

# THE USE OF GEOGRAPHICAL INFORMATION SYSTEMS IN THE URBAN COMMUNES OF ŁÓDŹ METROPOLITAN AREA

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## **Abstract**

The article presents the results of pilot studies carried out in the cities of Łódź Metropolitan Area. The study concerned the use of geographical information system by the employees of offices of these cities. The interest in the subject of GIS in Polish urban communes results from the assumptions of the EU INSPIRE Directive and the necessity of its implementation in the basic units of territorial division of Poland. The aim of the research was the analysis of the impact of GIS on the sphere of the public participation in the process of local management and the possible use of GIS in the decision making in communes. Research showed what kind of software was used in analyzed communes.

**Keywords:** geographical information system, Łódź Metropolitan Area, local government, INSPIRE

## **1. INTRODUCTION**

The process of managing territorial unit after Polish accession to the European Union had to be reorganize. It created for Polish local governments the possibility of using European Union funds, also reflected in the duties resulting from EU regulations. These duties are also associated with the management of territorial units, with the use of innovative tools in public administration such as geographical information systems (GIS). This follows from the assumption that the basis of functioning of "Border-free Europe" is not only the use of GIS in the management of territorial units, but also the creation of a Spatial Data Infrastructure (SDI) for the presentation of data in a standardized way (Masser, 2007, p. 13). The basis for these activities within the EU is the INSPIRE Directive.

The approach presented in this directive is to allow for the use of geographical information systems in the member states of EU and for the popularization of GIS in the relations self-government office - the local community, becoming a way for building the information society. The essential element in the pursuit of the use of geographical information systems are possibilities of using the spatial data resource and its availability. These data constitute over 80% of the entire data exploited in the everyday

work in self-government units (Albaredes, 1992, p. 830 - 837; Olenderek, Nowicki, Korpetta, Czajka, Karaszkiwicz, 2004). The geographical information systems are, thanks to that, the element that supports the administrative decision making process and the realization of the local development policy in territorial units.

Geographical information systems as the interdisciplinary tool can be used in many spheres of the activity of the local self-government. They become a basis of the decision making process in the field of: land use planning, real estate, geodesy, environmental protection, culture and the crisis management. The use of geographical information systems in these areas allows for raising the quality of services supplied by self-government offices. The practical applications of using GIS arise from the opportunities of gathering spatial information in the databases. Collecting a bigger amount of spatial data has a stimulating effect on a number and a quality of carried-out spatial analyses and simulations as well as of administrative decisions.

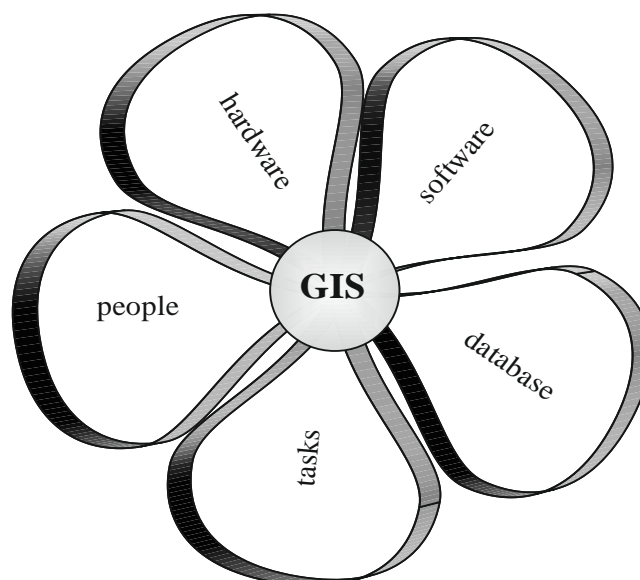


FIGURE 1 COMPONENTS OF THE GEOGRAPHICAL INFORMATION SYSTEMS.  
Source: own work based on the definition of GIS.

Undoubtedly important in the Polish local development conditions is the need to convince self-government clerks about the legitimacy of using geoinformation and GIS tools in the daily work. More and more Polish communes have geoportals, which present data from many areas of the commune's functioning. In these units it will be possible to implement the GIS tools through the investment related to individual components of these systems, such as: hardware, GIS software, building a digitized database of territorial units, development of human capital and determining new tasks in using spatial information.

## 2. MATERIALS AND METHODS

For the purpose of the article the research was carried out in urban communes of the Łódź Metropolitan Area (LMA) in which the population did not exceed one hundred thousand people. Łódź Metropolitan Area was designated in the voivodeship land use plan. It consists of the city of Łódź and four poviats: Łódzki Wschodni, Brzeziński, Pabianicki and Zgierski. Six urban communes which fulfill preliminary assumptions are located in this area (Figure 2). The research was carried out in Zgierz, Pabianice, Brzeziny, Konstantynów Łódzki, Ozorków and Głowno. The research was carried out at self-government offices of these cities with the use of questionnaire that concerned the use of GIS technology and the improvement of the work efficiency resulting from the use of this innovative tool.

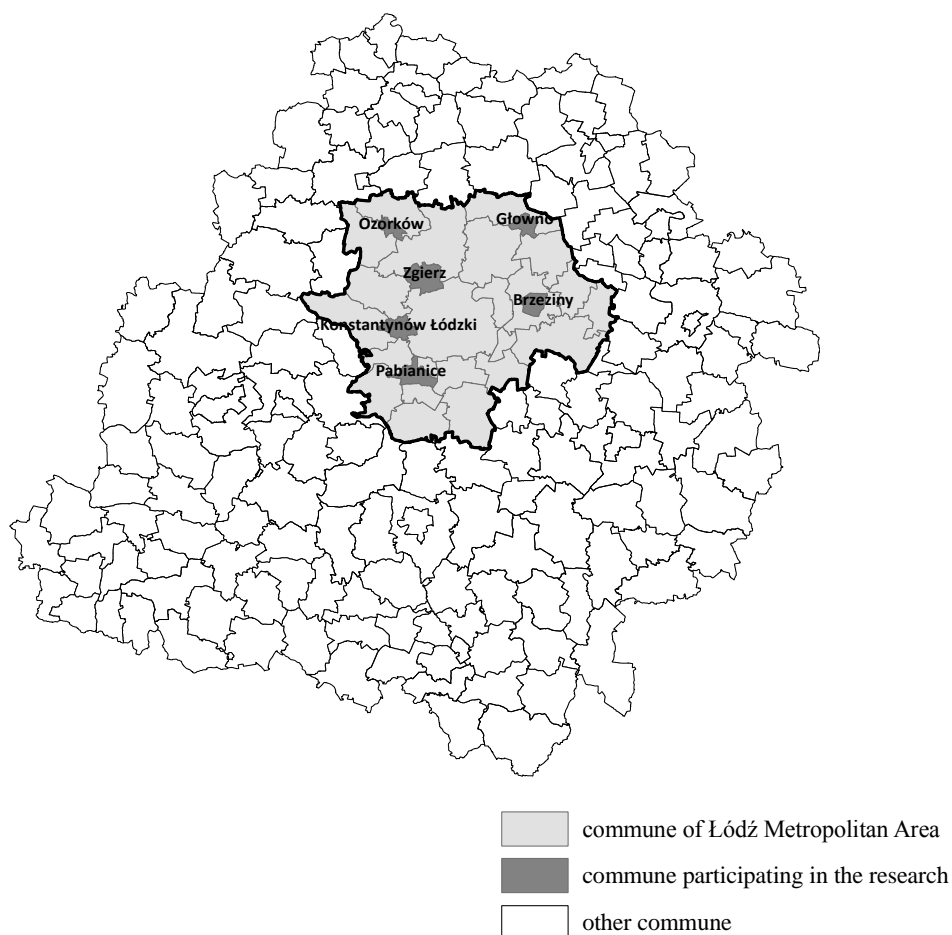


FIGURE 2 - COMMUNES PARTICIPATING IN THE RESEARCH.

Source: own work.

The questionnaire was directed at self-government clerks working at departments dealing with: the land use planning, the real estate management, the environment, the crisis management, the infrastructure

and the promotion of the commune. The responses provided by the employees of the offices of the cities allowed for the verification of the knowledge about the GIS technology and for defining the anticipated changes in the quality of the office work resulting from the use of GIS technology.

The analysis of the material gathered during direct interviews with clerks, enabled the assessment of the knowledge of GIS technology in the offices of the cities of the Łódź Metropolitan Area. This also creates possibilities of indicating changes in the offices that are necessary in order to implement the decisions associated with the INSPIRE Directive.

A key issue for the purposes of this article was the question about the possible changes in the quality of the office work connected with the use of GIS. The respondents could choose five of ten responses proposed in the questionnaire form. Among the possible responses were the following:

- possibility of the elimination of the information duplication;
- possibility of the improvement of the work efficiency;
- possibility of the improvement of the speed of making administrative decisions;
- possibility of data presentations given to applicants of the self-government office;
- possibility of facilitating the cooperation with other departments or self-government units;
- possibility of facilitating the planning and monitoring of the activities of the commune;
- possibility of public participation in making decisions in the commune;
- possibility of the support for economic planning;
- opportunity to improve the system of charging local taxes and fees;
- opportunity to improve the spatial planning and strategic planning.

The clerks had the opportunity to add other elements connected with the improvement of the quality of the office work that were not included on the attached list.

### 3. RESULTS AND DISCUSSION

The survey was attended by 43 clerks. Among them, 53.5% were women. About 37% of the respondents worked in management positions in departments of the self-government office. Others worked as inspectors, deputy inspectors and primary staff at the office. The average work experience of the clerks participating in the research was 12 years. It should be emphasized that the shortest working

person in the office worked there for 3 months, while a clerk with the longest seniority worked for 36 years.

The most important element of the research was to verify the number of clerks using the GIS technology in their daily work. The qualitative considerations about the scope of activities with the use of GIS and the manner of using it were not conducted in the research. Nearly 70% of participants of the research indicated that they used geographical information systems in their work. Other persons participating in the research despite having knowledge on the GIS technology did not use it at work.

The analysis of the research results about the use of geographical information systems and the position held at the self-government office, shows that persons working in management positions in 75% of cases used GIS software. In case of lower-level staff only 67% of clerks declared that they used GIS in their work. This indicates that in self-government units which took part in the research in more cases the executives used the GIS tool. This situation allows for a positive look at the future of GIS technology in territorial units in which the executives become more aware of the functionality of such solutions. This may allow for easier implementation of GIS in the departments managed by these persons.

The research was also to provide answers for the question about the kind of software that was used in the public utility sector. The respondents could choose from programs such as: ArcGIS, Autodesk, Bentley, Geobid, Intergraph, MapInfo. The majority of users indicated Geobid software as the basic software used in self-government units participating in the research. Only two clerks used Mapinfo company software.

The study allowed for the identification how long clerks used the GIS software in local government units. Among those who used GIS software in the workplace the largest group of clerks were people using GIS for 10 years and more. These people accounted for nearly 38% of the respondents. The next most numerous group were people with experience in using the GIS software from 1 to 5 years. These respondents accounted for 27.6% of the examined population. Over 20% of people indicated that they used geographical information systems from 5 to 10 years. The smallest group in the research were respondents with the least experience (less than one year) in the use of GIS. The average period of using GIS by clerks participating in the study amounted to slightly more than 7 years.

The research among the representatives of the staff working in the urban communes enabled the assessment of the areas in which clerks notice the possibility of improving the quality of work with the use of GIS. The largest number of responses (65.1%) indicated that the use of geographical information systems will improve the efficiency of their work. Amongst persons using GIS at their daily work this

answer was chosen by 80% of respondents. It should be pointed that people who did not use GIS at their work chose this answer in slightly more than 30% cases.

An important issue was also the possibility of cooperation between departments of the office and the data exchange with units cooperating with local government. This advantage was indicated by 62.8% of respondents. In case of persons using GIS this feature was indicated by 70% of respondents, however amongst people who did not use GIS at their work that element appeared in 46% of cases. It should be pointed that due to the information society development and the need for exchange of information between the various elements of the "organism" which the commune is, the rapid flow of information and the possible participation of more clerks in the management process allows for making better decisions.

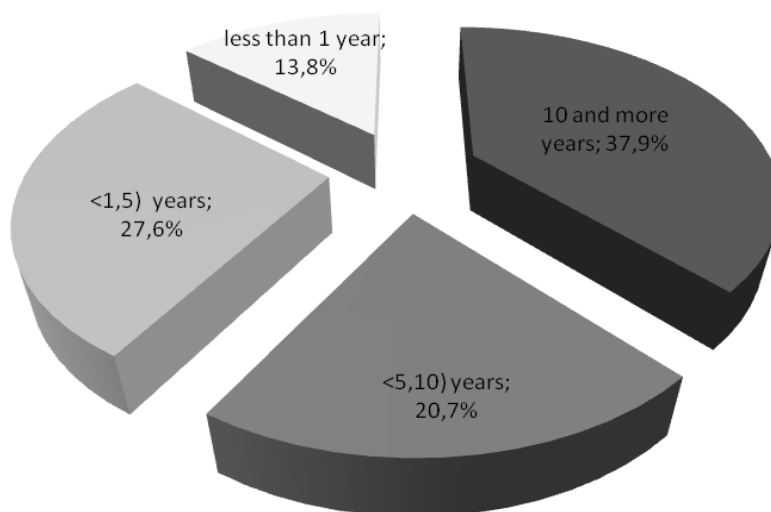


FIGURE 3 - THE USE OF GIS BY CLERKS IN THE COMMUNES (IN YEARS).  
 Source: own work based on research

The fast flow of information also affects the time needed for taking the administrative decision. This feature was indicated by 53.5% of respondents who noticed that in many cases the speed and the accuracy of administrative decisions affect the quality assessment of the functioning of various departments in the self-government office. The awareness of this functionality of geographical information systems amongst GIS users concerned 60% of respondents while in the case of those who did not use GIS it was only 38%.

An important feature of GIS, underlined in the theory, is avoiding repetition of the same data, which significantly affects the reduction of costs of the self-government functioning (Masser, 2007, p. 13; Litwin, Myrda, 2005, p. 25 - 34; Kwietniewski, 2008, p. 13 - 17). That functionality of GIS was indicated

by 46.5% of clerks. As in the previous part of the research this characteristic of geographical information systems pointed nearly 57% of people who used GIS at their daily work. In case of people who did not use GIS at work only 23% of them pointed this feature of GIS.

The ease of data presentation for the local community was indicated by nearly 42% of respondents. As the basic feature of GIS, data visualization lets to present in the simple way the results of the analyses and of the simulations to: employees of the self-government office, the local authority and the local community (Feltynowski, 2009, p. 122 - 127; Al-Kodmany, 1999). In the case of the local community it also involves the social participation in the processes of the commune management (Dunn, 2007). Unfortunately, this feature was not noticed in the research and was indicated by only 14% of the clerks.

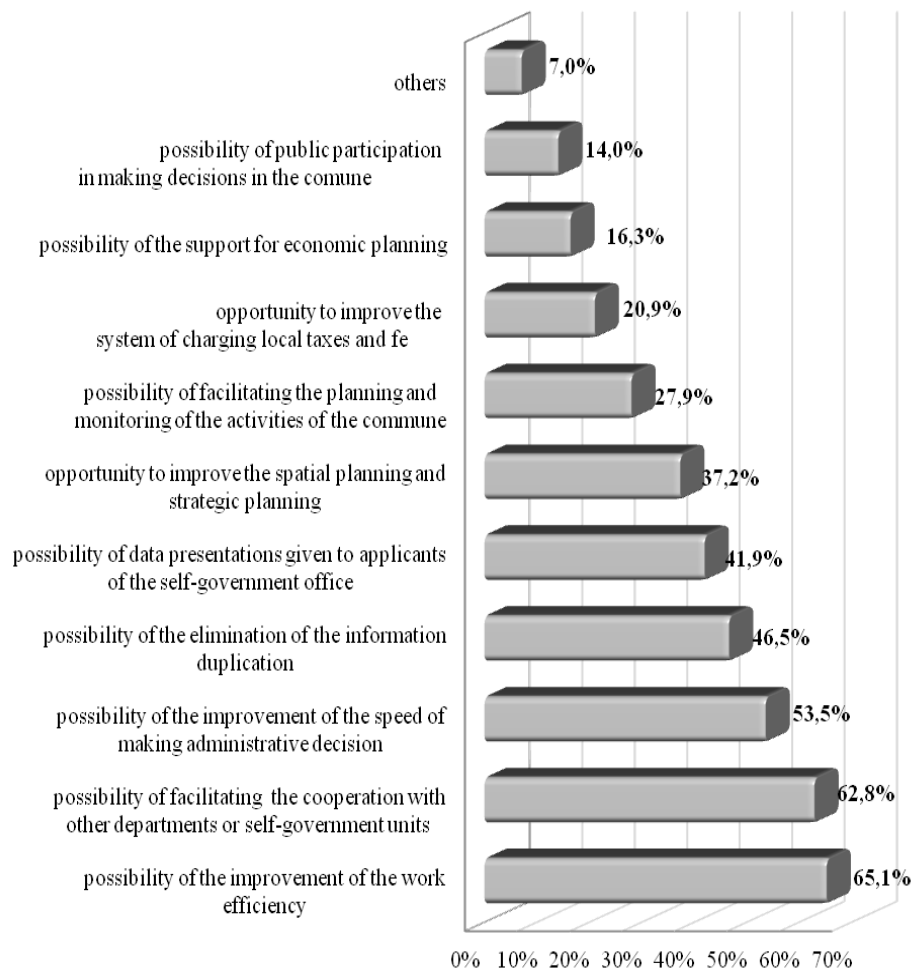


FIGURE 4 - POSSIBLE USE OF GIS IN COMMUNES - RESEARCH RESULTS.

Source: own work based on research.



Another feature of GIS is also improving the quality of services provided in self-government offices. In the research it was pointed out to improve the quality of services of land use planning and of strategic planning. This kind of functionality was noticed by 37.2% of respondents. On the other hand, GIS as a tool for monitoring the actions taken in a territorial unit was indicated by 27.9% of research participants.

Only 20.9% of respondents believe that geographical information systems can help in the process of both calculating and the execution of taxes and local fees. It is of special importance for calculating property taxes which exist in Poland. The next functionality of GIS pointed in the research was supporting the processes of the economic planning. 16.3% of the respondents indicated this feature. It is important from a point of view of the possibility of calculating incomes of the self-government from taxes indicated in the earlier part of this question. The use of GIS for this type of activity allows for the prediction of revenues, which results in better capabilities of making financial and investment calculations in the commune.

#### 4. CONCLUSIONS

Conducted pilot research shows that geographical information systems are used in self-government units, but it is not common. It is caused by the fact that only several departments of the offices of the analyzed cities use geographical information systems. The second reason is that not all employees of these departments use this technology. This can be noticed in the research results because not all respondents used GIS in their career. It should be noted that the research carried out in the communes of Łódzkie voivodeship in the year 2007 presented that knowledge about the characteristics of the GIS technology had only 48.6% of respondents (Feltynowski, 2009, p. 180 - 186).

In urban communes, where the research was carried out, the managers used the geographical information system more often than the lower-level clerks. It should be also noted that respondents using GIS were more aware of the possibilities of using GIS technology in self-government units. The attitude of clerks indicated that the main advantage of GIS is the improvement of their work efficiency and its facilitation. The possibility of cooperation with the local community through sharing of data and data visualization was only in the second place in the ranking of responses. The issues connected with the possibility of social participation in the local government activity were also rarely indicated in this research.

The analysis allows to conclude that nearly 70% of respondents used GIS in their workplace. The important issue is the improvement of their qualifications and conducting information and promotion campaign about the GIS technology. Such initiatives will let for further widening the knowledge about



the functionality of GIS and for increasing the number of clerks using GIS at daily work. Better qualified employees will allow for permanent dissemination of the Information Society idea in the local community.

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