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**THE LEVEL OF IMPLEMENTATION  
OF THE INFORMATIONAL FUNCTION  
OF SPATIAL PLANNING DOCUMENTS USING GIS.  
THE POLISH EXAMPLE**

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**Summary:** Geographical information systems (GIS) are nowadays one of the most dynamically developing disciplines of deployment of information in public administration. A GIS connection with data on local land use plans and on the study of land use conditions and directions allows to share information about the commune's spatial planning policy. The consequence of this assumption is the use of a commune's geoportals for implementing the information functions of documents on spatial planning. This paper presents the analysis of four geoportals with data containing information about spatial planning. The paper also allows to identify best practices in the solutions proposed in selected geoportals, with particular emphasis on the ease of use and speed of data acquisition.

**Keywords:** spatial planning, informational function, geographical information system, geoportal.

## **1. Introduction**

In the age of information society, the computer is becoming an increasingly common tool of work and a tool supporting the processes of managing a territorial unit. The territory is the area that combines the commune's management spheres, such as: environment, culture, society and economy. The space, as a limited good, makes its users care about the ways of using it. The local community must have information about the territory of the communes and the possibilities of land development. This information is located in spatial planning documents. The spatial planning documents become elements of supporting the information and promotion processes in the local units. Geographical information systems (GIS) are becoming a tool for the dissemination of information and for the publication of spatial planning documents. The main role of these systems is related to the implementation of the provisions of the INSPIRE Directive [Directive 2007/2/EC] and to the increasing role of the development of the information society in Poland.

This article presents the problem of using geoinformation in spatial planning. The main purpose of the article was to identify best practices in the area of land use information system in spatial planning. The main part of the analysis was focused on defining the scope of the spatial planning information and ways of sharing it in selected cities. A research questionnaire was allowed for the assessment of geoportals of each city.

## 2. Spatial planning system in communes in Poland

The system of spatial planning in Poland has been adjusted to the conditions of the market-driven economy since 1995. The Spatial Development Act<sup>1</sup> that was passed on 7 July 1994, was a response to the needs of adjusting the spatial planning system to market conditions. The changes in the spatial planning system were upheld by the Spatial Planning and Land Development Act<sup>2</sup> dated 27 March 2003, which came into force on 11 July 2003. The act allowed to organize the existing provisions relating to spatial planning. This was possible thanks to the unification of the procedure of preparing the study of land use conditions and directions and the local land use plan.

The Act of 2003 maintained a three-level competence for spatial planning in Poland, which omitted the level of a district. The provisions of the new Act are also formulated in a similar way in the scope of spatial planning in the commune. The study of land use conditions and directions is the obligatory document in the spatial planning system in the commune (*gmina* in Polish). Local land use plans have the *nature of a* local law. These documents have the greatest influence on the shape of space in the commune and on the implementation of the objectives of spatial order. The planning permission is a document which complements the system of spatial planning documents in the commune. The planning permission allows for investment within the area in cases of lack of local land use plans.

The documents that determine the use of space in communes have specific functions. It can be concluded that the study of land use conditions and directions and the local land use plans have the same functions. The local land use plans have, however, a greater impact due to the fact that this plan is an act of local law. The study of land use conditions and directions is only the act of internal management in the commune. In the literature the following functions of these documents appear [more in: Wojtasiewicz 1991; Markowski 1999; Potoczek 2003; Budner 2004]:

- regulatory function;
- coordination function;
- stabilization function;

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<sup>1</sup> The Spatial Development Act dated 7 July 1994, JL. 1994 No 89 pos. 415, with subsequent amendments.

<sup>2</sup> The Spatial Planning and Land Development Act dated 27 March 2003, JL. 2003 No 80 pos. 717, with subsequent amendments.

- creation function;
- activation function;
- promotional function;
- informational function.

In the case of regulatory function, the above mentioned documents have the aim of enforcing a specific behaviour of local actors in the space of the commune. This function is important in the case of the study of land use conditions and directions, as well as of the local land use plan. In the case of local land use plans, the impact of this function on the local actors is stronger, because these documents are the local law. The coordination function of the study of land use conditions and directions, and of the local land use plans, has its basis in the theory, because the territory is an element connecting the other areas of local government functioning which are the following spheres: social, economic, environmental and cultural.

The stabilization function is connected with determining the directions and priorities of the local spatial planning policy. This function is also connected with the fact that many communes do not introduce frequent changes when it comes to local spatial planning policy. This results from the assumption that spatial planning is a long-term policy. The stabilization function follows from the high costs of the procedure of changing the local law. The next reason is local government, which does not have the full knowledge about the ways and possibilities of managing territorial units with the use of spatial planning tools.

The creation and activation functions are mutually related. The creation function is associated with the creative process during drawing up the study of land use conditions and directions, and the local land use plans. The local community can take part in these processes, because people can submit comments and motions to the new documents. This is possible thanks to the right of public participation. The local community can take an active part in these actions and can shape the provisions of the spatial planning policy. The realization of these functions is facilitated in the age of information society thanks to the use of the geographical information systems by the visualization of different variants of local land use plans. These systems allow to participate actively in the process of preparing planning documents [Feltynowski 2009, p. 79].

The informational function is important when it comes to using geographical information systems in the commune. This function turns out to be important at the stage of preparing the project of the study of land use conditions and directions and of the local land use plan. The use of geographical information system in the planning process allows for reaching a wider audience. The same situation takes place when the study of land use conditions and directions and the local land use plans shall be open to the public. This function allows for consultation of planning documents and maintaining a lower level of social conflicts arising from the provision of these documents. The informational function becomes important during the public discussion about the project of the study of land use conditions and directions, and

of the local land use plans. Providing information about the spatial planning policy documents in the commune is the other way of realizing the informational function of spatial planning documents. It takes place after the passing of these documents by the commune's council and their publication in the voivodeship journal *of laws*. It is necessary to publish these documents in many sources to reach the widest audience.

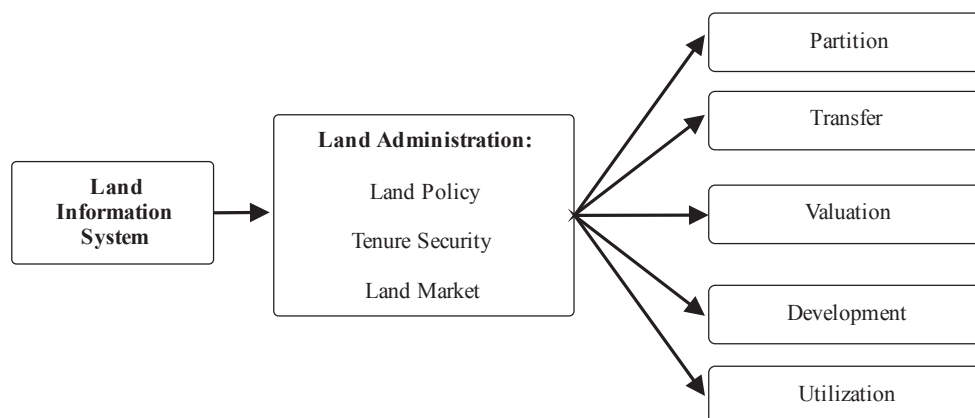
The promotional function is also an important part of the spatial planning documents. The importance of this feature results from the possibility to present the directions of the spatial development of the commune. Additionally, geoportals present data about the commune and the visualization of the study of land use conditions and directions, and of the local land use plans. It is a natural way of presenting data in the age of the Internet.

### 3. GIS and land management at local level

Geographical information systems are one of the fastest growing areas in the field of information systems. These systems use hardware, specialized software, spatially referenced data, human resources and tasks, which are the basis of their functioning in the communes. An important element of using a geographical information system is the ability to visualize spatially referenced data on maps. This becomes the basis for the realization of the informational and promotional function of spatial planning documents. Land information systems (LIS) are the best way of realizing the tasks and objectives of local government. The International Federation of Surveyors (FIG) defined it as a tool for taking legal, administrative and economic decisions and an aid for planning and development. The system consists of a database created for the specific area and the methods and techniques for the systematic collection, updating and sharing of data. The land information system has a uniform method of identification of the communes' area. The system is used for creating the relation between data of the system and different land information systems [United Nations 2005, pp. 71–72].

The public administration uses a great amount of spatially referenced data. This is the main reason for creating and using the land information systems in local and regional administration. In the case of employees of *the commune's office* it should be noted that each of their decisions is associated with the commune's territory [Białousz 2007, p. 10].

The offices of the communes can use the land information system in the following areas: economic, social, cultural, environmental and spatial, because the administrative officials are the group of workers closest to the local community and possibly know in the best way the needs of local communities. Land information systems allow for supporting the office in the area of spatial planning policy in the scope of allocation, transfer, evaluation, development and usage of the commune's area. These systems support the real estate market, consolidation and division of plots of land or property tax system [Tuladhar 2004, p. 34].



**Figure 1.** Land information system and administration

Source: [Tuladhar 2004, p. 34].

The use of a land information system is visible in the Internet, where more and more communes will publish spatially referenced data on geoportals. This thesis is also supported by the research in the field of geographical information systems used by communes [more in: Adamczyk 2007; Gajos 2010]. It also shows that LIS is a tool which can be used as an element supporting a decision-making process. LIS has a particular significance in planning processes and in the distribution of information about spatial planning policy.

#### **4. The use of LIS for realizing the informational functions in spatial planning**

The functioning of geoportals in Gdańsk, Łódź, Poznań and Wrocław was analyzed in this research. The questionnaire for the research was prepared, which allowed for the assessment of geoportals of each city (see Table 1). The portals could receive a maximum of five points for each question in the questionnaire. Only in the case of the fifth question was the maximum number of points two. The assessment method was a consequence of the first question, in which the number of points was dependent on the position of the geoportal in the Google search engine. The city received a number of points inversely proportional to the occupied place. Only the first five website positions could receive points. The number of points for question five results from the informational value of the raster images. Raster images only allow for visual analysis, without the possibility of obtaining an additional spatially referenced information. The maximum result possible to reach was 82 points for each geoportal.

**Table 1.** Criteria for evaluation of websites with spatial planning information

Question no.	Criterion
1	LIS website in the Google search engine
2	Website errors analyzed using W3C validator application
3	Site loading speed analyzed using NetMechanic
4	Information about the study of land use conditions and directions as a vector layer
5	Information about the study of land use conditions and directions as a raster layer
6	Information about the local land use plans as a vector layer
7	Layer of existing local land use plans as a vector layer
8	Layer of drawing up local land use plans as a vector layer
9	The identification numbers of local land use plans
10	Name of the area for which the local land use plan was made
11	Resolution number
12	The date of passing / publication of the resolution
13	Area of local land use plan
14	Link to the text of local land use plan
15	Link to the graphic of local land use plan
16	No additional window to navigate the local land use plan information
17	The ability to seamlessly switch between elements of geoportal

Source: own elaboration.

The analysis allowed to determine the level of “informativeness” of LIS websites related to the spatial planning data. Only in the case of the land information system of Gdańsk, was there a full functionality of the portal due to the ability to switch between the other maps available in the system. These functions allowed for the implementation of promotional and informational functions in other areas than spatial planning. The portals of other cities were located on separate subsites, which could make it difficult to use the land information systems of Łódź, Poznań and Wrocław.

A comprehensive assessment of the websites related to the spatial planning data showed that the informational function was best *implemented* in the case of the Gdańsk geoportal. This geoportal received 60 points (73.2% of maximum result). The geoportal of Łódź got second place in the research with 56 points (68.3% of maximum result). Poznań was third in the ranking with 47 points (57.3% of maximum result). Last place in the ranking was Wrocław with 35 points (42.7%). The portals in the first two places in ranking will need to improve the technical issues related to improving the speed of loading of websites and correcting the mistakes in the code of the websites (see Table 2).

The analysis showed that the geoportals of Gdańsk and Łódź are a rich source of information about local law. Besides the visualization, these portals are complete products that will combine data from different databases. This advantage is evident in the case of the possibility of linking and reading the contents of the resolution and the graphical annex of local land use plans. This kind of comprehensive information

provided through the geoportal allows the local community to learn about the records of the local land use plans using only one tool - the land information system.

The lower number of points were obtained by Poznań and Wrocław. This follows from the fact that the geoportals of these cities did not fully combine the functionality presented in the case of Gdańsk and Łódź. In the case of Poznań, there is no information about the identification numbers of local land use plans. The technical side of the geoportal in Poznań does not allow to obtain more information about the local land use plans presented on the website. The users of the website have the opportunity to view basic information about the local land use plans, but they are not able to read their text or see the graphical annex. This forces the use of other methods of finding the text or graphic of the local land use plan. In the case of Wrocław the database is not directly connected with a vector layer of the local land use plans. The users of the geoportal have the opportunity to find the localization of local land use plan and its identification number. Other information about the local land use plan is available by using the second window, where the remaining information about local land use plans, e.g. name of the area for which the local land use plan was made, resolution number and the date of passing of resolution or a link to the text of the resolution are located.

**Table 2.** Evaluation of geoportals in selected cities

Question no.	Geoportal of:			
	Gdańsk	Łódź	Poznań	Wrocław
1	5	4	5	5
2	0	0	5	5
3	0	0	5	5
4	0	0	0	0
5	0	2	2	0
6	5	5	5	5
7	5	5	5	5
8	5	5	5	5
9	5	5	0	5
10	0	5	5	0
11	5	5	5	0
12	5	5	5	0
13	5	0	0	0
14	5	5	0	0
15	5	5	0	0
16	5	5	0	0
17	5	0	0	0
Total	60	56	47	35
Percentage of a maximum result	73.2	68.3	57.3	42.7

Source: own elaboration.

It should be noted that all the geoportals, despite some disadvantages that arise during their usage, are best practices in the realization of the informational function of the local land use plans. The geoportals do not have such sophisticated features in the case of the study of land use conditions and directions. The geoportals present only raster images of the study of conditions and directions.

## 5. Conclusion

The analysis carried out in the research showed that geoportals thematically related to spatial planning, are becoming the source of information about the local government initiatives related to the local land use plans. It should be noted that the analyzed geoportals have not developed the informational function for the study of land use conditions and directions. The level of informational function in the case of local land use plans is differentiated. It should be emphasized that the best geoportal in the research can be best practice. The portal of Łódź can also be regarded as the best practice in Poland. The land information systems are the tools which connect different sources of data and present them in a comprehensive product combining multiple functions. Research shows that some elements of geoportals have to be developed and some of these elements have to be worked out technically.

The development of land information systems technology allows for more and better presentation and dissemination of spatially referenced data and information. In this way people can generate knowledge about local units and local government. Databases formed on these processes allow for conducting analyses also without the LIS tools. In this way they become useful in the office work for people not using land information systems in their daily work. These results of research can be generalized to build efficient and informative geoportals in land management in all Polish communes.

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## **POZIOM REALIZACJI FUNKCJI INFORMACYJNEJ DOKUMENTÓW Z ZAKRESU PLANOWANIA PRZESTRZENNEGO PRZY UŻYCIU SYSTEMÓW INFORMACJI PRZESTRZENNEJ. STUDIUM PRZYPADKU POLSKI**

**Streszczenie:** Systemy informacji przestrzennej (SIP) są obecnie jedną z najbardziej dynamicznie rozwijających się dyscyplin w zakresie wykorzystania w administracji publicznej. Połączenie SIP z danymi na temat planów zagospodarowania przestrzennego oraz studiów uwarunkowań i kierunków zagospodarowania przestrzennego otwiera możliwości udostępniania informacji na temat prowadzonej w gminie polityki przestrzennej. Konsekwencją takiego założenia staje się wykorzystanie geoportali gminnych do celów realizacji funkcji informacyjnej dokumentów z zakresu planowania przestrzennego. Artykuł prezentuje analizę czterech geoportali z danymi dotyczącymi planowania przestrzennego. Pozwala również na wskazanie dobrych praktyk w zakresie proponowanych rozwiązań w wybranych geoportalach, ze szczególnym uwzględnieniem łatwości ich obsługi oraz szybkości pozyskania danych.

**Słowa kluczowe:** planowanie przestrzenne, funkcja informacyjna, system informacji przestrzennej, geoportal.