

APPLICATION OF GIS IN THE AREA OF SOCIAL SECURITY

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Abstract

The role of Geographic Information System (GIS) consists primarily in the use of information obtained on the location of certain objects in space construed not only as fixed structures but also as economic and social phenomena. Their functionality is considered high. The systems are applied in numerous branches of science, not only in geography. Analyses of the systems have been conducted in the legal sciences (administrative law) for years. This article is an attempt to discuss the possibilities of the application of Geographic Information Systems in solutions related to social security. Its objective is to demonstrate their usefulness from the perspective of dogmatics of social security law. This was done to the extent the spatial data obtained permits the conduct of analysis of legal solutions in force and the drawing of conclusions as to what the law ought to be.

Keywords: GIS, social security

Introduction

Geographic Information Systems (GIS) are systems for the collection, processing and sharing data containing spatial information and the accompanying descriptions of the sites distinguished in different areas covered by the system's operation (GAŹDZICKI, 1990). In the age of widespread application of information science it is also stressed that the objective of the GIS is the collection, processing of spatial data and their visualisation (SZCZEPANEK, 2017) or, in other words, a Geographic Information System (GIS) is a computerised system of capturing, storing, processing, analysing and sharing information having a spatial reference to the surface of the Earth (DRZEWIECKI). The implementation of IT solutions to capturing, processing, analysing, sharing and storing data about objects and their location in space has translated into the widespread application of such data in sciences other than geography. The attractiveness of the GIS is manifested in the possibility of visualising spatial information which had earlier been presented on standard maps with the use of new technologies.

The fundamental element of a GIS is a database containing information about objects existing in the real world that are represented in the system. Information is displayed in spatial and descriptive variants. The role of a GIS generally consists in providing information about the location of specific structures in a given territory. GIS are applied in geographic science, urban planning and tourism. However, the functionality of the systems is, in fact, unlimited. The concept of an object located in space is a broadly defined term in the science of spatial information systems. It covers not only fixed natural and artificial structures, but also natural, economic and social phenomena (GAŹDZICKI, 1990), cultural and historical phenomena (FRANGEŚ, VUČETIĆ, POSLONČEC-PETRIĆ, 2003), archaeological phenomena (BACHAD, MAJID, SETAN, CHONG, SULAIMAN, 2012 and cited literature). The value of GIS is recognised in social science which apply data resources about the structure of the society, the labour market, the health condition of the citizens, demographics (as regards the latter see, e.g. RĄCZASZEK 2003). Geographic Information Systems are also used, among others, in law where they are applied to the analysis of the legal solutions in force, as well as to discussing potential amendments to the law and drawing conclusions as to what the law ought to be in reference to spatial planning. The productivity of the data about space provided exerts an impact on, among others, administrative procedures (SZPOR, 2012).

Methodological assumptions

The implementation of IT solutions and the availability of spatial information have opened up new analytical opportunities in the area of legal sciences. The publication is aimed at studying the usefulness of the application of GIS in the dogmatic analysis of the law on social security, the existing standpoint on the individual issues of spatial structure, growth forecasts, as well as the problems and threats related to the application of GIS.

Depending on the objective adopted, the discussion may focus on the individual social risks as they are spatially represented, on the subject-matter aspect of the people covered by the protection, on the distribution of the organisational structure and many more. The selection of the topic to be discussed in the context of the GIS stems from my research interests, which include the risk of the incapacity for work in the national social security framework. For this reason, the paper presents the results of an analysis of spatially represented publicly available information collected at the government level by the Social Security Institution (ZUS), Ministry of Family, Labour and Social Policy (MRPiPS), the Office of the Government Plenipotentiary for Disabled People (BON) and, in an auxiliary manner, by the National Labour Office, Regional Labour Offices (PUP). In view of the fact that the data originates from different sources, it is not uniform in nature, also in terms of its visual appearance. For cohesion, the data was grouped as per voivodeships. The aim of the data is only to illustrate the problem. In order to conduct a more profound analysis, the data would have to be divided as per the poviates, and then subsequently into cities and rural areas.

The application of GIS in the area of the law on social security

Geographic Information Systems may become a useful system and research tool in the area of social security, as well as in interdisciplinary research studying spatially arranged data contained in the data bases of social security systems; the so-called industry-specific GIS (BIELECKA, MAJ, 2009). As regards the collection of most advanced data for social security purposes, such data is collected by the Social Security Institution (ZUS). The other operating social security systems, namely, the Agricultural Social Insurance Fund (KRUS), the system of the Ministry of Defence (MON) and the Ministry of Internal Affairs and Administration (MSWiA) are not equipped with as extensive and multi-functional IT systems, or have no IT systems in place.

The body responsible for the collection of data for purposes of providing services and aid is the Ministry for Family, Labour and Social Policy which runs the "communication channel" EmP@tia. Its fundamental assumption is facilitating communication between citizens and the office and other offices, but it also collects data on the infrastructure of aid institutions, the types and number of places available in centres, the families receiving aid and the benefits granted. There also exists the Analytical and Reporting Platform for the Area of Social Security and Family (A-R Platform, PAR). It is a system permitting the acquisition of data from many different sources, and in different formats, the transformation (integration) of data to a state in which it can be used in analysis and reporting, the designing of analysis and reports, the publication and distribution of results.

Worthy of mention is also the EKSMOoN (Electronic National System for Monitoring Disability Assessment) system. It is aimed at collecting data on the disability assessment process. It supports the processes of registration and issuing disability assessments by the voivodeship and poviante disability assessment teams. The system is used to verify applications and appeals and the assessments that are issued nationwide, as well as to conduct ongoing analyses by the Government Plenipotentiary for Disabled People. The plenipotentiary is the body responsible for determining the scope and directions for development of the system and oversees it.

For reasons of clarity, it needs to be noted that a number of assessment systems dealing with the impairment of bodily fitness operate in Poland as well. There exists the national social insurance system, a separate system for social insurance of farmers, and security systems for the uniformed services. The incapacity for work determined for disability allowance purposes and disability for professional and social rehabilitation purposes are determined separately. There exists yet another system (an educational system consisting of a network of public psychological and pedagogical counselling centres) which conducts assessment of disabled children and youth for educational purposes. Those people who are not included in the social insurance system for the reason of not being insured or if their impairment of bodily fitness resulting in the incapacity to work occurred in their childhood or during their school years are eligible for benefits distributed by the social security system or welfare programmes.

The multitude of assessment systems poses a real practical obstacle for the beneficiaries of said systems (primarily in terms of having to obtain numerous assessments for different purposes for the reason of impairment of bodily fitness). This is demonstrated by the research conducted on the institutional determinants of disability which recommend the unification of the assessment system (GOLINOWSKA, 2012). Similar conclusions were made in the report developed by the Supreme Audit Office (Informacja o wynikach kontroli organizacja systemów orzecznictwa lekarskiego ZUS dla celów rentowych oraz orzekania o niepełnosprawności (Information on the results of the audit of the organisation of the Social Insurance Institution medical assessment system for disability allowance purposes and disability assessment)). The Supreme Audit Office found that the state failed to accomplish the objectives of the 1997 reform as a result of which the following assessment systems were established – an assessment system for disability allowance purposes and an assessment system for assessing disability and the degree of disability. The

separation of the two systems did not contribute to the accomplishment of the core priority of the reform, namely enhancing the role of medical and professional rehabilitation and the change of the function of compensatory benefits to activating forms of assistance. The separation does not make the collection of data, its processing and analysis for social security purposes easier either. In addition, a review of the data demonstrates that only a small part of the data is spatially presented. The majority of data is presented as tables or graphs. They constitute a valuable source of data on the operation of the social security system. However, there is a shortage of tools to compile this data with other sources of knowledge that might have an impact on the occurrence of incapacity for work. A GIS dedicated to social security issues could fill in this gap. The development of the system would have to be preceded by the elaboration of the relevant methodological assumptions as regards the conceptual framework and a list of comparable data.

Incapacity for work, being one of the social risks, refers to a condition where the fitness of the body is impaired thus affecting the given person's ability to perform work. However, in the micro scale, it is a phenomenon vulnerable to other factors (demographics, environmental, social and material, economic). At present, the number of assessments declaring the incapacity for work is not subject to such extensive fluctuation as was the case in the period of the regime transformation in Poland (the 1990s), and it has oscillated around a fairly stable level except for a certain decline in the volume of assessments issued as a result of a change of legislation which translated into the principle of awarding a person the status of being incapable for work for a period no longer than until the time the given person attains the age of retirement and the conversion of the disability allowance into *ex officio* pension once the given age was reached.

The Social Insurance Institution develops an annual report featuring data about the process of assessment of incapacity for work. Some of the data is also shared on a quarterly basis. In recent years, the Social Insurance Institution has been presenting data in spatial form of all assessments issued aggregately (i.e. full incapacity for work and incapacity to exist independently, incapacity for work), which allows for a better understanding of not only the degree of the incapacity for work within a spatial structure, but also the relationships between the different assessments in the individual voivodeships.

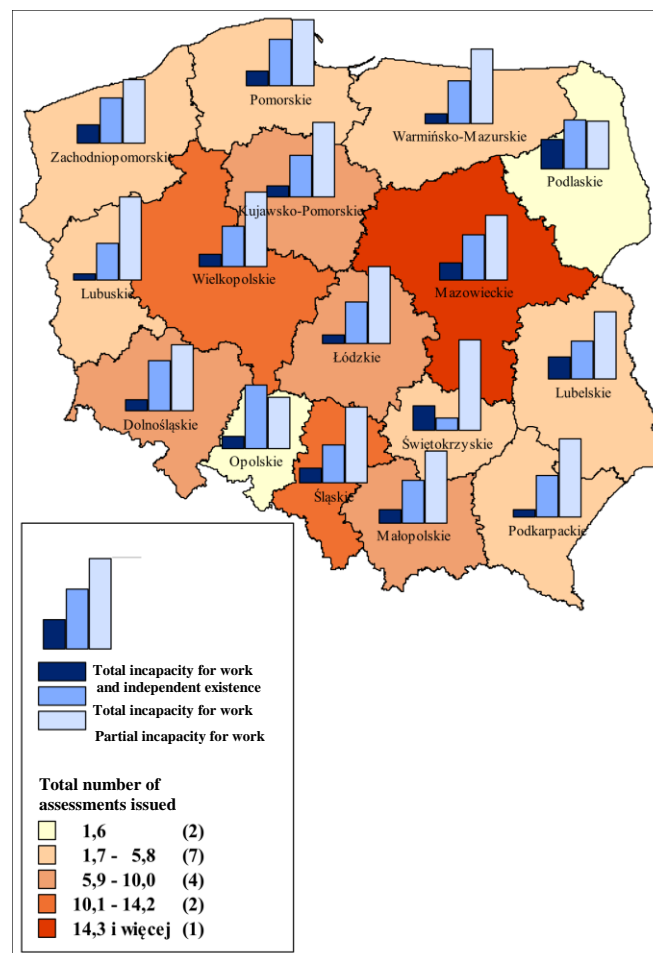


Fig. 1. The structure of first-time assessments declaring the incapacity for work for disability allowance purposes.
Source: (ZUS, 2017).

The structure of assessments on incapacity for work has disclosed certain recurring regularities. The highest percentage of assessments is issued in the Mazowieckie voivodeship, followed by Śląskie and Wielkopolskie. The rates have been stable level for the past few years. The case with voivodeships where the number of assessments issued is relatively lowest as compared to the other regions is similar (Orzeczenia lekarzy orzeczników ZUS o niezdolności do pracy wydane w 2016 roku (Assessments issued by certifying physicians of the Social Insurance Institution in 2016), p. 19).

Therefore, there are regions in Poland where we are recording a considerably higher or considerably lower percentage of assessment issued, however, the reason for the imbalance cannot be derived from said data. The reason behind the territorial diversity when it comes to the absolute number of assessments of incapacity for work is, above all, the number of inhabitants (population density). The voivodeship with the highest value of the population density factor is Śląskie, followed by Małopolskie and Mazowieckie. The smallest population density is recorded in Warmińsko-mazurskie and Podlaskie.

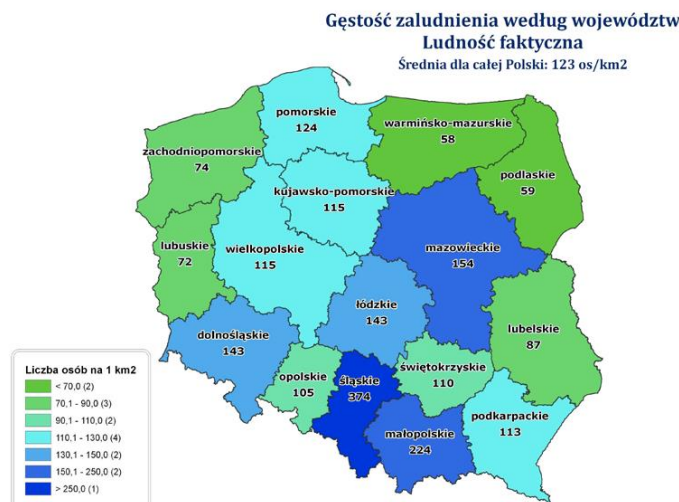


Fig. 2. Population density according to the National Census 2011.
Source: (GUS 2012).

Awareness of the configuration of incapacity for work in respect of age requires that the demographic factor also has to be taken into account. Incapacity for work occurs much more often in the case of older people. The frequency of incapacity increases with age. The most populous group, i.e. 47.4% of all of the research subjects are people aged 50-59 years old (Assessments issued by certifying physicians of the Social Insurance Institution in 2016, p. 26).

Also of significance is the scope of the risk of incapacity for work. This is a risk associated with the age of professional activity (working age). Upon reaching retirement age, a person deemed to be incapable for work becomes eligible to receive an *ex officio* pension (their status changes to that of a pensioner). The highest percentage of working age people (men under the age of 65 and women under 60) is reported in the following voivodeships: Opolskie and Warmińsko-mazurskie. The smallest percentage of persons in that age group inhabits the Łódzkie and Mazowieckie voivodeships. The largest number of people past the working age is found in the Łódzkie voivodeship, while the smallest in Warmińsko-mazurskie, Podkarpackie and Wielkopolskie (Powierzchnia i ludność w przekroju terytorialnym w 2017 r. (Area and Population in the Territorial Profile in 2017), p. 14).

Since 2013, the Social Insurance Institution has been developing an annual report entitled "Spatial diversity of frequency factors of incapacity for work assessment".

The intensity of assessing incapacity for work accounts for the number of assessments declaring incapacity for work for the first time by certifying physicians (except first-time assessments pertaining to the social allowance, inclusive of family allowance assessments) per 100,000 workers (save people working in individual farms in the farming industry and people working in state-owned institutions operating in the area of national defence and public security).

The report contains data presented in a different context other than in reference to the factor of the number of assessments issued, in the sense that they do not represent the number of absolute assessments issued but data in reference to the population of professionally active people inhabiting the given voivodeship essential from the perspective of the social insurance system. The highest intensity of first-time assessments on the incapacity for work was recorded in the Kujawsko-pomorskie voivodeship. It is a

voivodeship with a relatively high unemployment rate, although not the highest in the country - the topmost unemployment rate is reported in the Warmińsko-mazurskie voivodeship. The spatial diversity of unemployment demonstrates that among a number of factors that influence it (age, education, sex, place of residence), of greatest significance to the unemployment rate are factors such as large urban agglomerations or rural areas. In the voivodeships with a majority of cities, the rate of unemployment is lower (Terytorialne zróżnicowanie bezrobocia w Polsce w 2016 r. (Territorial diversity of unemployment in Poland in 2016).

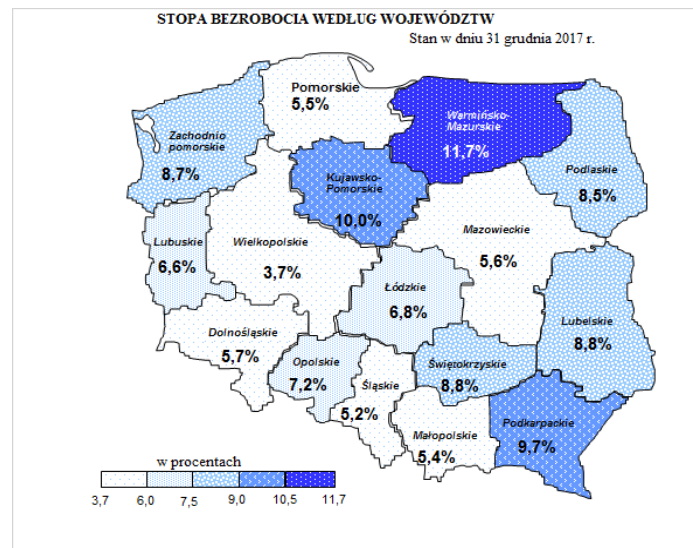


Fig. 3. Rate of registered unemployment in Poland.
Source: (MPIPS 2017).

The data about unemployment does not constitute, however, reliable data for the purposes of assessing incapacity for work. The legal definition of an unemployed person does not cover people who obtained their entitlement to a disability allowance as a result of incapacity for work (including a training allowance, a social allowance) in the amount in excess of half of the minimum remuneration for work. As such, they are not accounted for in the cited statistics although, without a doubt, a higher level of unemployment affects the desire to obtain a social security benefit. A more adequate criterion for the assessment of the spatial distribution of the incapacity for work is the information on professional inactivity. The professionally inactive population is to be understood as people found outside the labour force; this group includes all people 15 years old and over who were not classified neither as workers nor the unemployed (Aktywność ekonomiczna ludności Polski IV kwartał 2017 r. (The economic activity of the population of Poland 4Q 2017) p. 206). However, the professionally inactive population is not classified according to the assessment of incapacity for work but in a broader spectrum – with regard to their disability. The latter constitutes the second most important reason for inactivity among the working age population (Aktywność ekonomiczna ludności Polski IV kwartał 2017 r. (The economic activity of the population of Poland 4Q 2017) p. 206).

Bearing in mind the knowledge about the functioning of a separate legal system on the assessment of incapacity for work on a farm, the data collected by the Social Insurance Institution could be compiled with information about the structure of the rural and urban populations in the given region. The percentage share of the population inhabiting rural areas is the highest in the following voivodeships: Podkarpackie, Świętokrzyskie, Lubelskie and Małopolskie, and the lowest in the Śląskie voivodeship (Powierzchnia i ludność w przekroju terytorialnym w 2017 (Area and Population in the Territorial Profile in 2017) GUS, Warszawa 2017, p. 13). In fact, with the exception of the Małopolskie voivodeship, the percentage of people incapable of working within the social insurance system is not high in these regions.

Conclusions

Similarly to the emergence of an economic legal analysis, one can expect the development of GIS-oriented legal analysis. Geographic Information Systems applied to the area of social security may help public authorities to not only collect and report on data, but also to better “adjust” the benefits and social services provided thereby. As regards the science of social security, a legal analysis could add new value to the field. Provisions would be subject to assessment not only from the formal and legal perspective, as

regards the textual layer of the provision or juristic evaluation, but also the wording of the provision could be referred to its other-than-legal consequences (economic, statistic and spatial). From the perspective of dogmatics of law, given the higher degree of awareness of the legal environment and the consequences the provision may have, it would permit to construe the law, analyse its practical application, propose amendments to laws, modify definitions and concepts which affect the scope of the given legislation or which give rise to doubt as to the practice of its application that become apparent only once it is spatially arranged.

The collection, presentation and compilation of data spatially for the purposes of social security may, therefore, constitute an important element of a practical and dogmatic analysis. However, in order for the entire system established for this purposes to be easily legible, it must compile and compare a maximum of a few items of data in visual form at a time. As such, of crucial importance is the careful selection of data. And such selection could be performed based on knowledge of the given phenomena. It is not enough to be familiar with, for instance, demographics, the labour market or the social situation of the population of a given area. It is also necessary to be equipped with legal knowledge in the modelling of the GIS to cater to the needs of social security. The notions that occur there, to which relevant data are adjusted, are legal notions with determined content designata.

The risk of incapacity for work was the subject adopted for the purposes of the analysis of the usefulness of the GIS. A person incapable of working is a person who was deemed such in the course of an assessment process declaring their incapacity for work conducted by a competent body designated for this purpose in the given assessment system (the so-called social security system, disability allowance system). Incapacity for work constitutes both a social phenomenon which is connected with remunerated work, the person's age, their health, and education. Regulations pertaining to the risk of incapacity for work are thus correlated with the employment law, the labour market, the structure of education, health care, etc.

In the area of social security, Geographic Information Systems may serve the purpose of searching for specific values in a spatial arrangement, as well as forecasting of social consequences, and factors affecting them based on the information obtained from a GIS. Information obtained from the extensive resources of the social security system may be a valuable source of knowledge for institutions specialising in providing aid. A better awareness of the determinants of the cited spatially arranged risk of incapacity for work, periodical verification and data analysis would permit a more precise adjustment of support, the possibility of adjusting the infrastructure of teams tasked with the assessment of incapacity for work and the management of relevant prophylactic programmes.

IT systems applied in the area of social security forms part of the common computerisation of public services but they are far from securing the intended integration. There exists no GIS that could be used to aggregate diverse data obtained from social security systems. At present, not only the degree of development of spatial data is varied, but also there exists a considerable imbalance among the resources themselves and the advancement of IT solutions applied thereto. However, when it comes to a system that would be sensitive to the broadly defined social context, the benefits that the application of a GIS offers for the purposes of social security cannot be overestimated.

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