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Research paper

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Statistics review of complaints addressed to provincial inspectorate for geodesy and cartography

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Summary

This article examines the scale of complaints regarding geodetic and cartographic works in Poland between 2020 and 2023, with particular emphasis on data from 2023. The study focuses on complaints submitted to the Voivodeship Inspectorate for Geodesy and Cartography (WINGIK) regarding the work of licensed surveyors. The aim is to assess whether geodetic and cartographic tasks are performed with due diligence and to identify regional differences in the number of complaints. The analysis is based on statistical data obtained from all sixteen WINGIK offices. The collected data includes the number of complaints registered in each voivodeship between 2020 and 2023. To ensure comparability, data normalization was applied, taking into account the population of each voivodeship, the number of reported geodetic and cartographic works, and the number of registered land parcels. The results indicate significant regional variations. Annual complaints ranged from 522 to 602, with a decreasing trend since 2021. The highest number of complaints was recorded in Małopolskie Voivodeship, while the lowest occurred in Lubuskie, Pomorskie, Zachodniopomorskie, and Podlaskie. After normalization, Małopolskie, Świętokrzyskie, Śląskie, and Lubelskie still exhibited the highest complaint rates, while Pomorskie had the lowest. The findings highlight the need for a regionally differentiated approach to supervision and quality control. Voivodeships with high complaint rates require enhanced oversight, while those with fewer complaints should focus on maintaining high standards and identifying factors contributing to their success.

Keywards

complaint • provincial inspectorate for geodesy and cartography supervision • geodetic and cartographic works

1. Introduction

Geodesy and cartography play a fundamental role in spatial management, real estate administration, and land-use planning. The precision of geodetic data is essential for multiple sectors, including infrastructure development, environmental monitoring, and public administration [Barańska and Eckes 2023]. Over the past decades, advancements in geographic information systems (GIS) and digital surveying techniques have significantly improved the accuracy and accessibility of geospatial data [Glowienka et al. 2016]. However, despite these technological improvements, inconsistencies and errors in geodetic work continue to be a subject of concern, particularly in the context of cadastral records and property boundaries.

In Poland, geodetic supervision is carried out by the Voivodeship Inspectorates for Geodesy and Cartography (WINGIK), which are responsible for handling complaints related to surveying work. Errors in geodetic data can lead to legal disputes, delays in infrastructure projects, and inefficiencies in spatial planning. Although the importance of quality control in geodesy has been widely recognized, there is still a lack of comprehensive research on the patterns and determinants of complaints about surveying work at the regional level.

This study aims to fill this gap by analyzing the scale of complaints related to geodetic and cartographic work in Poland between 2020 and 2023. By examining statistical data from all sixteen Voivodeship Inspectorates, this paper assesses regional disparities in complaint rates. The findings provide valuable insights into the effectiveness of geodetic supervision and highlight areas where improvements in quality control procedures may be needed.

2. Research subject and methodology

This article aims to assess the scale of complaints related to geodetic and cartographic work in Poland between 2020 and 2023, with particular emphasis on data from 2023. The analysis of the number of reported complaints allows for an evaluation of the reliability of geodetic work and the effectiveness of geodetic oversight across individual provinces. The research problem is to determine whether these complaints show significant regional differences and what factors may influence their frequency.

The study is based on an analysis of statistical data obtained from all sixteen Voivodeship Inspectorates for Geodesy and Cartography (WINGIK). The collected data includes the number of complaints registered in individual provinces from 2020 to 2023. To obtain an objective picture, the number of complaints was normalized, taking into account the number of inhabitants in each province, the number of reported geodetic works, and the number of registered cadastral parcels [Jasińska and Preweda 2021].

3. Literature review

The issue of geodetic work quality and its supervision has already been addressed in scientific literature. The analysis of the quality of spatial data in land records high-

lights key aspects of their accuracy and compliance with reality [Hanus et al. 2020]. Meanwhile, the assessment of object geometry in cartographic generalization emphasizes the importance of precise measurement methods and the impact of errors on the interpretation of spatial data [Bac-Bronowicz et al. 2024]. Problems related to the recording of cadastral changes in geodetic documentation and difficulties encountered in the process of updating land records have been widely discussed in the literature [Buśko and Przewięźlikowska 2016]. In the context of supervision and complaint handling, the procedures for evaluating the correctness of geodetic work by provincial inspectorates are of significant importance and have been thoroughly described in the literature [Porucznik 2023].

In the international context, systems for supervising geodetic and cartographic work operate in diverse ways. However, in most European Union countries, the responsibility for these activities lies with government institutions – both at the central and regional levels [Piotrowska 2005]. For example, in Germany, supervision is carried out by the mapping offices of individual federal states, in cooperation with the Federal Agency for Cartography and Geodesy (BKG). In France, a similar role is played by the Institut Géographique National (IGN), while in Italy, regional institutions cooperate with the Istituto Geografico Militare (IGM). In Spain, the responsibility lies with the Instituto Geográfico Nacional (IGN), and in Austria, it is the Bundesamt für Eich- und Vermessungswesen (BEV). Belgium stands out for dividing supervision according to linguistic regions: the Nationaal Geografisch Instituut (NGI) in Wallonia and the Flanders Geographical Information Agency (FGIA) in Flanders. In the Netherlands, this role is fulfilled by the Kadaster, in Ireland by Ordnance Survey Ireland (OSi), and in Sweden by Lantmäteriet [Plimmer 2001]. In Poland, geodetic and cartographic supervision is the responsibility of the Chief Surveyor of Poland, supported by the Voivodeship Inspectorates for Geodesy and Cartography. Despite organizational differences, a common feature among most of the discussed institutions is the combination of geodetic and cartographic tasks, as well as their supervisory and coordinating functions concerning the quality and compliance of the work performed [Golaczynski and Kaczorowska 2023].

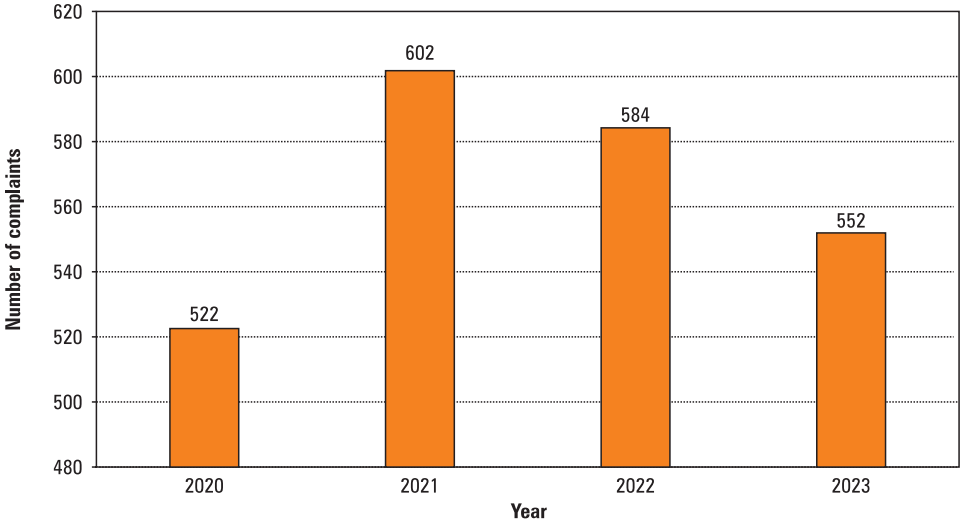
Objections and allegations regarding the performance of surveying work by specific entities may serve as a basis for WINGIK to initiate further investigative actions, potentially leading to disciplinary proceedings against individuals performing independent functions in surveying and cartography [Ustawa 1989].

A statistical analysis of complaints on a regional scale can serve as a valuable supplement to existing research, providing insights into the quality of geodetic services and the effectiveness of supervision in different parts of the country. The results of such studies can also indicate directions for improving the quality and standardization of geodetic procedures in Poland.

4. Results

Thanks to the comprehensive dataset from across Poland, the number of complaints about geodetic and cartographic works was analysed for each year from 2020 to 2023.

The data presented illustrate the number of complaints received by WINGIK in the years in question. Often the complaints relate to works carried out even several years back.



Source: Authors' own study

Fig. 1. Number of complaints about surveying and cartographic works in Poland in 2020–2023

Summarising the number of complaints received by all WINGIKs, we observe that the number ranges from 522 to 602 complaints per year. The increase occurred in 2021. From 2021 onwards we see a decreasing trend, but the number of registered complaints in 2023 is still above the number from 2020.

Illustrations of reported complaints by province are shown in the cartogram in Figure 2.

A significant disparity between Poland's regions is evident. The lowest number of complaints was recorded in Lubuskie, Pomorskie, Zachodniopomorskie, and Podlaskie Voivodeships. A dozen times more complaints were handled in Małopolskie Voivodeship. Only in this voivodeship did the number of complaints exceed one hundred, amounting to 125. Opolskie Voivodeship is characterised by the smallest area, but the number of complaints is high.

The cartogram shown in Figure 3 illustrates the aggregated number of complaints received from the beginning of 2020 to the end of 2023.

Overall, the number of complaints from 2020–2023 is also the highest for Małopolskie Voivodeship. Figures 2 and 3 highlight the disparities in the number of complaints processed across different regions. Compared to Lubelskie Voivodeship, the number of complaints in Małopolskie was more than thirteen times higher than in Lubuskie or Kujawsko-Pomorskie Voivodeships.

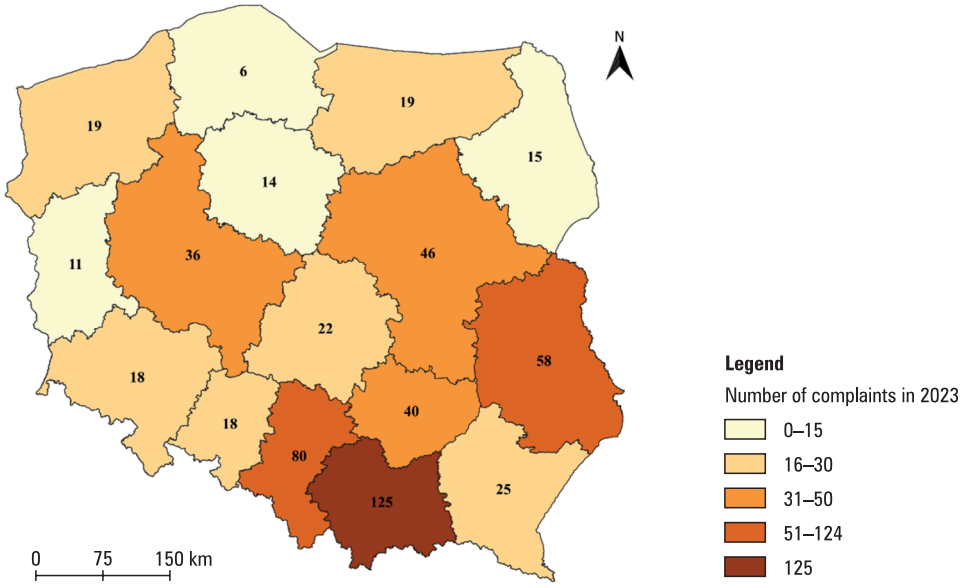


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Fig. 2. Number of complaints about surveying and artographic works by voivodeship in 2023

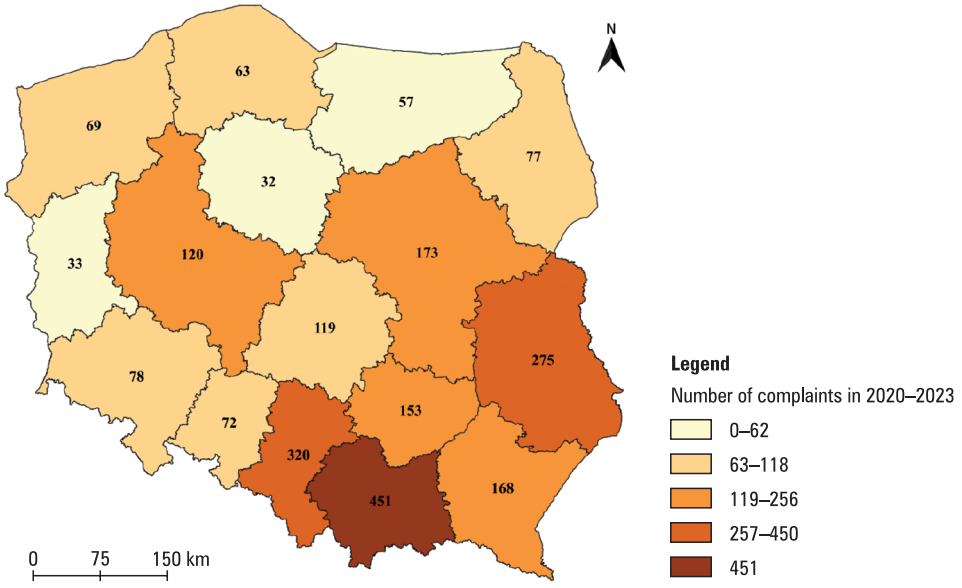

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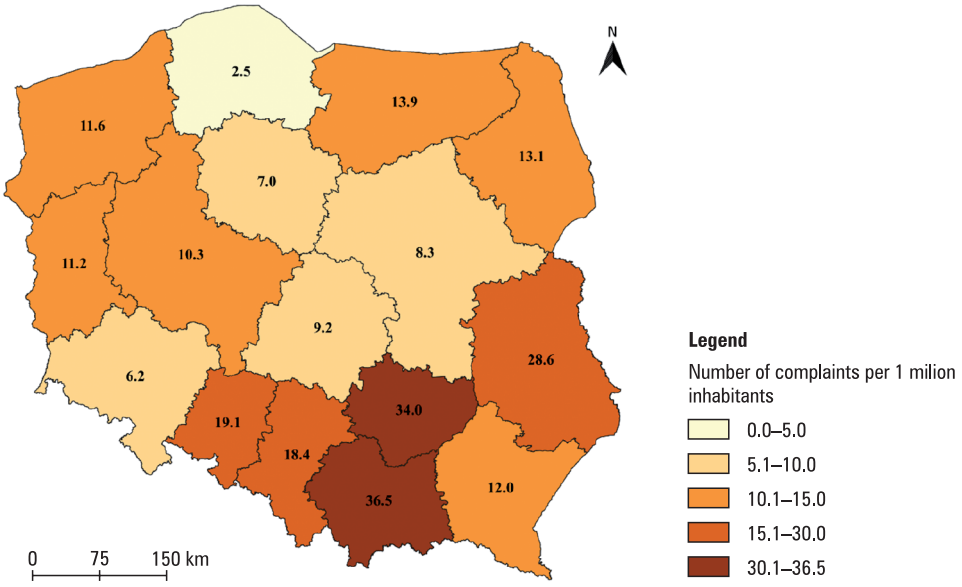
Fig. 3. Number of complaints about surveying and cartographic works by voivodeship in 2020–2023

5. Data normalization

Naturally, each voivodeship exhibits distinct characteristics. The voivodeships differ, for example, in the area or the number of inhabitants. The number of plots of land, also correlates with these data in terms of the number of notifications of surveying works. In order to objectively present the analysed data on reported complaints, their number was normalised, taking into account the number of inhabitants of the voivodeship, the number of reported geodetic and cartographic works and the number of registered plots. Figure 4 shows the number of reported complaints in 2023 per 1 million inhabitants of a given voivodeship. Statistics on the number of inhabitants of the respective voivodeships in 2023 were obtained from the Statistical Yearbook of voivodeships of 2023 [Statistical Yearbook 2023].



Source: Authors' own study

Fig. 4. Number of complaints about surveying and cartographic works in 2023 per 1 million inhabitants of the voivodeship in 2023

In result, Opolskie Voivodeship, which has the smallest population, has one of the higher rates. Małopolskie Voivodeship has the most complaints per 1 million inhabitants. Just behind it is Świętokrzyskie Voivodeship, which is fourth from last in terms of population. Mazowieckie Voivodeship, which has the largest number of inhabitants, has the fourth lowest ratio. A very low ratio is recorded in Pomorskie Voivodeship. It is only 2.5.

Based on data received from the Central Office of Geodesy and Cartography, a normalisation of the 2023 data was also prepared taking into account the number of notifications of geodetic and cartographic works and the number of registered plots.

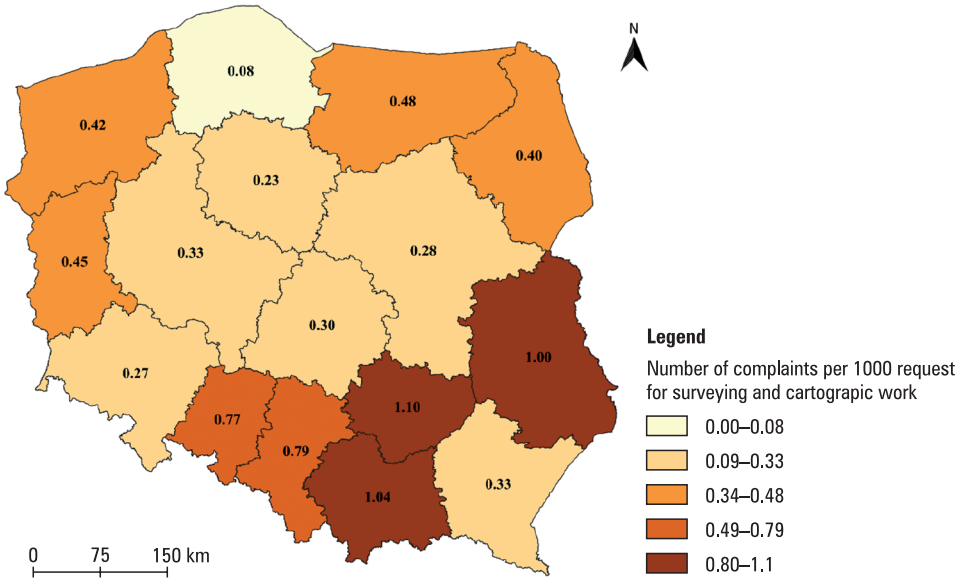
Table 1. Data received from 2023 from the General Office of Geodesy and Cartography

No.	Province	Number of notifications of surveying and cartographic works	Number of registered parcels	Number of notifications per number of parcels
1.	Dolnośląskie	66896	1898336	0.0352
2.	Kujawsko-pomorskie	59814	1376602	0.0435
3.	Lubelskie	58258	3734095	0.0156
4.	Lubuskie	24717	785259	0.0315
5.	Łódzkie	73247	2784506	0.0263
6.	Małopolskie	119841	4760133	0.0252
7.	Mazowieckie	166340	5501891	0.0302
8.	Opolskie	23279	998516	0.0233
9.	Podkarpackie	74685	3222186	0.0232
10.	Podlaskie	37041	1674995	0.0221
11.	Pomorskie	73105	1420252	0.0515
12.	Śląskie	100846	3518920	0.0287
13.	Świętokrzyskie	36251	1902681	0.0191
14.	Warmińsko-mazurskie	40000	1232922	0.0324
15.	Wielkopolskie	107796	2779513	0.0388
16.	Zachodniopomorskie	44824	1118028	0.0401

The first of the standardisations prepared on the basis of the data received shows the number of complaints from 2023 per 1 000 geodetic and cartographic work notifications in 2023 in a given voivodeship.

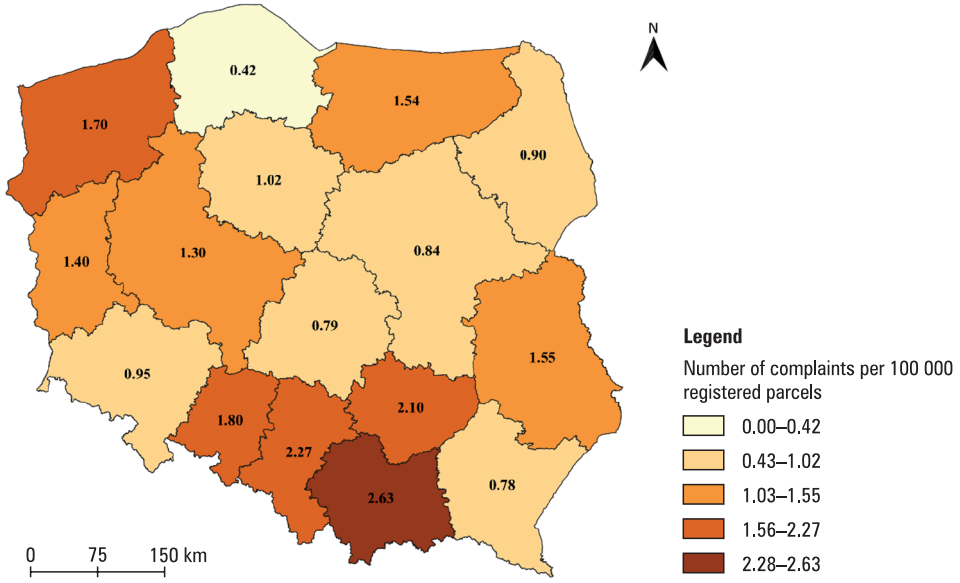
In Mazowieckie Voivodeship, despite the fact that it had the highest number of work notifications (over 166,000), the indicator shows a relatively low number of complaints – 0.28. In Świętokrzyskie Voivodeship, there were over 36 000 notifications (the second lowest number of work notifications in Poland), but the complaint index there is as high as 1.04, which is a very high value compared to, for example, Pomorskie Voivodeship, where the number of work notifications was over 73 000 and the complaint index was only 0.45.

Another normalisation involves presenting the number of complaints per 100,000 plots of land located in a given voivodeship. The analysis of the number of complaints per 100,000 plots of land provides a different perspective compared to the earlier data on the number of complaints per 1 000 notifications of geodetic and cartographic works, and makes it possible to assess the workload of individual voivodeships in relation to the size of the areas covered by the registration of plots of land.



Source: Authors' own study

Fig. 5. Number of complaints about surveying and cartographic works in 2023 per 1 000 surveying and cartographic work notifications in 2023 in the voivodeship.



Source: Authors' own study

Fig. 6. Number of complaints about surveying and cartographic works in 2023 per 100 000 plots of land in the voivodeship

The map clearly illustrates regional differences in the number of complaints about plots of land, showing that the voivodeships in the south of Poland have the highest rates, while the northern regions of the country, have the lowest rates.

The average number of complaints is 565 per year, with an average of about 35 complaints per province in 2023. An analysis of complaint rates and their normalisation, taking into account both the number of inhabitants, submissions of geodetic and cartographic works, and the number of complaints per 100 000 plots of land, shows that the number of reported problems varies significantly between different regions of the country. Małopolskie Voivodeship was distinguished by the highest number of complaints in comparison to other regions. The fewest complaints were registered in Lubuskie, Pomorskie, Zachodniopomorskie and Podlaskie Voivodeships. Standardisation taking into account various factors showed that complaints about surveying works are most frequent in Małopolskie Voivodeship, followed by Świętokrzyskie, Śląskie and Lubelskie. The best situation from this perspective is in Pomorskie Voivodeship.

Additionally, data was obtained regarding the number of complaints submitted to the disciplinary commissioner in connection with detected irregularities in the geodetic work reported in the complaints. Consequently, these data indicate the number of justified complaints submitted to the WINGIK. The Table below presents data on the number of requests submitted to the disciplinary commissioner to initiate an investigative procedure, as well as the percentage of justified complaints in the years 2020–2023.

Table 2. Data on the number of requests to the disciplinary commissioner for investigation in the years 2020–2023

No.	Province	Number of complaints	Number of requests sent to the disciplinary commissioner	Percentage of requests sent per number of complaints
1.	Dolnośląskie	78	55	71
2.	Kujawsko-pomorskie	32	80	250
3.	Lubelskie	275	83	30
4.	Lubuskie	33	2	6
5.	Łódzkie	119	27	23
6.	Małopolskie	451	106	24
7.	Mazowieckie	173	67	39
8.	Opolskie	72	33	46
9.	Podkarpackie	168	11	7
10.	Podlaskie	77	16	21
11.	Pomorskie	63	9	14
12.	Śląskie	320	29	9

Table 2. cont.

No.	Province	Number of complaints	Number of requests sent to the disciplinary commissioner	Percentage of requests sent per number of complaints
13.	Świętokrzyskie	153	1	1
14.	Warmińsko-mazurskie	57	9	16
15.	Wielkopolskie	120	47	39
16.	Zachodniopomorskie	69	22	32

The data from 2020–2023 shows significant regional variation in the number of requests submitted to the disciplinary commissioner to initiate an investigative procedure. The highest percentage of requests in relation to the number of complaints was recorded in Kujawsko-Pomorskie Voivodeship (250%), suggesting that multiple requests may have stemmed from individual complaints, or that some were submitted in cases not directly linked to formal complaints. It is also possible that certain requests made to the disciplinary commissioner during this period were based on complaints from previous years or on inspections conducted at the companies concerned. High ratios were also observed in Dolnośląskie (71%) and Opolskie (46%) Voivodeships, suggesting a proactive approach to addressing reported irregularities.

Małopolskie had the highest total number of complaints (451) and also recorded the largest number of requests (106), but the percentage of requests in relation to complaints remained relatively low (24%). This may point to a more cautious approach in escalating cases or a lower proportion of complaints deemed substantiated.

In contrast, provinces such as Świętokrzyskie (1%), Lubuskie (6%), and Podkarpackie (7%) had very low ratios of requests to complaints, which could suggest either fewer confirmed irregularities or less frequent follow-up through formal investigative procedures.

The calculated Pearson correlation coefficient was $r = 0.552$, indicating a moderate positive correlation between the number of complaints and the number of disciplinary referrals. This suggests that in regions with a higher number of complaints, there is also a tendency for disciplinary actions to be initiated more frequently, although the relationship is not particularly strong.

Overall, the data highlights considerable differences in how regional authorities respond to complaints, both in terms of quantity and the likelihood of escalating cases to the disciplinary commissioner.

6. Summary and conclusions

In conclusion, it is worth reflecting on the reasons for complaints to the WINGIK. Such an analysis should take into account both the purpose behind the geodetic complaint to

the WINGIK, as well as the historical and legal conditions related to the management of the resource in the region.

The data indicate the need for a differentiated approach to supervision and quality control of surveyors' work in different regions of the country, taking into account the specific local conditions and population. The south-eastern regions, such as the Małopolskie, Świętokrzyskie, Śląskie or Lubelskie Voivodeships, require special attention due to the high complaint rates both in relation to submissions of surveying work and the number of plots. A greater focus on these regions, in the form of increased quality control, additional training for surveyors and streamlined registration processes, may help to reduce the number of problems in the future.

In contrast, in voivodeships with a low number of complaints, such as Pomorskie, Zachodniopomorskie or Warmińsko-Mazurskie, it is worth focusing on maintaining the current high standards of work and analysing the factors that contribute to the low number of complaints. This can be particularly valuable in developing good practices that could be adapted in other regions of the country. It is worth highlighting the fact that Pomorskie Voivodeship is characterised by the highest parameter of the number of notifications of surveying and cartographic works per number of registered plots of land with the lowest number of complaints. It is also worth noting Kujawsko-Pomorskie Voivodeship, which is characterized by the highest percentage of requests submitted to the disciplinary commissioner in the years 2020–2023. A correlation result of $r = 0.552$ points to a moderate positive association between the number of complaints and the number of referrals to the disciplinary commissioner in the years 2020–2023. This indicates that while there is a tendency toward more frequent initiation of disciplinary proceedings in cases with a higher volume of complaints, the strength of this relationship is limited and warrants further investigation.

The diversity of approaches to the management of the quality of geodetic and cartographic works will allow for more effective management of processes across the country, which will ultimately contribute to increasing public confidence in these services. An approach based on diverse regional needs will not only help to identify systemic problems, but will also allow their elimination, which in turn can lead to an overall improvement in the quality of surveying services in Poland.

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