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# A COMPARATIVE ANALYSIS OF HIGH-RISE BUILDING MODELS AS A DATA SOURCE FOR MULTIDIMENSIONAL CADASTRE

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## ABSTRACT

The paper presents a problem related to the limitations of the current form of cadastre used in Poland – the two-dimensional cadastre, which is often insufficient for technological developments. The problem was presented by means of a comparative analysis of six selected high-rise buildings in Warsaw, which are characterised by complex solid geometry: Rondo 1, Skysawa, Złota 44, Central Tower, Forest and LIM Centre. The introduction discusses the limitations of the two-dimensional cadastre, as well as the opportunities presented by a multipurpose cadastre, which, thanks to integration with GIS systems and BIM technology, might be a revolution in the Polish cadastral system. In the analytical part, two models of each analysed high-rise building were created in Revit using the data available in the national Land and Building Register (EGiB) and the available data on the actual building to present the inaccuracies of the two-dimensional cadastre in more detail. The urban indicators calculated according to the Land and Building Register were also compared with the actual indicators, confirming that the cadastre in its current form is insufficient for a reliable depiction of reality.

**Keywords:** multidimensional cadastre, high-rise buildings, BIM

## INTRODUCTION

A cadastre, according to a statement on cadastre prepared by the International Federation of Surveyors (FIG), is "usually a plot-based current land information system containing a register of interests in land (e.g. rights, restrictions and obligations). It generally contains a geometric description of the 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 [FIG], 1998). The basic cadastre can be divided into three types: fiscal, legal, and physical real estate (Etel, Dowgier, Liszewski, Poplawski & Presnarowicz, 2008). The first type is responsible for the taxation of land, the second for the protection of land rights and the development of the real estate market (Bydłosz, 2012), and the third registers maps, plans, and real estate data (Kopyściańska, 2017).

The two-dimensional cadastre has its limitations. One of them is its two-dimensional graphic representation, which does not consider height information and the spatial properties of buildings in the third dimension. Buildings and underground infrastructure are interconnected, while the solidity of buildings

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varies according to height. With two-dimensional cadastre maps, buildings start to overlap, making it impossible to obtain real information. Another limitation is the impossibility of presenting RRR (acronym for: rights, restrictions, and responsibilities) information. Within a single location, there are different forms of ownership at different elevation levels, so there is a problem of vertical overlap in the two-dimensional cadastre (Atazadeh et al., 2021).

In Poland, the main problem of the two-dimensional cadastre is that according to the Decree of the Minister of Development, Labour and Technology of 27 July 2021 on the land and buildings register, buildings are defined by the projection on the horizontal plane of the external planes of the external walls of the ground storey of a building, and in buildings founded on pillars on the basis of the projection of the external planes of the external walls of the storey resting on these pillars (Rozporządzenie Ministra Rozwoju, Pracy i Technologii z dnia 27 lipca 2021 r.). This means that the national Land and Building Register (Polish: *Ewidencja gruntów i budynków* – EGiB) does not consider the projections of the planes formed by the external walls of the upper storeys, which can vary according to height. In its current form, the cadastral system in Poland is not intended to be a universal solution governing all economic and spatial aspects (Noszczyk & Hernik, 2019). The main functions of the cadastre are tax (fiscal) and legal issues (Borkowski, Adamczyk, Gadosz, & Marynowski, 2025). The economic dimension is also important here, as it is necessary for the valuation of real estate since prices are primarily determined based on area (Baumane, 2010).

A new concept of a multipurpose cadastre is currently described in the literature. It is an elaborate system that not only records property data but also allows its analysis in the context of different domains, such as environmental protection, urban planning, transport, and disaster management (Bennett, Rajabifard, Kalantari, Wallace & Williamson, 2011). A multipurpose cadastre includes different layers of information that are processed and used for different purposes, making it a more versatile tool than a traditional cadastre (Uşak, Çağdaş & Kara, 2024). By integrating with GIS systems, a multipurpose cadastre allows the visualisation of spatial data and more precise decision-making, which is particularly important in the context of sustainable development, natural resource conservation, and urban planning (Li & Gar-On Yeh, 2000).

An even more accurate tool necessary for the implementation of a multipurpose cadastre is BIM, which has many benefits, especially if it accompanies the building from its inception (Kjartansdóttir, Mordue, Nowak, Philp & Snæbjörnsson, 2017). An additional advantage of BIM technology is the ability to integrate with GIS systems (Borkowski, Osińska & Szymańska 2022) due to BIM's focus on microrepresentations of the buildings themselves and the provision of macrorepresentations of external building environments by GIS (Wang, Pan & Luo, 2019). Digital models of buildings made with BIM or GIS can allow more accurate identification of properties in cadastral systems, among others. In addition to solving property problems, detailed information about the geometry of buildings will allow for more accurate analyses (Sun, Mi, Olsson, Paulsson & Harrie, 2019).

The lack of comprehensive studies on the integration of BIM with GIS technologies (Borkowski & To Duc 2024) to improve the quality of the cadastre in Poland currently limits the possibilities to fully exploit the potential of these technologies. There is also a paucity of analyses comparing the geometric data of buildings in the EGiB with reality and their impact on key urban planning parameters important in the context of spatial planning, such as total area or building intensity.

Thus, the aim of the study was a comparative analysis of high-rise building models developed based on the EGiB data and reality. The study aimed to identify the limitations associated with the two-dimensional cadastre, to identify the differences between the data available in the EGiB and the actual parameters of buildings, and to assess the impact of these differences on the actual urban indicators and those developed based on the data available in the EGiB.

## MATERIAL AND METHODS

Figure 1 presents a methodology for conducting a comparative analysis of high-rise building models that can serve as a data source for a multidimensional cadastre. The process is divided into seven complementary steps.

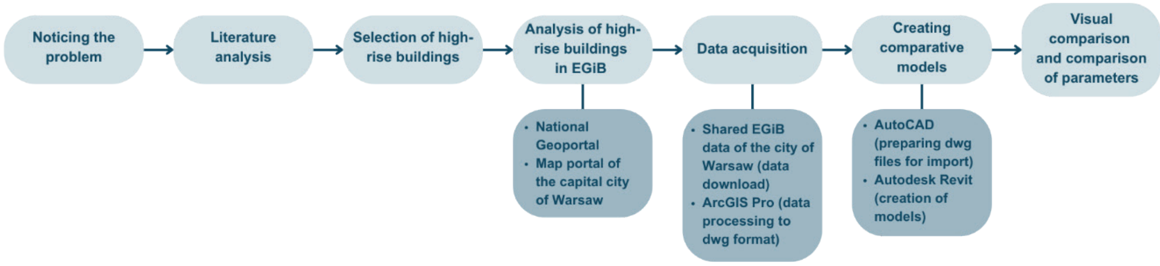



**Fig. 1.** Analysis of materials and methods flowchart

Source: own work.

The first step was to note the problem, which was then identified and clarified. On this basis, a literature analysis was carried out, focusing on the definition, types and functions of the cadastre, the limitations of its two-dimensional form and the concept of a multipurpose cadastre. This culminated in the identification of the research gap and the research objective. The next step was the selection of high-rise buildings, i.e. the selection of buildings to be analysed as part of the study. These buildings were then analysed in the EGiB based on information made available by the National Geoportal and the Warsaw City mapping service. Following the analysis, the EGiB data was downloaded in shp format and then processed in ArcGIS Pro into dwg format. This enabled further preparation of files in AutoCAD for import into Autodesk Revit, which then produced two versions of the building model (a building developed based on the EGiB information alone and a building mapped in accordance with the actual geometry). The final stage of the study involved comparing the two models. The analysis focused on a visual comparison and a comparison of parameters such as the built-up area, total built-up area and building intensity.

## CASE STUDIES

At the selection stage, six high-rise buildings in Warsaw characterised by specific geometric building forms were selected for analysis, which, once analysed, will make it possible to demonstrate the lack of precision of the two-dimensional cadastre and to consider the possibilities associated with the multipurpose cadastre:

1. Rondo 1 – A high-rise building located at Rondo ONZ 1 in Warsaw, the construction of which was completed in March 2006 (Urbanity, 2021). The total area of this high-rise building is 103,000 m$^2$. It consists of two buildings – Building A, with 10 above-ground storeys and two underground storeys, and Building B, with 41 above-ground storeys and two underground storeys. The building's height to the roof is 159 m, while its structural height is 192 m. Its function is primarily focused on offices and services (Rondo 1, 2025).
2. Skysawa – A high-rise building located at Rondo ONZ (Świętokrzyska 36/34 in Warsaw), the construction of which was completed in 2022 (Skysawa, 2025). The total area of this high-rise building is 34,550 m$^2$. It consists of two buildings – Building A with 9 above-ground storeys and 3 underground storeys, and Building B with 40 above-ground storeys and 3 underground storeys. The height of the building is 155 m. Its function is primarily focused on offices and retail (Skysawa, 2025).

3. Złota 44 – A high-rise building located on Złota 44 in Warsaw, the construction of which was completed in 2013. It is the tallest residential development in the European Union – it is 192 m high (55 storeys) and has two underground storeys (Złota 44, 2025). The total area of this building is 77,071 $m^2$ (Puls Biznesu, 2022), within which there are 287 flats and 1,800 $m^2$ of amenity space for residents, such as a swimming pool, gym, and sauna (Złota 44, 2025).
4. Central Tower – A high-rise building located at Rondo Czterdziestolatka (Al. Jerozolimskie 81 in Warsaw), the construction of which was completed in 1996. The total area of this high-rise building is 20,804 $m^2$, including 14,460 $m^2$ of leasable area (Knight Frank, 2025). It consists of 26 floors above ground. The height of the building is 115 m. Its function is primarily focused on offices.
5. Forest – An office campus located at Rondo Zgrupowania Armii Krajowej "Radosław" (Burakowska 14 in Warsaw), the construction of which was completed in 2022 (HB Reavis, 2023). The complex consists of a 120 m high high-rise building (29 storeys) and adjacent buildings with six to eight storeys (Sarniewicz, 2022). In addition, there are three underground floors with 500 parking spaces for bicycles and 800 for cars (HB Reavis, 2023). The total area of the campus is 78,990 $m^2$, of which 71,000 $m^2$ is for office space and 5,000 $m^2$ for retail and service functions (Urbanity, 2025).
6. LIM Centre – A high-rise building located at Rondo Czterdziestolatka (Al. Jerozolimskie 65/79 in Warsaw), the construction of which took place in the late 1980s. (Urbanity, 2025). The total area of this high-rise building is 86,000 $m^2$. It consists of a three-storey podium and a tower with a total of 42 floors above ground. There are also two underground floors. The height of the building is 140 m. Its function focuses primarily on offices, retail, and hospitality (LIM Center, 2021).

## RESULTS

### Rondo 1

*The Land and Building Register (EGiB) analysis*

According to the Land Registry (Fig. 2), the built-up area of the Rondo 1 high-rise building is 4,700 $m^2$, and its number of above-ground floors is 10 and 40 for Building A and Building B, respectively. This high-rise building is located on two plots of land: 36/4 and 40, precinct 5-03-08. Their total area is 5,820 $m^2$.

Development area: 4,700 $m^2$

Number of storeys:
10 – building A, 40 – building B

Plot area: 5,820 $m^2$

**Fig. 2.** The Rondo 1 high-rise building in the Land and Building Register (EGiB)

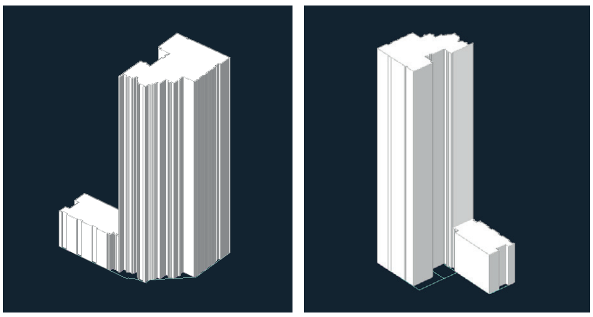
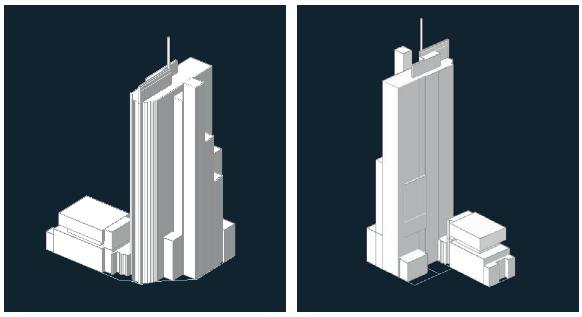
Source: Główny Urząd Geodezji i Kartografii [GUGiK] (2025).

However, there is an inconsistency in the EGiB regarding the number of storeys of Building B, as according to the information from the developer, there are 41 above-ground storeys. Information on two underground storeys is also missing.

*Comparative model*

The model of the high-rise building created based on the data in the EGiB does not reflect the true appearance of the high-rise building. The model has a very simplified geometry of the building with a shape like two cuboids joined together, and it does not consider more complex architectural elements that may affect the spatial representation (Table 1). This simplification means that the model does not fully represent the actual shape or proportions of the building (Table 2).

**Table 1.** Models of Rondo 1 made in Autodesk Revit

| The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|
|  |  |

Source: own work.

**Table 2.** Differences in the parameters of the Rondo 1 models

| Specification | The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|---|
| Building area | 4,700 $m^2$ | 4,700 $m^2$ |
| Total built-up area | 139,535 $m^2$ | 103,000 $m^2$ |
| Building intensity | 24.0 | 17.7 |

Source: own work.

Due to the same building footprint, the built-up area is the same in both cases. The difference is noticeable in the total built-up area and building intensity. The building model, according to EGiB, has overestimated the parameters by 36,535 $m^2$ and 6.3, respectively.

## Skysawa

*The Land and Building Register (EGiB) analysis*

According to the data contained in the EGiB (Fig. 3), the built-up area of the Skysawa high-rise building is 2,990 $m^2$ and its number of storeys is 38. The area of the plots on which it is located (20/1, 20/3, 20/4, precinct 5-03-06) is 5,970 $m^2$.

Built-up area: 2,990 m$^2$

Number of storeys: 38

Plot area: 5,970 m$^2$

**Fig. 3.** The Skysawa high-rise building in the Land and Building Register (EGiB)

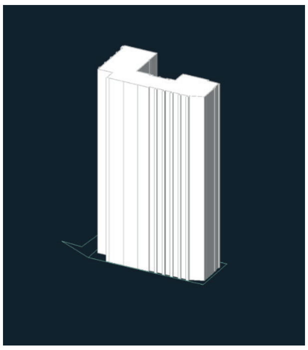
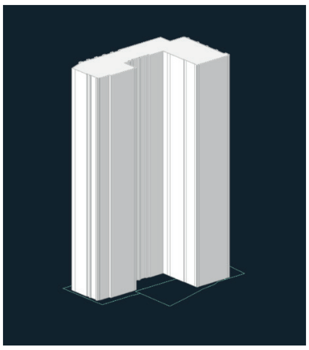
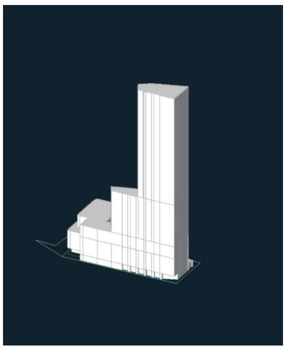
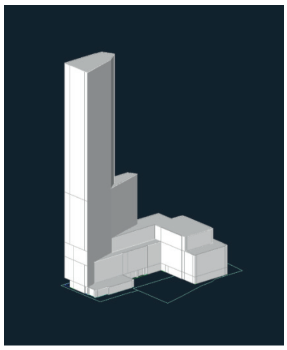
Source: GUGiK (2025).

Comparing this information to the actual state, inconsistencies in the number of storeys can be seen. The building has 40 above-ground storeys and three underground storeys, which is not reflected in the EGiB data. The register also does not consider the fact that the high-rise building consists of two buildings with a different number of storeys.

*Comparative model*

The model of the high-rise building created based on the data in the EGiB does not reflect the true appearance of the high-rise building. The model has a very simplified geometry of the building with a shape like two cuboids joined together, and it does not consider more complex architectural elements that may affect the spatial representation (Table 3). This simplification means that the model does not fully represent the actual shape or proportions of the building (Table 4).

**Table 3.** Models of Skysawa made in Autodesk Revit

| The building according to the Land and Building Register (EGiB) | | The building in reality | |
|---|---|---|---|
|  |  |  |  |

Source: own work.

**Table 4.** Differences in the parameters of the Skysawa models

| Specification | The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|---|
| Building area | 2,990 m$^2$ | 2,990 m$^2$ |
| Total built-up area | 113,620 m$^2$ | 34,550 m$^2$ |
| Building intensity | 19.0 | 5.8 |

Source: own work.

Due to the same building footprint, the built-up area is the same in both cases. The difference can be seen in the total built-up area and amounts to 79,070 m$^2$, which directly affects the difference in building intensity of 13.2.

## Złota 44

*The Land and Building Register (EGiB) analysis*

According to the EGiB (Fig. 4), the built-up area of the high-rise building is 2,048 m$^2$, and its number of storeys is 55. The area of the plot on which it is located (41, precinct 5-03-08) is 4,407 m$^2$.

Built-up area: 2,048 m$^2$

Number of storeys: 55

Plot area: 4,407 m$^2$

**Fig. 4.** The Złota 44 high-rise building in the Land and Building Register (EGiB)

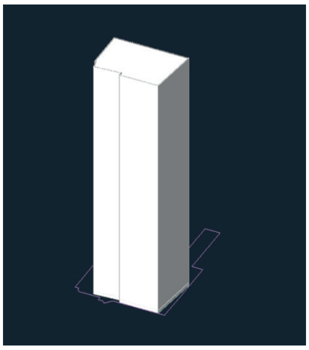
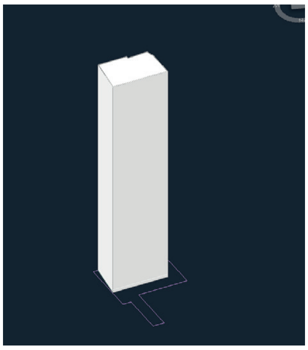
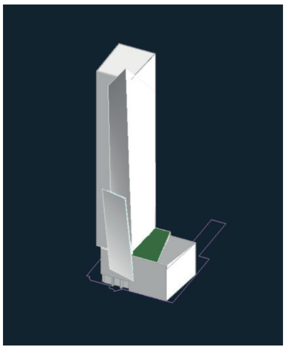
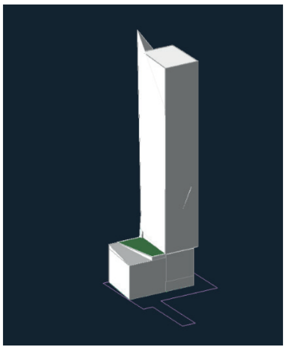
Source: GUGiK (2025).

In the case of Złota 44, the number of above-ground storeys is the same in the records. The number of underground storeys in the inventory is not included, thus there is an anomaly when compared to the actual building (Table 5). The records also do not consider the fact that only part of the building is elevated at 55 storeys.

*Comparative model*

The model of the high-rise building created based on data in the EGiB shows the building as a simple block. It does not consider the elements of architecture, which, thanks to technological progress, is able to take increasingly complex forms. In this case, the height part of the building first decreases in circumference and then increases to the highest point of the building. In the records, such structural changes are not recorded. At a height of approximately 30 m, the high-rise building has an overhang that extends the massing beyond the building's perimeter (Fig. 5), which may affect the lighting of the space below.

**Table 5.** Models of Złota 44 made in Autodesk Revit

| The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|
|   |   |

Source: own work.


**Fig. 5.** Representation of the building overhang extending beyond the outline of the building at ground level

Source: Google Streetview.

It can also cause spatial or ownership conflicts if the projecting section extends beyond the plot boundary. Due to the same building footprint, the built-up area is the same in both cases. The difference can be seen in the total built-up area, which amounts to 35,569 m$^2$. This results in a significant increase in building intensity for the model developed according to the EGiB (Table 6).

**Table 6.** Differences in the parameters of the Złota 44 models

| Specification | The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|---|
| Building area | 2,048 m$^2$ | 2,048 m$^2$ |
| Total built-up area | 112,640 m$^2$ | 77,071 m$^2$ |
| Building intensity | 25.6 | 17.5 |

Source: own work.

## Central Tower

*The Land and Building Register (EGiB) analysis*

According to the EGiB (Fig. 6), the built-up area of the Central Tower high-rise building is 645 m$^2$, and its number of storeys is 26. This high-rise building is located on plot 36, precinct 2-01-02, with an area of 807 m$^2$. The ground outline of the building also extends minimally into plot 40/2 in the same area to the north. The number of storeys provided by the developer agrees with the number of storeys in the EGiB. An understatement in the EGiB is the outline of the high-rise building due to the height at which the survey measurements for the EGiB are carried out. At a height of about 5 m, an overhang appears, and this outline changes. The outline of the high-rise building at ground level is shown in red, while the outline of the high-rise building at a height of approximately 5 m is shown in blue in Figure 7.


Built-up area: 645 m$^2$

Number of storeys: 26

Plot area: 807 m$^2$

**Fig. 6.** The Central Tower high-rise building in the Land and Building Register (EGiB)

Source: GUGiK (2025).

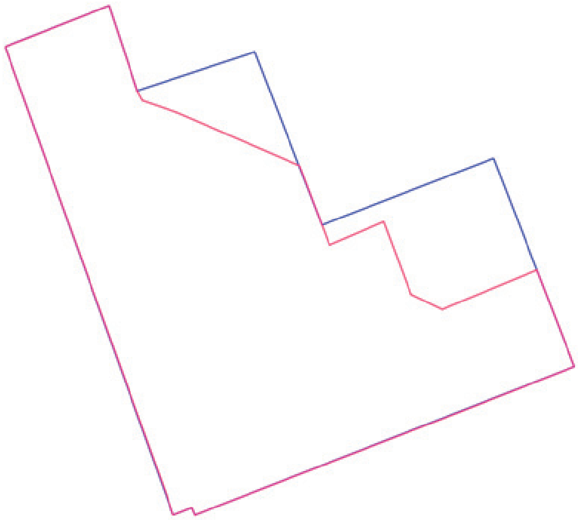


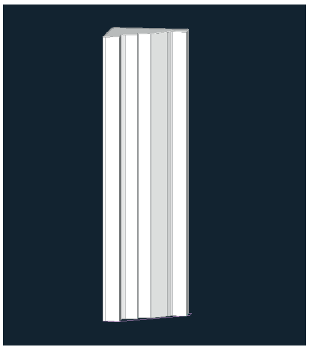
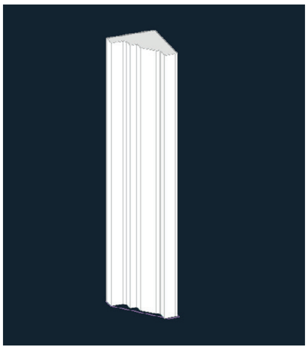
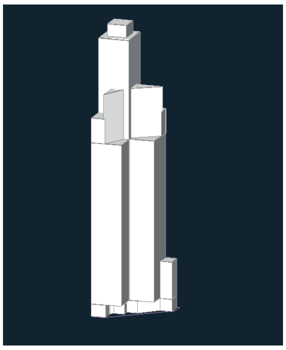
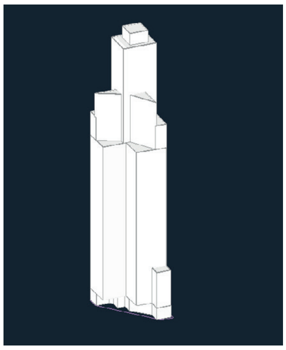
**Fig. 7.** A comparison of the high-rise building's outline at ground level and the outline at a height of about 5 m

Source: own work based on a building outline from the Land and Building Register (EGiB) and a digital surface model (GUGiK, 2025).

*Comparative model*

The high-rise building model created based on the EGiB has a very simplified geometry and differs significantly from the actual form (Table 7). The biggest difference that can be noticed first is that there are walls that extend beyond the outline of the high-rise building in the EGiB. In addition, the model created based on the EGiB lacks characteristic features, as the model of the high-rise building reproducing the actual shape of the building contains additional massing and features that faithfully reproduce the characteristic architectural features of the building, including irregularities in the shape of the façade and level differences on the roof (Table 8).

**Table 7.** Models of Central Tower made in Autodesk Revit

| The building according to the Land and Building Register (EGiB) | | The building in reality | |
|---|---|---|---|
|  |  |  |  |

Source: own work.

**Table 8.** Differences in the parameters of the Central Tower models

| Specification | The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|---|
| Building area | 645 m$^2$ | 645 m$^2$ |
| Total built-up area | 16,770 m$^2$ | 20,804 m$^2$ |
| Building intensity | 20.8 | 25.8 |

Source: own work.

Due to the same building footprint, the built-up area is the same in both cases. The difference is noticeable in the total built-up area and building intensity. The ratios calculated on the basis of the EGiB are underestimated compared to the actual ratios given by the developer and are higher by 4,034 m$^2$ and 5.0, respectively.

## Forest

*The Land and Building Register (EGiB) analysis*

According to the EGiB (Fig. 8), the built-up area of the Forest complex is 8,542 m$^2$, and its number of storeys is 28. The area of the plot on which it is located (20/4, precinct 6-03-02) is 19,616 m$^2$. Comparing this information to the actual state, an anomaly in the number of storeys can be seen. In fact, the building has 29 above-ground storeys and three underground storeys, which is not reflected in the EGiB data. The register also does not consider the fact that the campus consists of a high-rise section in a small area – the rest of the development is much lower. Due to the lack of distinction in the number of storeys, the outline shown in the EGiB misleadingly resembles a multi-family residential quarter rather than an office building.

Construction area: 8,542 m$^2$

Number of storeys: 28

Plot area: 19,616 m$^2$

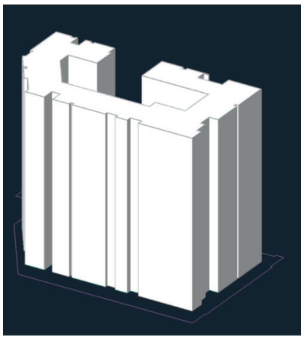
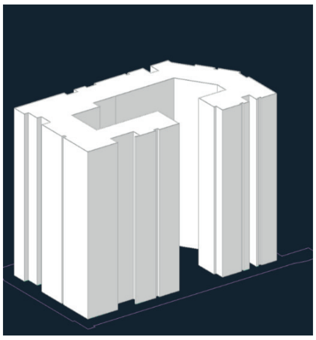
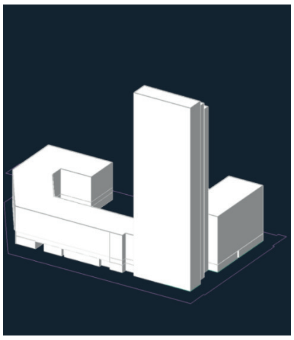
**Fig. 8.** The Forest high-rise building in the Land and Building Register (EGiB)

Source: GUGiK (2025).

*Comparative model*

The high-rise building model created based on the data in the EGiB shows the building as a uniform block (Table 9). It does not consider the architecturally complex massing, which is divided into sections with different height and width segments. The concave elements of the building – such as the entrances to the building or the entrances to the underground garage noticeable at ground level – cause the building on the upper floors to adopt the same cut-outs. The EGiB, due to the two-dimensionality of the stored data, does not assume changes in volume with increasing height. This results in a significant difference between the model created from the records and the actual building.

**Table 9.** Models of Forest made in Autodesk Revit

| The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|
|   |   |

Source: own work.

Both the model and the actual building have the same outline at ground level, so the built-up area is the same in both cases. The differences are visible in the total built-up area and amount to 160,186 m$^2$, which directly results in a much higher built-up intensity in the case of the model created from the records (Table 10).

**Table 10.** Differences in the parameters of the Forest models

| Specification | The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|---|
| Building area | 8,542 m$^2$ | 8,542 m$^2$ |
| Total built-up area | 239,176 m$^2$ | 78,990 m$^2$ |
| Building intensity | 12.2 | 4.0 |

Source: own work.

## LIM Centre

*The Land and Building Register (EGiB) analysis*

According to the data in the Land Registry (Fig. 9), the built-up area of the LIM Centre high-rise building is 7,327 m$^2$ and its number of storeys is 43. The area of the plot on which it is located (3, precinct 5-05-01) is 13,384 m$^2$.

Built-up area: 7,327 m$^2$

Number of storeys: 43

Plot area: 13,384 m$^2$

**Fig. 9.** The LIM Centre high-rise building in the Land and Building Register (EGiB)

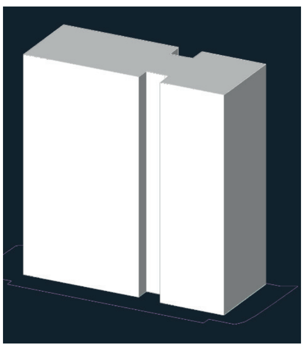
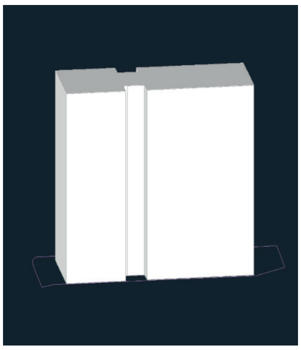
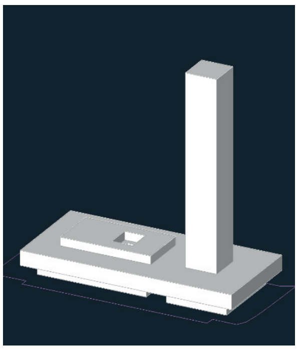
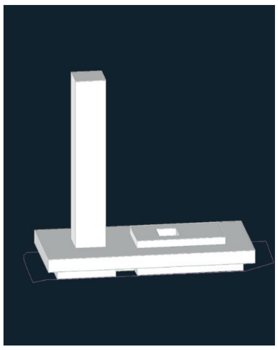
Source: GUGiK (2025).

When comparing this information to the actual state, inconsistencies in the number of storeys can be seen. In fact, the building has 42 above-ground storeys and two underground storeys, which is not reflected in the EGiB data. In addition, the number of above-ground storeys in the register is inconsistent with reality. The register also does not consider the fact that the high-rise building consists of a podium and a tower, which have a different number of storeys.

*Comparative model*

The model of the high-rise building created based on the data in the EGiB is much simplified and shows the building as a compact, uniform block with simple shapes (Table 11). It does not consider the more complex architecture of the actual building, which consists of a tall, slender tower set on an extended base with a much larger footprint. The model, according to the EGiB, omits important structural details such as the variety of massing within the base of the building and internal openings visible in the actual structure. The simplified form of the model does not fully reflect the proportions and distinctive segmentation that are central to the actual architecture of the building (Table 12).

**Table 11.** Models of the LIM Centre made in Autodesk Revit

| The building according to the Land and Building Register (EGiB) | | The building in reality | |
|---|---|---|---|
|  |  |  |  |

Source: own work.

**Table 12.** Differences in the parameters of the LIM Centre models

| Specification | The building according to the Land and Building Register (EGiB) | The building in reality |
|---|---|---|
| Building area | 7,327 m$^2$ | 7,327 m$^2$ |
| Total built-up area | 315,061 m$^2$ | 86,000 m$^2$ |
| Building intensity | 23.5 | 6.4 |

Source: own work.

Due to the same building footprint, the built-up area is the same in both cases. The difference can be seen in the total built-up area and amounts to 229,061 m$^2$, which directly affects the difference in building intensity of 17.1.

It should be noted that this approach can be used for secondary research, although the complexity of the building shape must be analysed individually in each case.

## CONCLUSIONS

The analysis points out the inadequacies of the two-dimensional cadastre currently in use and highlights the opportunities presented by a multipurpose cadastre. The use of three-dimensional modelling in combination with the usual data available in the two-dimensional cadastre is insufficient and is responsible for the unrealistic results of urban indicators. Often, it is impossible to obtain the actual parameters needed to calculate these indicators in a given building, so they are calculated on the basis of the data available through the two-dimensional cadastre and turn out to be inconsistent with the actual state of affairs. Building structures are constructed in accordance with the design and are approved for use on the basis of appropriate control measurements (as-built survey). This raises the question of whether it is possible to use the actual three-dimensional model created as a result of measurements – e.g., laser scanning (photogrammetry) or BIM – or whether we should rather use design and construction data to build the model. In this context, should the results of actual field measurements or data from construction documentation be taken into account for the settlement of areas and their comparison with the cadastre? In the case of digital twins, it should be assumed that they will reflect the actual state very reliably; hence, geometrically and semantically correct BIM models could be used for fiscal purposes.

Therefore, the introduction of a multipurpose cadastre will avoid such inconsistencies. Another argument in favour of the introduction of a multipurpose cadastre, especially in cooperation with BIM, is the possibility of performing more accurate analyses of buildings, e.g. only a selected part of a building with a specific height, which is currently impossible due to the lack of such detailing in the two-dimensional cadastre. The introduction of a multidimensional and multipurpose cadastre in Poland would bring many benefits. The possibilities of integrating the cadastre with other technologies, such as BIM, for example, provide an opportunity to create a tool to support the effective management of urban space and development processes. However, the replacement of the two-dimensional cadastre with a multipurpose cadastre is associated with several challenges, including legal challenges, due to the need to refine the legal provisions through which the multipurpose cadastre could become the norm in the Polish cadastral system.

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## Authors' contributions

Conceptualisation: A.S.B., A.D., P.G. and M.G.; methodology: A.S.B., A.D., P.G. and M.G.; validation: A.S.B.; formal analysis: A.S.B., A.D., P.G. and M.G.; resources: A.D., P.G. and M.G.; data curation: A.D., P.G. and M.G.; writing – original draft preparation: A.S.B., A.D., P.G. and M.G.; writing review and editing: A.S.B., A.D., P.G. and M.G.; visualisation: A.D., P.G. and M.G.; supervision: A.S.B.; funding acquisition: A.S.B.

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## ANALIZA PORÓWNAWCZA MODELI BUDYNKÓW WYSOKOŚCIOWYCH JAKO ŹRÓDŁA DANYCH DLA KATASTRU WIELOWYMIAROWEGO

### STRESZCZENIE

W artykule przedstawiono problem związany z ograniczeniami obecnej formy katastru stosowanej w Polsce – katastru dwuwymiarowego, która często nie jest wystarczająca w obliczu rozwoju technologicznego. Problem ten został przedstawiony za pomocą analizy porównawczej sześciu wybranych warszawskich budynków wysokościowych, które cechują się złożoną geometrią bryły: Rondo 1, Skysawa, Złota 44, Central Tower, Forest oraz Centrum LIM. We wprowadzeniu został poruszony temat ograniczeń katastru dwuwymiarowego, a także szans, jakie ze sobą niesie kataster wielozadaniowy, który dzięki integracji z systemami GIS i technologią BIM może być rewolucją w polskim systemie katastralnym. W części analitycznej, za pomocą danych dostępnych w Ewidencji gruntów i budynków (EGiB) oraz dostępnych danych o rzeczywistej bryle, w programie Revit stworzono po dwa modele każdego analizowanego wieżowca, aby bliżej zaprezentować niedokładności katastru dwuwymiarowego. Wyliczone według EGiB wskaźniki urbanistyczne zostały porównane również ze wskaźnikami rzeczywistymi, co potwierdziło, że kataster w obecnej formie jest niewystarczający do rzetelnego zobrazowania rzeczywistości.

**Słowa kluczowe:** kataster wielowymiarowy, wieżowiec, BIM