- i. maintaining a central repository of copies of land and building records data sets;
- ii. monitoring the consistency and quality of land and building records data sets on a scale of individual voivodeships and the entire country;
- iii. exchange of data in the form of electronic documents between the land and building records and other public registers, such as: land register, state register of borders and areas of territorial divisions of the country, national official register of territorial division of the country, national official register of national economy entities, national system records of producers, records of farms and records of applications for payments, to the extent necessary to maintain these public registers, as well as forwarding notifications in the form of electronic documents of changes in data made in individual public registers, relevant for other public registers included in the integrated system real estate information;
- iv. verifications referred by courts keeping land registers according to the art. 626§ 4 of the Code of Civil Procedure;
- v. verification of compliance of land and building records with data

contained in: land registers, the Universal Electronic Population Registration System, the national official register of national economy entities and the national official register of the territorial division of the country, as well as obtaining data contained in these registers for the purposes of land and building records;

vi. providing public administration bodies and other entities carrying out public tasks based on separate provisions or as a result of their entrustment or commission by a public administration body with land and building records necessary for the implementation of public tasks by these entities;

vii. conducting spatial analyses on land and building records data sets covering areas larger than one district.

This system is created on the basis of copies of land and building records data sets. In accordance with Regulation (2022), it consists of a central repository of copies of land and building records data sets, the ZSIN portal, and communication tools intended to exchange information between the registers included in ZSIN. The system will also include such registers as: land registers, the Universal Electronic Population Registration System (PESEL) and the National Official Register of National Economy Entities (REGON).

Figure 1 shows the architecture diagram of an Integrated Real Estate Information System.

According to the data (Head Office of Geodesy and Cartography, 2024) – Figure 2, in three poviats, the transmission of electronic notifications of changes in land registers from electronic land registers (eKW) to the land and buildings records (EGiB) via the Integrated Real Estate Information System (ZSIN) has not yet been implemented.

Currently, the central repository of copies of land and buildings records data sets is maintained based on copies of land and building cadastral data sets submitted by starostas or mayors of cities with district rights, which are transferred to the ZSIN at least once a year. According to the current regulation (Regulation, 2022), the aforementioned repository should also be maintained "based on data made available via network services referred to in the regulations issued under Art. 26, sec. 2 of the Act" (i.e., Act, 1989).

The amending Regulation of the Minister of Development and Technology of March 15, 2023 (Regulation, 2021) introduced annex no. 8a – specification of network services for providing land and buildings records data to the Integrated Real Estate Information System (ZSIN). According to the aforementioned annex, network services that would provide data from district land and buildings records databases for the purposes of ZSIN should be compliant with the Web Feature Service (WFS) standard. The first deadline for launching the above-mentioned service was December 31, 2023. As reported by the Surveyor General of Poland, WFS services providing data from district land and buildings records databases for the needs of ZSIN "were not launched by the districts due to technical problems and the need to incur additional costs related to the implementation of the new functionality and meeting security requirements (resulting, among others, from the sharing/exchange of sensitive data, such as the Land Register number)"¹. Due to the issues described above, on November 13, 2024, the Ministry of Development and Technology submitted a draft regulation prepared in cooperation with the Ministry of Agriculture and Rural Development, amending the regulation on the land and buildings records. This draft proposes repealing annex 8a to the regulation of July 27, 2021, on the land and buildings records and enabling the ZSIN system to be populated with services providing up-to-date land and building records data. As indicated in the document, "in accordance with the information provided by the Surveyor General of Poland, taking into account the costs reported by the poviats necessary to launch the WFS

1 https://www.senat.gov.pl/download/gfx/senat/pl/senatoswiadczenia/5478/11_031_735_1_odp.pdf

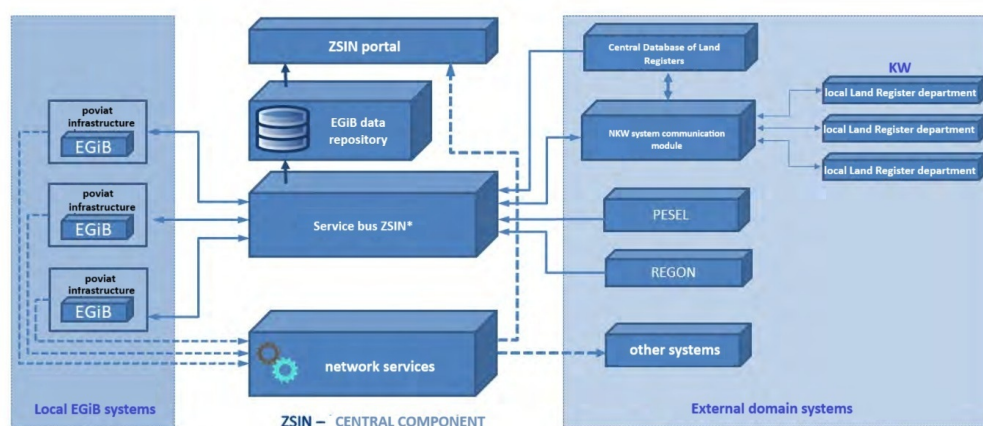


Figure 1. Architecture diagram of an Integrated Real Estate Information System (ZSIN – Integrated Real Estate Information System; EGiB – land and buildings records (real estate cadastre); KW – land register; PESEL – Universal Electronic Population Registration System; REGON – National Official Register of National Economy Entities) (Regulation, 2022). Communication between systems included in ZSIN is carried out using a service bus or dedicated network services.

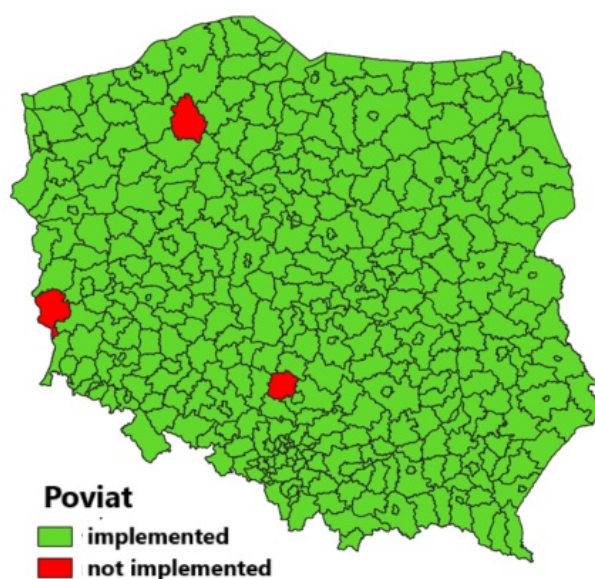


Figure 2. The implementation status of sending electronic notifications about changes in land registers from electronic land registers (eKW) to EGiB via ZSIN (Head Office of Geodesy and Cartography, 2024)

download service specified in annex 8a and the rational spending of public funds, existing network services described in annex 8 to the Regulation of 27 July 2021 on the land and building records should be used to make land and building records data available for the purposes of ZSIN². According to the list of legislative works of the Minister of Finance and Economy of September 19, 2025, available on the website of the Republic of Poland (Gov.pl, 2025), work on the draft of the aforementioned regulation was suspended "in connection with the pending draft act amending the Geodetic and Cartographic Law and the Act on Spatial Information Infrastructure (UD60) – the regulations of which affect the changes contained in the draft regulation".

Financial support for the construction of ZSIN was to include, among others, funds obtained from the EU as part of the implementation of two projects: ZSIN – Construction of an Integrated Real Estate Information System – Phase I and ZSIN – Construction of an Integrated Real Estate Information System – Phase II. In 2020, the Department of Infrastructure of the Supreme Audit Office carried out an inspection of the construction of ZSIN. The results were not optimistic. As indicated in the report (Supreme Audit Office, 2020), the Chief Surveyor of the Country did not take into account the low quality of EGiB data; only 118 district offices received assistance from the funds obtained, and the ZSIN Central Register was poorly supplied with EGiB data. The above-mentioned comments are just some of the results listed in the report.

As indicated by Supreme Audit Office (2020), according to the Ministry's estimates, with the concept implemented so far and successive expenditure in the total amount of PLN 1.7 billion to 2.6 billion PLN, full functionality of ZSIN will be achieved no earlier than 2030.

3.2 Development of the land cadastre and real estate registration system in Ukraine

The creation of a modern land cadastre in Ukraine began at the end of 1997 with the adoption of the Cabinet of Ministers of Ukraine's resolution "On the Program for the Creation of an Automated System for Managing the State Land Cadastre." This program outlined a series of measures aimed at automating the information and technological processes related to the operational management and use of state land cadastre data. At that time, the state land cadastre con-

² <https://legislacja.rcl.gov.pl/docs//578/12391451/13093850/13093851/dokument692007.pdf>

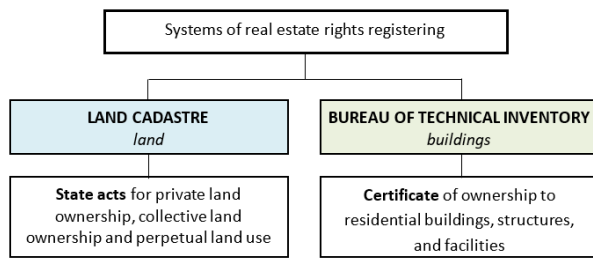


Figure 3. Systems of real estate rights registering

tained information and documents on the legal status of lands, their distribution among landowners and land users, including tenants, by land categories, as well as their qualitative characteristics and economic value. The program's implementation aimed primarily to introduce automated management of land ownership registration and land cadastre data accounting (Decree, 1997).

Therefore, land ownership and land use registration were considered as part of the automated state land cadastre system, which consists of a computer database containing information on the preparation and issuance of state acts for private land ownership, collective land ownership and perpetual land use, as well as agreements for temporary land use (including rental agreements) and land lease agreements.

Parallel to the development of the land rights registration system, measures were taken to create an automated system for the registration of real estate rights, aimed at properly ensuring the protection of property rights on real estate for individuals and legal entities, excluding land plots.

Foremost, in 2002, a Temporary Regulation on the Procedure for Registering Property Rights to Real Estate was adopted, which provided measures to establish software for the registrars of the Bureau of Technical Inventory for maintaining the electronic Register of Property Rights to Real Estate.

Later, the norms of the regulation were more broadly represented in the Procedure for Maintaining the Register of Property Rights on Real Estate and provided for the maintenance of the Unified State Register of Real Estate Rights, which, in addition to land plots, also defined the procedure for state registration (at the location of the real estate), and the procedure for obtaining information about property rights by interested parties.

It should be noted that the property registration system in place from 1998 to 2002 followed a procedure that had been established during the Soviet era. Traditionally, property registration was carried out by municipal technical inventory bureaus, which conducted technical inventory of real estate objects. Rights to real estate other than buildings, specifically land rights, were registered in the land cadastre, while lease rights were registered with local government authorities. Thus, the functions of state registration of different types of real estate were assigned to various state and local government bodies.

In Ukraine, in 2002, there were two systems for registering property rights. The first system, related to land plots, operated within the state land cadastre system, while the other, concerning the registration of rights to residential buildings, structures, and facilities, was managed by the technical inventory bureau registrars (Figure 3). Therefore, when acquiring ownership of a completed real estate object, i.e., a land plot and the building (or structure) located on it, it was necessary to separately register the ownership rights for both the land and the building (or structure).

In addition, both registration systems conducted both technical and legal registration of real estate and were characterized by the local isolation of real estate registration data. Each technical inventory bureau or state land cadastre department maintained its own local register, and there was no exchange of such information even

within their own agencies.

The beginning of the second stage in the formation of the registration system for property rights can be considered the adoption of the Decree of the President of Ukraine dated February 17, 2003, No. 134 "On Measures for Creating a Unified System of State Registration of Land Plots, Real Estate, and Rights to Them as Part of the State Land Cadastre" (Decree, 2003). This Decree radically changed the approaches to property rights registration.

Based on this, land plots, other real estate objects, and the rights to them (ownership rights, usage rights, leases, easements) were to be entered into a single register within the state land cadastre system. To achieve this, a state land register was initially created, which included a book of records for state acts on land ownership and perpetual land use rights, land lease agreements with cadastral numbers of land plots, and the Land Book, which contains information about the land plot and is formed using the Automated System of State Land Cadastre. The formation of the State Register of Land and Real Estate Rights was postponed until January 1, 2005.

In continuation of the Decree, the Law of Ukraine "On State Registration of Real Rights to Immovable Property and Their Encumbrances" was adopted, which came into effect on July 1, 2004 (Act, 2004). It, in particular, established that Ukraine would form and maintain a unified State Register of Rights, based on the state registration of land plots of all forms of ownership and the immovable property located on them, the registration of real rights to immovable property, their encumbrances, and transactions concerning immovable property.

The information support for the State Register of Property Rights should include (Act, 2004):

- i. a database for recording land plots and other real estate, and transactions related to real estate;
- ii. data from the technical inventory of real estate objects;
- iii. cadastral plans of land plots;
- iv. information on registration files;
- v. a database of applications for state registration of rights and their restrictions;
- vi. a database of inquiries about registered rights and their restrictions.

Thus, it was anticipated to create a unified system of state registration bodies for rights, as well as to form the State Register of Rights as part of the state land cadastre, incorporating information from municipal enterprises and technical inventory bureaus.

However, this system never got off the ground. The period from 2005 to 2011 was marked by interdepartmental struggle between the Ministry of Justice and the State Committee for Land Resources over the right to be the holder of the real estate register. Both agencies claimed the leading role and were unwilling to cede their informational resources to the competitor.

Significant changes took place in July 2011, when the Law of Ukraine "On the State Land Cadastre" was adopted. This law provided for the creation of a unified information system for the State Land Cadastre and the transfer of records concerning the state registration of land plots, restrictions, and encumbrances on their use, which were previously registered in the State Land Register maintained by state land resources authorities. As for the Registration Books of agreements and state acts, this registration procedure existed until the amendments to the Law of Ukraine "On State Registration of Property Rights to Real Estate and Their Encumbrances" came into effect, based on the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Improvement and Simplification of the Procedure for State Registration of Land Plots and Property Rights to Real Estate."

According to the legislative changes adopted since 2013, several registers related to real estate rights ceased to function, namely:

- The Register of Ownership Rights to Real Estate;
- The Unified Register of Prohibitions on Alienation of Real Estate Objects;

- The State Mortgage Register;
- The State Register of Transactions; and
- The State Land Register.

The functions of these registers were transferred to a new unified register, the State Register of Property Rights to Real Estate. In addition to the introduction of the Register of Rights, the role and functions of the Land Cadastre were revised.

In this regard, the territorial bodies of the State Geocadastral of Ukraine retain the authority for the state registration of land plots as real estate objects in the State Land Cadastre, while the functions of state registration of property rights and other real rights to land plots have been transferred to the registration services, which were established as structural units of the justice departments.

According to the same principle, the functions of real estate registration were transferred from the Technical Inventory Bureau to the State Registration Service of Ukraine, while still leaving the provision of technical inventory services for real estate objects.

As of the beginning of 2013, the State Register of Rights was used to record real rights and encumbrances on land plots, as well as on immovable property located on a land plot, whose relocation would be impossible without depreciating their value and changing their intended use. This includes enterprises as single property complexes, residential buildings, structures (their individual parts), apartments, and residential and non-residential premises (Act, 2004).

4 Information interaction of the Land Cadastre and the Property Registration System

4.1 Information interaction of real estate cadastre, land register and Integrated Real Estate Information System in Poland

Pursuant to art. 27.1 (Act, 1982), the basis for marking real estate in the land register is the real estate cadastre data. The obligation to exchange data and inform about changes is regulated in applicable legal provisions. And so, in accordance with art. 23.1 point 2 (Act, 1989), the courts provide the starost with notices of new entries in sections I and II of the land register within 14 days from the date on which these documents produce legal effects. The starost immediately, but no later than 30 days from the date of receipt of the above-mentioned documents, enters the data resulting from them into the land and buildings register (art. 23.7 of the Act, 1989). In turn, the starost, in accordance with § 35.1 point. 2 (Regulation, 2021), notifies the land register department of the local district court about changes made in the registration data within 14 days of making a change in the records, in the case of changes to data covered by section I of the land register. Therefore, these registers should be consistent in terms of the same data being recorded twice (see Karabin-Zych and Karabin, 2015).

Unfortunately, among others, due to double registration, errors and discrepancies have been generated. In order to check the scale of the problem, many Authors and Scientists conducted compliance studies of jointly registered data contained in the real estate cadastre and land registers for randomly selected real estate located in various locations in Poland. The research results included, among others, the following: Karabin and Łuczyński (2022); Karabin-Zych and Karabin (2015); Karabin (2012). As research shows, there are discrepancies in the scope of: location of the property, subject data (first name, second name, surname, parents' names/name of the legal entity), share in the rights of owners, perpetual usufructuary or other entities, parcel register numbers and area of real estate.

The reasons for the discrepancies may be various and there may be many of them – from negligence on the part of entities or bodies in the scope of reporting changes in data and in the process of current updating, as well as at the stage of earlier migration of land

registers, through errors made by people in the entered data (e.g. typos), or changing requirements in applicable legal regulations in the scope of, for example, the accuracy of reporting the area of cadastral plots.

Currently, in the event of changes to the registration data covered by section I of the land register, notifications of changes are prepared by the starost in the form of an electronic document and delivered using ZSIN. Regulation (2021) also allows the possibility of preparing and delivering notices in paper form if technical conditions would not allow the above-mentioned form.

As the Nogalski et al. (2022) point out, “ZSIN is a tool that is intended to help detect inconsistencies between the content contained in various registers, in particular between EGIB and KW”. However, as the Authors point out, “ZSIN cannot delete them in any case, as it cannot make decisions in individual cases or make entries in the registers”. Therefore, this system will not completely solve the problems.

4.2 Information interaction of land cadastre and property registration system in Ukraine

In accordance with Article 30 of the Law "On the State Land Cadastre" (Act, 2003c) and Article 281 of the Law "On State Registration of Property Rights to Real Estate and Their Encumbrances" (Act, 2004) the Cabinet of Ministers of Ukraine adopted a resolution on February 22, 2012, titled "On Information Interaction Between the Body Responsible for Maintaining the State Land Cadastre and the State Registration Authority for Property Rights" (Decree, 2012). This resolution approved the Procedure for Providing Information on Registered Land Plots to the State Registration Authority for Property Rights and Information on Registered Property Rights to Land Plots to the Body Responsible for Maintaining the State Land Cadastre.

According to this procedure, the body responsible for maintaining the State Land Cadastre, simultaneously with the state registration of a land plot, provides the State Registration Authority for Property Rights with information on:

- the date of state registration,
- the cadastral number, area, and location of the land plot,
- the cadastral plan of the registered land plot in electronic (digital) form.

Additionally, the resolution granted access to cadastral maps (plans) for land plots regarding which applications for state registration of rights and encumbrances were considered, as well as for land plots on which real estate or unfinished construction objects are located, regarding which applications for state registration of rights and encumbrances are being reviewed (Decree, 2012).

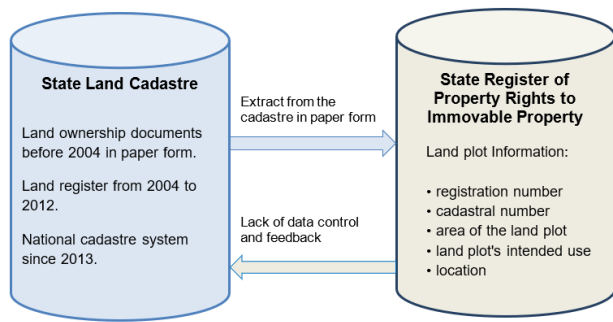
In turn, the state registration authority, simultaneously with the state registration of property rights to a land plot, provides the body responsible for maintaining the State Land Cadastre with information about:

- the subject of ownership rights to the land plot,
- the subject of property rights to the land plot,
- the state registration of ownership rights to the land plot, rights of use (servitude) of the land plot, rights of permanent use, lease rights (sublease) of the land plot, rights to use the land plot for agricultural needs (emphyteusis), and rights to develop the land plot (superficies),
- the date of state registration, the registration number of the land plot in the State Register of Property Rights to Immovable Property, including information about its cadastral number and the authority that performed the state registration.

At the same time, no automatic transfer of information about registered land rights from the State Land Register to the State Register of Property Rights to Immovable Property took place. This led to the absence of information in the State Register of Property Rights to Immovable Property concerning land rights that arose

Table 1. Consequences of ineffective information interaction between the systems of the State Land Cadastre and the State Register of Property Rights to Immovable Property

Technical and technological problems	Consequences of information interaction
Data is manually entered into the Rights Register based on excerpts from the land cadastre.	1. A large number of errors and the potential for abuse. 2. The inability to enter large volumes of data.
Registrars do not have access to the state land cadastre.	1. Submission of requests in paper form to obtain information from the cadastre. 2. Lack of the ability to verify data.
There is no system for reconciling and controlling data between databases	1. Discrepancies in the data and the inability to detect errors. 2. Inability to update and confirm the accuracy of the data.

**Figure 4.** Information Interaction of Land Cadastre and Property Registration Systems

before 2013.

A significant drawback was also the state of the information contained in the State Land Cadastre. Specifically, a large portion of information about land plots, the ownership of which arose before 2004, was not transferred from paper records to the State Land Cadastre. The issue was that such plots lacked a cadastral number, and information about them had not been entered into the State Land Register. This meant it was impossible to spatially identify them on cartographic documents of the State Land Register, namely the current cadastral plan.

Even if a land plot was registered in the cadastre, the two authorities could not exchange information about it, as their electronic databases (registers) did not function together for information exchange (Figure 4). This, in turn, made it impossible to conduct state registration of rights within the established timeframes.

Due to the lack of technical and technological capabilities to provide information about registered land plots and registered rights to them during the process of informational interaction between both systems, negative consequences arose (Table 1).

To improve information exchange between the two systems, in July 2017, a Procedure for Access to the Information of the State Land Cadastre for State Registrars of Property Rights to Immovable Property was approved, which significantly simplified the procedure for registering rights to land plots. According to this procedure, during the state registration of property rights to land plots, the state registrar of immovable property rights gained access to information about the land plot, its owners, and users, which had been transferred from the State Land Register and contained in the State Land Cadastre, by generating a search query in the State Register of Rights using the cadastral number of the land plot. The State Land Cadastre administrator, in turn, will transmit information about the land plot to the State Register of Rights in real-time based on the criteria specified in the search query (Decree, 2017).

Along with this, in the previous period, there were cases of registering property rights for land plots for which no information was available in the State Land Cadastre. Considering that the state recognizes the validity of already registered property rights and to protect landowners from possible raider seizures, Law of Ukraine

No. 340-IX "On Amendments to Certain Legislative Acts of Ukraine Concerning Anti-Raiding Measures" was adopted on December 5, 2019 (Act, 2019).

In particular, this law imposed obligations on state registrars to check not only the information in the State Register of Property Rights to Real Estate but also the availability of corresponding information in the State Land Cadastre. During the registration of rights, the state registrar is also required to verify the presence of information about the real estate in other state registers, which should prevent the double registration of rights to land plots by different individuals. Additionally, the state registrar must reject the application for registration of property rights if the cadastral number of the land plot is not present in the State Land Cadastre (Act, 2019).

In compliance with the provisions of this Law, on November 25, 2020, the Cabinet of Ministers approved the Procedure for verifying the consistency of information from the State Register of Property Rights to Real Estate regarding land plots, property rights, and encumbrances registered on them, with the information from the State Land Cadastre regarding the presence of state registration of such land plots.

The Procedure established the legal basis for the effective interaction between the information systems of the State Register of Property Rights to Real Estate and the State Land Cadastre, allowing state registrars to receive real-time information from the State Land Cadastre about rights to land plots registered before 2013, and enabling the bodies maintaining the State Land Cadastre to access, respectively, information from the State Register of Property Rights to Real Estate on land plots and their encumbrances (Decree, 2020).

According to the adopted Procedure, a one-time verification of the consistency of information from the State Register of Property Rights to Real Estate regarding land plots, property rights, and encumbrances registered on them with the information from the State Land Cadastre regarding the state registration of such land plots was envisaged, as well as the publication of the results of such verification, specifically for land plots lacking registration data in the State Land Cadastre, on the official website of the Ministry of Justice.

However, the Russian invasion of Ukraine has influenced all spheres of social relations, including the land ones. The key elements of land relations functioning include the state information system, particularly the State Register of Property Rights to Immovable Property and State Land Cadastre.

In connection with the military aggression of the Russian Federation against Ukraine, the operations of the State Register of Property Rights to Real Estate were temporarily halted, which also led to the suspension of state registration of property rights to real estate, including land plots. As a result, a temporary mechanism for the registration of land rights was established to regulate land relations under martial law.

In particular, the Law of Ukraine dated May 12, 2022, No. 2247-IX "On Amendments to Certain Legislative Acts of Ukraine Regarding the Creation of Conditions for Ensuring Food Security in the Context of Martial Law" (Act, 2022) provided for the possibility of formalizing lease rights for state and communal land plots without

Table 2. Information interaction within the Trembita integration system regarding land parcels and their owners

Information on Land Parcels	Information on Landowners / Land Users
Cadastral number	Owners/users before 2013
Coordinates and parcel boundaries	Owners/users after 2013 (current data from the State Register of Property Rights)
Area and configuration (by polygon/coordinates)	List of parcels owned or used by a natural/legal person (based on Tax ID / Unified State Register code)
Status in the cadastre (active, archived)	Information on property rights to the parcel
Data on registration actions and recorded changes	Changes in data on owners/users (corrections, updates)

entering information about such rights into the State Land Cadastre and the State Register of Rights, with mandatory registration in the book of registration of land ownership and land use agreements for leases and subleases of land plots by district military administrations.

However, after the restoration of the functioning of the State Land Cadastre and the State Register of Rights, it became possible to return to the procedure for state registration of property rights to agricultural land plots that existed before the amendments. In particular, new provisions that came into effect on November 19, 2022, stipulated that the leasing of agricultural land plots is carried out on the condition that information about the land plots is available in the State Land Cadastre and that rights to them are recorded in the State Register of Rights.

The subsequent stage of the practical implementation of electronic information interaction between the State Land Cadastre and the State Register of Property Rights to Real Estate commenced at the end of 2024 through the use of the national electronic interaction system of state electronic information resources “Trembita”. This system, launched in May 2019, ensures electronic interoperability among state information resources, electronic registers, and information systems. It is intended to provide state authorities and local self-government bodies with prompt, seamless, and reliable access to the information required for the exercise of their statutory powers. The primary objective of its implementation is to facilitate real-time data exchange between information systems and electronic state registers.

Within the framework of the Trembita integration system, the information interaction between the State Land Cadastre and the State Register of Property Rights to Real Estate encompasses the following exchange of data on land parcels and their owners (Table 2).

5 Summary and conclusions

As the conducted research shows, in Poland there are two separate systems operated by separate bodies, registering certain common data on real estate – the real estate cadastre (land and buildings records) and land registers, and a third system, which is in the implementation phase – the ZSIN, which is to integrate data from various public registers, including the real estate cadastre and land registers. The real estate cadastre registers data on the entity, which comes from the land register, if it was established for the real estate, while the designation of the real estate in section I–O of the land register comes from the real estate cadastre. Theoretically, double registration of the same data and the obligations of individual bodies or entities resulting from legal regulations in the scope of notifying about changes in the data should result in consistency between the two. As the research cited in the article shows, in practice, there may be various types of discrepancies in the data contained in the real estate cadastre and land registers.

The Integrated Real Estate Information System is to ensure the integration of data from many public registers, including the real

estate cadastre and land registers. Its maintenance includes: maintaining a central repository of copies of land and building records data sets, monitoring the consistency and quality of land and building records data sets (on a province and national scale), verifying the consistency of land and building records data with the data contained in land registers, among others, or exchanging data in the form of electronic documents between the land and building records and other public registers, such as the land register. In most poviats, it is already possible to send electronic notifications of changes in land registers from eKW to the EGIB via the ZSIN.

As indicated in [Nogalski et al. \(2022\)](#), ZSIN cannot, in any case, remove detected inconsistencies between the content contained in different registers (in particular between the land and building records and land registers), because it can neither make decisions in individual cases nor make entries in these registers. In further work on improving the system, it would be necessary to consider the possibility of introducing procedures and tools that would allow such actions. Thanks to this, the system would contribute in a comprehensive way to providing up-to-date and consistent information on real estate.

According to the Authors of this article, after implementing all ZSIN functionalities (including bilateral exchange of notifications between eKW, ZSIN and EGIB), as well as supplying ZSIN with services that would provide up-to-date data on the land and building records (in the amended in 2.1 formula proposed by the Ministry of Development and Technology), the information interaction between the land and building records and the land registers will be improved, as well as data synchronization will be better.

The ideal solution to prevent further inconsistencies in the data contained in land registers and the real estate cadastre is, in addition to legal mechanisms, the implementation of technical mechanisms to prevent this, i.e., the creation of a single integrated cadastral and land register database (as discussed in the conclusions in [Karabin \(2012\)](#)). Such a solution would eliminate the double recording of the same data in the real estate cadastre and the land register.

Similar to the situation in Poland, Ukraine operates three separate systems for registering real estate data, each managed by a different institution. The State Land Cadastre contains core information on land parcels, including cadastral numbers, coordinates of turning points defining parcel boundaries, area, ownership, land use type, designated purpose, and other data on the quantitative and qualitative characteristics of land, including its valuation. However, it does not include information on buildings located on the parcels.

In contrast, the State Register of Property Rights primarily records ownership and other real rights – such as lease, servitude, emphyteusis, and superficies – related to land parcels and buildings, along with encumbrances on those rights, including tax liens and mortgages. It also contains essential data required to identify each land parcel. Despite the inclusion of registered real rights to immovable property and unfinished construction projects, the Register's data remains incomplete because part of the information is still maintained in paper format by the Bureau of Technical Inven-

tory (BTI). Consequently, access to registry books and registration files maintained by these enterprises is critical for state authorities and notaries to implement accurate registration procedures and ensure complete and reliable information on property rights.

The establishment of a comprehensive real estate cadastre in Ukraine necessitates addressing the current fragmentation and duplication of data across separate registries. A critical step is the introduction of an identification mechanism within the State Land Cadastre for real estate objects, including buildings, structures, engineering networks, as well as delineated parts of land parcels subject to servitudes or sublease agreements. Achieving this goal requires:

- implementation of real-time electronic interoperability between the State Land Cadastre and the Unified State Electronic System in the Construction Sector;
- enhancement of information exchange between the State Land Cadastre and the State Register of Property Rights to Real Estate;
- integration with other cadastral and state information systems.

The situation was improved through the integration of the State Land Cadastre with the State Register of Property Rights to Real Estate via the Trembita system, which enables real-time data exchange on land parcels and their owners.

Yet, the Russian invasion of Ukraine has profoundly affected land relations, temporarily disrupting the functioning of key state information systems. The suspension of property rights registration necessitated the introduction of provisional mechanisms for regulating land relations under martial law, particularly through simplified procedures for leasing state and communal land. Following the restoration of the State Land Cadastre and the State Register, Ukraine has retained certain restrictions. Recent legislative measures limiting the accessibility of public registers highlight the need to balance transparency with national security during armed conflict. These measures include concealing cadastral numbers, replacing precise addresses with regional identifiers, and restricting access to ownership data in order to prevent adversaries from exploiting registry information for military purposes. Although such restrictions reduce public accessibility, they serve as a protective mechanism to safeguard critical infrastructure and defense-related enterprises.

Overall, Ukraine's approach demonstrates a dual trajectory: on the one hand, the modernization and integration of cadastral and registration systems to enhance efficiency and transparency; on the other, the adaptive imposition of security-oriented limitations in response to wartime threats. This combination reflects both resilience and adaptability in the governance of land and property rights under conditions of external aggression.

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References

- Act (1964). Act of April 23, 1964 Civil Code. Act. Journal of Laws, 2024, item 1061, Poland.
- Act (1982). Act of July 6, 1982 about land registers and mortgages. Act. Journal of Laws, 2023, item 1984, Poland.
- Act (1989). Act of May 17, 1989 Geodetic and Cartographic Law. Act. Journal of Laws, 2024, item 1151, with subsequent amendments, Poland.
- Act (1996). Constitution of Ukraine.
- Act (2001). Land Code of Ukraine. Law No. 2768-III, 2001.
- Act (2003a). Act of 14 February 2003 on the transfer of the content of the land register to the structure of the land register maintained in the computer system. Act. Journal of Laws, 2003, no 42, item 363, Poland.
- Act (2003b). Civil Code of Ukraine. Law No. 435-IV, 2003.
- Act (2003c). On Land Cadastre. Law of Ukraine No. 858-IV, 2003.
- Act (2004). On State Registration of Real Rights to Immovable Property and Their Encumbrances. Law of Ukraine No. 1952-IV, 2004.
- Act (2017). Act of July 20, 2017, Water Law. Act. Journal of Laws, 2024, item 1087, with subsequent amendments, Poland.
- Act (2019). On Amendments to Certain Legislative Acts of Ukraine Concerning Anti-Raiding Measures. Law of Ukraine No. 340-IX, 2019.
- Act (2022). On Amendments to certain legislative acts of Ukraine regarding the creation of conditions for ensuring food security in the context of martial law. Law of Ukraine No. 2247-IX, 2022.
- Decree (1946). Decree of October 11, 1946, Law on land registers. Act. Journal of Laws, 1946, no 57, item 320, Poland (repealed).
- Decree (1955). Decree of February 2, 1955 on the register of land and buildings. Act. Journal of Laws, 1955, no 6, item 32, Poland (repealed).
- Decree (1997). On the Program for the Creation of an Automated System for Managing the State Land Cadastre. Decree of the Cabinet of Ministers of Ukraine No. 1355, 1997.
- Decree (2003). On Measures for creating a unified system of state registration of land plots, real estate, and rights to them as part of the State Land Cadastre. Decree of the Cabinet of Ministers of Ukraine No.134, 2003.
- Decree (2012). On the informational interaction between the body maintaining the State Land Cadastre and the body of state registration of rights. Decree of the Cabinet of Ministers of Ukraine No.118, 2012.
- Decree (2017). On the approval of the Procedure for access of state registrars of rights to immovable property and the use of information from the State Land Cadastre. Decree of the Cabinet of Ministers of Ukraine No.509, 2017.
- Decree (2020). On the approval of the Procedure for access of state registrars of rights to immovable property and the use of information from the State Land Cadastre. Decree of the Cabinet of Ministers of Ukraine No. 1155, 2020.
- Gov.pl (2025). List of legislative works – Ministry of Development and Technology. <https://www.gov.pl/web/rozwoj-technologie/wykaz-prac-legislacyjnych> (access: 09.2025).
- Head Office of Geodesy and Cartography (2024). 11th meeting of the Team for the Government Program for the Development of an Integrated Real Estate Information System. Warsaw, November 26, 2024. <https://www.gov.pl/web/gugik/xi-posiedzenie-zespolu-ds-rzadowego-programu-rozwoju-zintegrowanego-systemu-informacji-o-nieruchomosciach>.
- Hopfer, A. and Wilkowski, W. (2007). Kataster nieruchomości w Polsce – jest czy go nie ma? (Cadastral in Poland – does it really exist?). *Przegląd Geodezyjny*, 79(1):6–12.
- Hycner, R. and Mika, M. (2020). System ksiąg wieczystych w Polsce – analiza stanu istniejącego w aspekcie przepływu informacji o terenie i tworzenia katastru nieruchomości (The land register system in Poland – analysis of the existing state in terms of the flow of information about the area and the creation of the real estate cadastre). 6(1):71–79.
- International Federation of Surveyors (1995). Statement of the Cadastre. <https://www.fig.net/resources/publications/figpub/pub11/FIG%20Statement%20on%20the%20Cadastre.pdf>.
- Karabin, M. (2012). Badanie zgodności danych zawartych w katastrze nieruchomości i księgach wieczystych dla nieruchomości z obszaru powiatu warszawskiego zachodniego (Testing the compatibility of data stored in the real estate cadastre and in property registers for real estate located within the Warsaw district). *Przegląd Geodezyjny*, 84(10):3–8.
- Karabin, M. and Łuczyński, R. (2022). The Issues Regarding the Compliance of Data Contained in the Cadastre and land register

- in Poland. In XXVII FIG Congress 'Volunteering for the future – Geospatial excellence for a better living', 11.09–15.09.2022r. Warsaw, Poland.
- Karabin-Zych, M. and Karabin, M. (2015). Comparing analysis of the data included in the cadastre and land register – in the context of the implementation of the integrated system of the real property data in Poland. In *Water Resources, Forest, Marine and Ocean Ecosystems, Conference Proceedings, Volume II, Soil, Forest Ecosystems, Marine and Ocean Ecosystems, International Multidisciplinary Scientific GeoConference and EXPO SGEM*, volume II of SGEM2015 B22, pages 153–160. Stef92 Technology, doi:10.5593/sgem2015/b22/s9.019.
- Konieczna, J. (2017). The Cadastre with Respect to the Integrated System of Real Estate Information. In *Proceedings of 10th International Conference "Environmental Engineering"*, Vilnius Gediminas Technical University Lithuania, 27–28 April 2017. VGTU Technika, doi:10.3846/enviro.2017.203.
- Kuryltsiv, R., Hernik, J., and Kryshenyk, N. (2018). Impact of land reform on sustainable land management in Ukraine. *Acta Scientiarum Polonorum. Formatio Circumiectus*, 17(2):105–115, doi:10.15576/asp.fc/2018.17.2.105.
- Mika, M. (2002). *Analiza wybranych systemów informacji o terenie w aspekcie katastru nieruchomości (Analysis of selected area information systems in the aspect of the real estate cadastre)*. PhD thesis, Akademia Górniczo-Hutnicza im. Stanisława Staszica w Krakowie.
- Mika, M. (2010). Historia katastru polskiego (Cadastre history in Poland). *Infrastruktura i ekologia terenów wiejskich*, (6):75–85.
- Nogalski, B., Klimek, A., and Wenta, J. (2022). System Informacji o Nieruchomościach (SIN): Elementy analizy stanu (Real Estate Information System (SIN): State analysis elements). *Przegląd Geodezyjny*, 1(9):24–29, doi:10.15199/50.2022.9.2.
- Order (1969). Order of the Minister of Agriculture and Municipal Economy of 20 February 1969 on Land Records. Act. Journal of Laws, 1969, no 11, item 98, Poland (repealed).
- Regulation (1996). Regulation of the Ministers of Spatial Economy and Construction and Agriculture and Food Economy of 17 December 1996 on the land and building register. Act. Journal of Laws, 1996, no 158, item 813, Poland (repealed).
- Regulation (2001a). Regulation of the Minister of Justice of 17 September 2001 on maintaining land registers and set of documents. Act. Journal of Laws, 2001, no 102, item 1122, Poland (repealed).
- Regulation (2001b). Regulation of the Minister of Regional Development and Construction of 29 March 2001 on the land and building records. Act. Journal of Laws, 2001, no 38, item 454, Poland (repealed).
- Regulation (2003a). Regulation of the Minister of Justice of 20 August 2003 on the establishment and maintenance of land registers in the computer system. Act. Journal of Laws, 2003, no 162, item 1575, Poland (repealed).
- Regulation (2003b). Regulation of the Minister of Justice of 20 August 2003 on the method of transferring the content of the previous land register to the structure of the land register maintained in the computer system. Act. Journal of Laws, 2003, no 162, item 1574, Poland.
- Regulation (2016). Regulation of the Minister of Justice of 15 February 2016 on the establishment and maintenance of land registers in the IT system. Act. Journal of Laws, 2024, item 1583, with subsequent amendments, Poland.
- Regulation (2021). Regulation of the Minister of Development, Labor and Technology of July 27, 2021 on the register of land and buildings. Act. Journal of Laws, 2024, item 219, with subsequent amendments, Poland.
- Regulation (2022). Regulation of the Council of Ministers of October 14, 2022 on the integrated real estate information system. Act. Journal of Laws, 2022, item 2469, with subsequent amendments, Poland.
- Supreme Audit Office (2020). Informacja o wynikach kontroli. Budowa Zintegrowanego Systemu Informacji o Nieruchomościach (Information on inspection results. Development of an Integrated Real Estate Information System). KIN.430.003.2020, No 141/2020/P/19/032/KIN, <https://www.nik.gov.pl/kontrola/P/19/032/> (access: 20.06.2024).
- Wilkowska-Kożakowska, D. (2022). Real estate cadastre as a register of land, buildings and premises. Proposal to repeal the term land and buildings register introduced by the 1947 decree. *Nieruchomości@*, II(II):115–128, doi:10.5604/01.3001.0015.8601.
- Wilkowski, W. (2005). Historia katastru w Polsce (History of the cadastre in Poland). *Przegląd Geodezyjny*, 77(7):15–22.
- Yomralioglu, T. and McLaughlin, J. (2017). *Cadastre: Geo-Information Innovations in Land Administration*. Springer International Publishing, doi:10.1007/978-3-319-51216-7.
- Zadura, A., Zawadska, M., and Struziak, A. (2008). Land bank and land consolidation (Polish case). In *Workshop paper for FAO land consolidation and land banking workshop in Prague*.