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E-ADMINISTRATION IN POLISH VOIVODESHIPS AGAINST THE BACKGROUND OF EUROPE

Abstract

- *Goal* – the aim of the article is to assess the level of development of e-government services in Europe, with particular emphasis on the level of use of these services in Polish voivodships.
- *Research methodology* – the Perkal method and the analysis of the EGDI index were used to achieve the research objective. The study was conducted on the basis of the available data from the United Nations E-Government Survey and the Central Statistical Office in the area of public e-government services for citizens.
- *Score/results* – the analysis of the United Nations E-Government Survey reports showed that, since 2003, Denmark, Finland and Sweden have been occupying the highest place in the development of e-government in Europe and in the world. The research results showed that the level of the EGDI indicator increases over the years 2003–2022. The author's own research on the use of e-government services in Polish voivodeships showed that over the years 2014–2022 the level of use of e-government services by citizens increased. Mazowieckie, Dolnośląskie and Pomorskie Voivodships are characterized by the highest level of use of e-administration services, while the Świętokrzyskie, Podkarpackie and Lubelskie Voivodships are among the voivodships with the lowest use of these services.
- *Originality/value* – the introduction of various e-government solutions is becoming a very clear trend. Regional differences, on the other hand, result from the level of the state development in individual countries. The article showed that the use of e-government services in Poland by citizens is increasing, but it is still at an unsatisfactory level. Noticeable disproportions can be seen in individual voivodeships of Poland. Polish society does not take full advantage of the facilities offered by public

administration, therefore it seems necessary in this situation to take decisive action that could encourage the society to use e-services. In order to enhance the increase in the use of these services, each voivodeship should develop separate actions that will contribute to greater interest of citizens in e-government services, and consequently to their use. The carried out analyses may therefore be a contribution to further in-depth research, because the issues of electronic administration are very up-to-date and knowledge in this field requires constant updating.

Keywords: e-administration, information society, public administration, Perkal method.

1. Introduction

In the modern world, the traditional provision of services is giving way to new forms of work with the use of ICT (Information and Communications Technology). Modern ICT technologies are implemented in all branches of the economy, e.g. in the public sector, while becoming more attractive and accessible to citizens. In the contemporary management of public administration, the key place is occupied by electronic administration, the basis of which is the use of the Internet in relations between the citizen and the office, which in turn should bring a number of benefits to citizens, enterprises, but also public administration units themselves.

Despite the importance of e-government services both at the European Union level and in Poland, it is worth noting that there is insufficient knowledge about regional differences. Therefore, the aim of the study is to assess the level of diversification of the use of e-government services in Polish voivodeships.

In the first part of the article, the author analyzed the development of e-government in Europe, and then focused on the analysis of the use of public administration e-services in Polish voivodeships. The concept of using e-government services includes e.g. using citizenship websites to search for information, download forms and sending them to a specific institution.

2. Development of e-government in the world

The development of e-government in the world can be traced by analyzing reports of the United Nations E-Government Survey. Since 2001, every two years,

the United Nations Department of Economics and Social Policy examines the level of development of e-government services in all 193 member countries. However, only since 2003 the UN has presented the collected data in the form of a report.

Until August 2023, twelve editions of the study were published: 2001 [Benchmarking E-Government: A Global Perspective 2001], 2003 [UN Global E-government Survey 2003], 2004 [United Nations Global E-Government Readiness Report 2004], 2005 [United Nations Global E-Government Readiness Report 2005], 2008 [UN E-Government Survey 2008], 2010 [United Nations E-Government Survey 2010], 2012 [United Nations E-Government Survey 2012], 2014 [United Nations E-Government Survey 2014], 2016 [United Nations E-Government Survey 2016], 2018 [United Nations E-Government Survey 2018], 2020 [United Nations E-Government Survey 2020] and 2022 [United Nations E-Government Survey 2022]. The next study is scheduled for 2024.

The reports present the level of e-government development in individual countries. There are also indicated countries and areas where the potential of information and communication technologies (ICT) and of the e-government has not yet been fully used and which should be supported in development.

This report contains information that can be used by individual countries to identify the strengths and weaknesses of their own e-government and to develop appropriate policies and strategies in this area. The report also serves as a source of information for international bodies, including the United Nations General Assembly, the Economic and Social Council and the High Level Political Forum, to make decisions on issues related to e-government and its development at the international level. This report can also be referred to by government officials, policy makers and representatives of civil society and the private sector, when making decisions regarding e-government in their own countries.

The document also provides information necessary for further implementation of the 2030 Agenda for Sustainable Development [UN, Rezolucja 2015]. The report is the only publication of this type in the world.

The level of development of e-administration is assessed according to the EGDI (E-Government Development Index) developed by the United Nations. This index is used to assess the development of e-government at the national level. It is a composite indicator based on a weighted average of three normalized indicators. Each of these three indicators is also a composite measure that can be extracted and analyzed independently.

One third of the value of the EGDI depends on the telecommunications infrastructure index (TII) calculated on the basis of data provided by the International Telecommunications Union (ITU). Another third of the EGDI depends on the Human Capital Index (HCI) calculated from data provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The next third of the index is driven by the Online Services Index (OSI). The OSI is based on information collected from the independent Online Services Questionnaire (OSQ) by UNDESA [UNDESA 2018] (United Nations Department of Economic and Social Affairs), which assesses the national online presence of all 193 UN member states. This indicator also includes the E-Participation Index (EPI), a complementary index to the UN e-government survey, focusing on the government use of online services through electronic information sharing, e-consultation and e-decision. From 2018, an additional indicator, the Local Online Services Index (LOSI), was introduced, which takes into account the provision of e-government services at the city level of the entire United Nations. In 2019, the pilot Open Government Data Index (OGDI) was introduced, which is derived from the sub-indices: EGDI and OSI. The framework of this indicator is based on three key pillars, i.e. policy, platform and impact [United Nations E-Government Survey 2022: 210].

The methodological basis for the calculation of the EGDI remained consistent throughout the study periods, while its components (three index-building indicators) were updated to reflect new trends in e-government, telecommunications and human capital.

It is worth noting that until 2008, the EGDI was treated as a measurement of e-government readiness E-Government Readiness Index (EGRI) in the analyzed countries, only since 2010 the name of the indicator was changed to E-Government Development Index (EGDI), (the methodology has not changed much).

The composite value of each component index in question is then normalized to be between 0 and 1, and the overall EGDI value is obtained by taking the arithmetic mean of these three components. The report assumes that the value:

- within the range of 0,001–0,25 is assessed as a low value of the EGDI index (Low-EGDI),
- within the range of 0,2501–0,50 is assessed as the average value of the EGDI (Middle-EGDI),
- within the range of 0,5001–0,75 is assessed as a high value of the EGDI index (High-EGDI),
- within the range of 0,7501–1,00 is assessed as a very high value of the EGDI indicator (Very High EGDI).

The values of the EGDI index allow to create a ranking of countries according to the level of e-government development.

Considering the fact that the EGDI is relative, caution should be exercised in interpreting changes in its value. This is especially true for countries with similar positions in the ranking. A higher position does not necessarily mean a significantly higher level of e-government development. Each country independently decides on the level and scope of its own initiatives in this area, based on its specific cultural context and development policy. These decisions may affect the position occupied in the ranking, but this does not necessarily mean a significantly better or worse situation in a given country [Goliński, 2011: 77].

Moving on to the analysis of the information contained in the studies, it is clear that over the twenty years of creating reports by the United Nations, there has been a clear increase in the level of e-government service use. The average global level of the EGDI in 2003 was 0.402 (so it was at an average level), while in 2022 the index was 0.6102 (so it was already a high value of the EGDI). The group of countries with the highest level of the EGDI index in 2003 included 10 countries, while in 2022 there were already 73 of them. The number of countries with the lowest level of the EGDI index decreased. In 2003, there were 55 countries in this group, and in 2020 there were only 7 countries.

Focusing on the latest report from 2022, it should be noted that the group of countries with a low level of the EGDI indicator included (as stated above) 7 countries, the average level of this indicator regards 53 countries, the high level of the indicator was found in 73 countries, and a very high level of this indicator appeared in as many as 60 countries. Compared to the situation in 2020 (the previous United Nations E-Government Survey 2020 report), 8 countries joined the group of countries with a high and very high level of e-government development. As a result, the cumulative percentage of countries with a high and very high level of e-government development in 2022 reached as much as 69%. The top ten countries are Denmark, Finland, the Republic of Korea, New Zealand, Iceland, Sweden, Australia, Estonia, the Netherlands, the USA. Since the first UN eGovernment survey, Europe has always had the highest EGDI. Out of the 43 European countries surveyed in 2022, as many as 35 are in the group with a very high EGDI.

In 2022, the top ten countries with the highest EGDI level in the world included six European countries, including five belonging to the EU. They

were Denmark (1st in the world), Finland (2nd in the world), Iceland (5th in the world), Sweden (6th in the world), Estonia (8th in the world) and the Netherlands (9th in the world). All European countries have a high or very high EGDI.

Europe has earned this success because, regardless of the existing environmental, social and economic problems (i.e. progressing financial crisis, lower economic growth, unemployment, aging population, pandemic, war, etc.), European countries actively sought innovative solutions in terms of providing public services to citizens. Most of the countries in the region, despite the difficult situation, did not reduce the funds for investments related to e-government, and Ukraine and Serbia even increased them, as they moved from the group of high to very high EGDI for the first time [United Nations E-Government Survey, 2022: 71]. As a result, the region improved its EGDI from 0.817 in 2020 to 0.8305 in 2022. Latvia (up 12 ranking places), Belarus, Serbia (up 9 ranking places), Ukraine (an increase of 8 ranking places), Greece, Malta (an increase of 7 ranking places) and Bulgaria, Croatia, the Czech Republic, Iceland, Germany, Switzerland (an increase of 4 ranking places).

Table 1. EGDI in Europe in 2022

Country	EGDI index	Ranking place in the world	Ranking place in Europe
Albania	0,7413	63	35
Andorra	0,7177	76	39
Austria	0,8801	20	11
Belarus	0,758	58	34
Belgium	0,8269	39	24
Bosnia and Herzegovina	0,6256	96	42
Bulgaria	0,7766	52	32
Croatia	0,8106	44	27
Czech Republic	0,8088	45	28
Denmark	0,9717	1	1
Estonia	0,9393	8	4

Country	EGDI index	Ranking place in the world	Ranking place in Europe
Finland	0,9533	2	2
France	0,8832	19	10
Germany	0,877	22	13
Great Britain	0,9138	11	6
Greece	0,8455	33	20
Italy	0,8375	37	22
Ireland	0,8567	30	19
Iceland	0,941	5	3
Lichtenstein	0,8685	25	16
Lithuania	0,8745	24	15
Luxemburg	0,8675	26	17
Latvia	0,8599	29	18
Macedonia	0,7	80	40
Malta	0,8943	15	7
Moldawia	0,7251	72	37
Monaco	0,7228	73	38
Montenegro	0,726	71	36
Netherlands	0,9384	9	5
Norway	0,8879	17	8
Poland	0,8437	34	21
Portugal	0,8273	38	23
Russia	0,8162	42	26
Romania	0,7619	57	33
San Marino	0,6454	90	41

Country	EGDI index	Ranking place in the world	Ranking place in Europe
Serbia	0,8237	40	25
Slovakia	0,8008	47	30
Slovenia	0,8781	21	12
Spain	0,8842	18	9
Switzerland	0,8752	23	14
Sweden	0,941	5	3
Ukraine	0,8029	46	29
Hungary	0,7827	51	31

Source: the author's own work: United..., 2022: 213–220.

Summing up the above analysis, it should be emphasized once again that the level of the EGDI index is increasing all over the world. Every year, individual countries introduce new solutions in the field of e-government. Regional differences, on the other hand, result from the level of development of countries.

3. The use of e-administration services in Polish voivodeships

The previous subchapter shows the development of e-government in the world, with particular emphasis on European countries. In this subchapter, the author wanted to present the territorial differentiation in Poland in terms of e-government indicators. Information on individual voivodeships has been available only from 2014, therefore further research concerns the period 2014–2022.

In order to present how the level of using e-administration services in Polish voivodeships has developed, it is necessary to use a method which allows to make a comparison of individual variables adopted in the study.

Changes in the use of e-administration services in voivodeships were assessed using the Perkal index. The study used the following five variables:

- X1: number of people using the Internet in the last 12 months,
- X2: number of people using public administration services via the Internet in the last 12 months,
- X3: number of people using public administration services via the Internet in the last 12 months to search for information on public administration websites,
- X4: number of people using public administration services via the Internet in the last 12 months to download official forms
- X5: number of people using public administration services via the Internet in the last 12 months to send completed forms.

The calculations were made by determining the development pattern for each year separately, which allowed to organize the objects in a given year. It should be noted that all variables adopted for the study were stimulants[1] [Młodak, 2006: 33] and the same weights were used for all variables.

Perkal's indicator enables comparison of individual measures and obtaining one synthetic indicator of the level of using e-administration services in voivodeships. This process includes the following phases [Szymala, 2005: 101–111]:

1. standardization of individual indicators adopted for research, as a result of which all indicators expressed in standardized units become comparable and can be summed up (they have a zero mean and the same standard deviation). Standardization was made for stimulants according to the formula:

$$t_{ij} = \frac{x_{ij} - \overline{x}_j}{S_j} \text{ dla } i = 1,2,\ldots 16;\ j = 1,2,\ldots 5$$

2. calculation of synthetic indicators () of the level of using e-government services via the Internet according to the formula:

$$W_i = \frac{\sum_{j=1}^{n} t_{ij}}{m}$$

[1] Stimulant – a feature whose the high values of which are desirable from the point of view of the essence of the study. The higher the stimulant values, the better the object is qualified.

where:
t_{ij} – the standardized value of the observation in the *i*th case and the *j*th variable,
m – number,
x_{ij} – the original value of the *i*th case of the *j*th variable,
$\bar{x}_j$, S_j – arithmetic mean and standard deviation of the *j*th variable.

The obtained values are close to 0, which means that the voivodships with the highest use of e-government services will take the value of the indicator above 0, the voivodeships with the average use of e-government services will oscillate around the value of 0, while the voivodeships with the least use of e-government services e-government will assume values below 0.

When analyzing the X1 variable - concerning the number of people using the Internet in the last 12 months, it can be seen that in the years 2014–2022, the largest number of people used this service in the Zachodniopomorskie, Śląskie, Mazowieckie and Pomorskie voivodships. The lowest interest in the analyzed years was noted in the Lubelskie, Świętokrzyskie, Kujawsko-Pomorskie and Opolskie voivodeships.

Another variable concerned the number of people using public administration services via the Internet in the last 12 months. The Mazowieckie, Dolnośląskie, Śląskie and Pomorskie voivodeships ranked highest in terms of this variable. Unfortunately, in 2014, the Wielkopolskie and Świętokrzyskie voivodeships were in the lowest position, and the difference was even 13.4 p.p. (compared to the Mazowieckie voivodeship). In 2015, the smallest number of people used public administration services via the Internet in the Świętokrzyskie, Kujawsko-Pomorskie and Opolskie voivodships. The difference between Mazowieckie and Świętokrzyskie was 17.5 p.p. In 2022, the Dolnośląskie Voivodeship was the leader in using public administration services via the Internet (63.8%), while the Opolskie (44%), Podlaskie (44.7%), Podkarpackie (47.6%) and Lubuskie (47%).7%) were in the lowest positions.

In the years 2014–2022, the Mazowieckie Voivodeship ranked first in terms of the number of people using the Internet to obtain information on public administration websites (X3). On the other hand, in the Świętokrzyskie Voivodship, the lowest values of these indicators were recorded in 2014–2017 and 2019–2021, while in 2018, the Podkarpackie Voivodeship was in the last position, while in 2022, the Małopolskie Voivodeship was in the last position. The difference between Mazowieckie and Świętokrzyskie in 2014 was 15.9 p.p., while in 2018 the difference between Mazowieckie and Podkarpackie

was 19.5 p.p. and in 2022 the difference between the Mazowieckie and Małopolskie voivodeships was 14.2 p.p.

The analysis of data on variable X4 - the number of people using public administration services via the Internet in the last 12 months to download official forms, indicates that the Mazowieckie Voivodship (2014, 2018, 2019, 2021 and 2022), Małopolskie Voivodeship was in the top position (2015), Pomeranian (2016), Zachodniopomorskie (2017) and Lower Silesian (2020). The lowest places were taken by the Wielkopolskie (2014), Świętokrzyskie (2015 and 2022), Warmińsko-Mazurskie (2016 and 2019), Podkarpackie (2017 and 2018), Opolskie (2020) and Lubelskie (2021) voivodeships. The difference in 2014 between the leader and the voivodeship in the last position was as much as 11 p.p. in 2014, and 15.7 p.p. in 2022.

When analyzing the last variable X5 – the number of people using public administration services via the Internet in the last 12 months to send completed forms, it is noticeable that the Mazowieckie Voivodeship (2014 – 20%, 2018 – 29.4% and 2020 – 43.7%), Małopolskie (2015 – 19.9%), Śląskie (2016 – 23.1% and 2019 – 42.4%), Zachodniopomorskie (2017 – 29.6%) and Dolnośląskie (2021 – 47.8% and 2022 – 69.6%) occupy the first positions in the analyzed years. Unfortunately, the Opolskie (2014 – 9.8%), Świętokrzyskie (2015 – 7.5% and 2016–12.2%), Lubuskie (2017–12.4% and 2018–18.3%), Lubelskie (2019 – 23.1%, 2020 – 26.5% and 2021 – 28.9) and Podlaskie (2022 – 31.7%) took the lowest positions of the analyzed variable. The difference between Mazowieckie and Opolskie in 2014 was 10.2 p.p., while in 2022 the difference between Dolnośląskie and Podlaskie was 37.9 p.p.

The rankings of voivodships were prepared on the basis of the conducted analysis. Table 2 presents the values of the calculated measures of the level of use of e-government services in Polish voivodeships in 2014–2022.

Considering the border years of 2014 and 2022, it was noted that the largest recorded differences include 11 ranking places in the Wielkopolskie Voivodship, 6 ranking places in the Lubelskie Voivodship and 5 ranking places in the Kujawsko-Pomorskie Voivodship. These voivodships advanced to higher positions in 2022 compared to 2014. On the other hand, in the Małopolskie and Opolskie voivodeships there was a noticeable drop from a higher position in 2014 to a lower position, which had a negative impact on the position of these voivodeships in 2022 and the difference was 7 places in the ranking.

Table 2. Perkal value indicator describing the level of use of e-government services in Polish voivodeships in 2014–2022 and rankings of voivodeships

Voivodeship	2014		2015		2016		2017		2018		2019		2020		2021		2022	
	W_i	rank	W_i	rank	W_i	rank	WW_i	rank	W_i	rank	W_i	rank	W_i	rank	W_i	rank	W_i	rank
dolnośląskie	1,2520	3	0,7245	3	0,0091	6	0,0518	9	0,3741	5	0,9575	4	1,481	2	1,4514	2	1,4383	1
kujawsko - pomorskie	-0,4057	10	-1,4123	15	-0,7782	13	0,2547	5	-0,0519	10	0,1988	6	0,091	5	0,6776	4	0,6350	5
lubelskie	-0,7065	14	-0,2583	12	-0,2208	8	-1,2350	16	-1,0169	15	-1,1558	16	- 0,880	14	-1,4049	16	-0,0481	8
lubuskie	-0,6213	12	-0,0779	9	-0,8792	15	-0,8918	13	-0,9479	14	-0,4480	11	- 0,435	12	-0,4754	11	-0,6085	12
łódzkie	-0,3335	8	-0,5574	14	-0,4788	11	-0,5013	11	-0,3409	11	0,0060	7	- 0,249	10	-0,3608	9	-0,0612	9
małopolskie	0,8274	4	0,9943	2	1,2265	3	-0,0236	10	0,6005	4	-0,5434	13	- 0,320	11	0,0566	8	-0,5227	11
mazowieckie	2,0413	1	1,5478	1	1,5853	1	1,1633	3	1,6657	1	1,3045	3	2,206	1	1,9316	1	1,3705	2
opolskie	-0,3745	9	-0,2281	11	-0,2049	7	0,0698	8	-0,8623	13	-0,5259	12	- 1,409	16	-0,8958	13	-1,2025	16

Voivodeship	2014		2015		2016		2017		2018		2019		2020		2021		2022	
	w_i	rank	w_i	rank	w_i	rank	ww_i	rank	w_i	rank	w_i	rank	w_i	rank	w_i	rank	w_i	rank
podkarpackie	-0,6175	13	0,1247	7	-0,5061	12	-1,0200	15	-1,7574	16	-1,1012	14	- 0,134	9	-0,9008	14	-1,0071	13
podlaskie	-0,4507	11	0,7032	4	-0,4248	10	-0,8960	14	0,2933	6	-0,0755	8	- 0,699	13	-0,4421	10	-1,1869	14
pomorskie	1,5837	2	-0,1501	10	1,0349	4	1,3713	2	1,2387	2	1,4903	1	0,054	7	1,1616	3	0,4667	6
śląskie	0,0757	5	0,5570	5	1,2974	2	0,5987	4	0,8510	3	1,3309	2	0,850	3	0,1302	6	0,9631	3
świętokrzyskie	-1,0736	16	-2,0180	16	-1,4451	16	-0,6678	12	-0,6501	12	-0,3205	10	- 1,044	15	-1,0939	15	-1,1999	15
warmińsko - mazurskie	0,0007	6	-0,0543	8	-0,7983	14	0,0785	7	0,2747	7	-1,1501	15	0,081	6	-0,5505	12	-0,1895	10
wielkopolskie	-0,9150	15	-0,3270	13	-0,3371	9	0,1779	6	0,2483	8	-0,3165	9	- 0,074	8	0,6093	5	0,9307	4
zachodnio-pomorskie	-0,2822	7	0,4319	6	0,9201	5	1,4694	1	0,0810	9	0,3489	5	0,480	4	0,1058	7	0,2222	7

Source: the author's own work: GUS, 2014; GUS, 2015; GUS, 2016; GUS, 2017; GUS, 2018; GUS, 2019; GUS, 2020; GUS, 2021; GUS, 2022.

Analyzing the ranking based on equal weights, the analysis of the value of the synthetic measure of use shows that Polish voivodeships in particular years occupied different places in the classification regarding the use of e-government services. The example of the Wielkopolskie Voivodeship, which in 2014 was ranked 15th among the 16 regions covered by the study, is extremely interesting. In 2015, this voivodeship was promoted to the 13th position, in 2016 it took the 9th place, in 2017 it took the 6th place, in 2018 it took the 8th place, in 2019 – 9th place, in 2020 – 8th place, in 2021 – 5th place, and in 2022 it took 4th place in the classification of the Perkala index. Podlaskie Voivodeship also deserves special attention, because from 11th place in 2014 with a negative value of the Perkal index -0.4507, in 2015 it was promoted to the 4th place in the analyzed ranking with a positive value of this index of 0.7032. In 2016, the value of this indicator decreased again and amounted to -0.4248, which resulted in the voivodship dropping to the 10th position. In the next considered year, 2017, the value of the Perkal index decreased to -0.8960, which contributed to the fall to 14th place among all Polish voivodships. In 2018, the value of the examined indicator increased and amounted to 0.2933, which meant that Podlaskie Voivodeship took a high 6th position in the ranking of all voivodeships, while from 2019 it again takes negative values and in 2022 it is ranked 14th among voivodeships. A similar situation took place in the Warmińsko-Mazurskie and Opolskie Voivodships. This means that these voivodships, compared to others, are characterized by high dynamics of change in terms of the level of use of e-government services.

The Łódzkie, Małopolskie, Mazowieckie, Opolskie, Podlaskie, Pomorskie and Warmińsko-Mazurskie voivodships in 2022 were ranked lower than in 2014.

Thanks to the use of the Perkal index, a general picture of the spatial differentiation of voivodeships in terms of the use of e-government services in the years 2014–2022 was obtained. Voivodships were classified on the basis of the obtained values of the synthetic Perkal measure. The basis for obtaining classes are the ranges assumed by the indicator based on the arithmetic mean and standard deviation. The author decided to distinguish four classes. The classes of the tested objects were obtained using the formula [Makać, 1998: 56–70]:

Class I – high use of e-government services, marked in dark grey:

$$q_{it} \geq \overline{x} + s$$

Class II – medium-high use of e-government services, marked in gray:

$$\overline{x} + s > q_{it} \geq \overline{x}$$

Class III – medium low use of e-government services, marked in light gray:

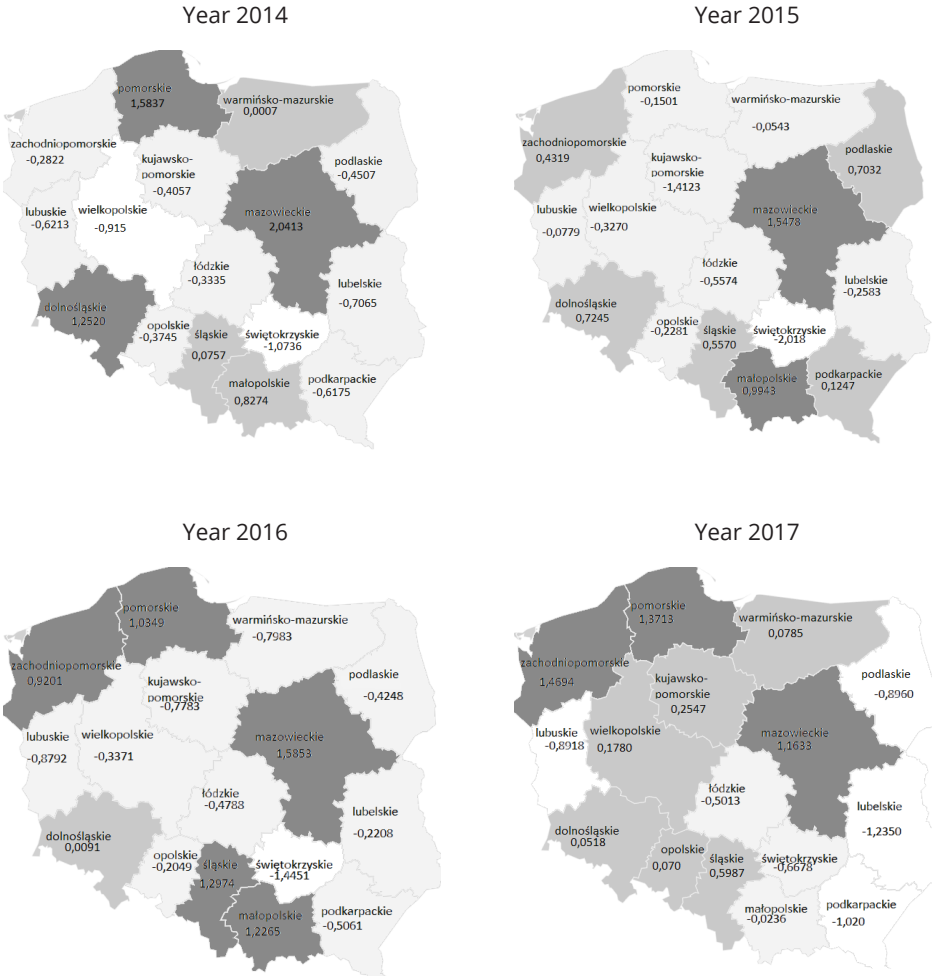
$$\overline{x} > q_{it} \geq \overline{x} - s$$

Class IV – low use of e-government services, marked in white:

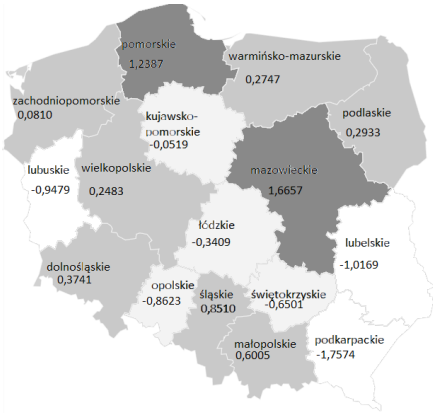
$$q_{it} < \overline{x} - s$$

The conducted research made it possible to assign voivodeships in terms of the achieved level of use of e-administration services. The results obtained in individual years are presented in Figure 1.

Figure 1. Perkal's value indicator describing the level of use of e-government services in Polish voivodships in 2014–2022



Year 2018



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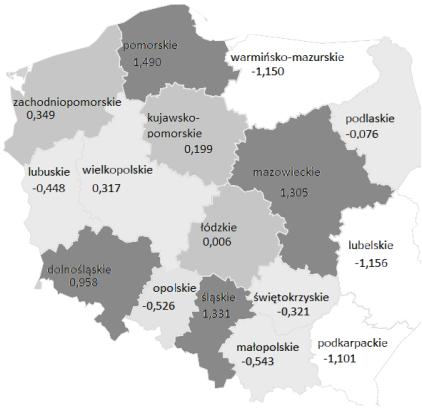

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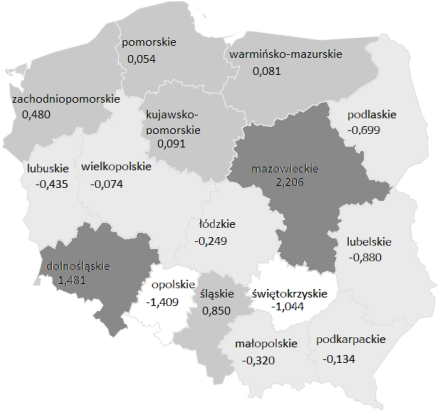

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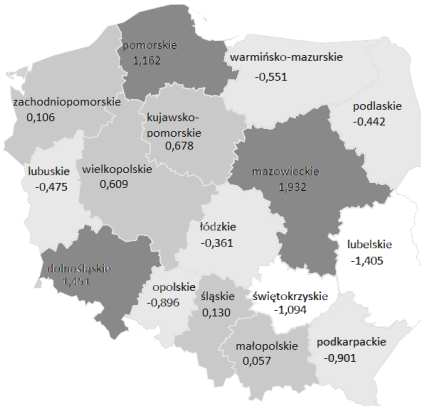
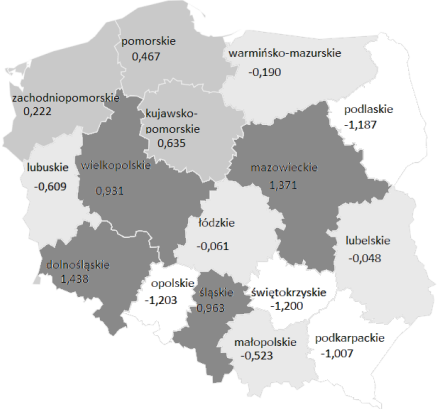
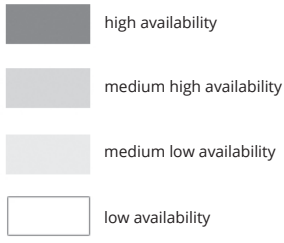


Year 2022





Source: the author's own work.

The ranking of voivodeships obtained with the use of the Perkal method indicates that the Mazowieckie Voivodeship is the undisputed leader in using e-government services in the analyzed period.

The voivodeships characterized by highest degree of use of e-government services also include Dolnośląskie and Pomorskie, which only in 2015 were in the category of low use. The category of voivodships characterized by an average-high use of e-government services includes the Śląskie, Warmińsko-Mazurskie, Małopolskie and Zachodniopomorskie voivodeships. The remaining voivodships can be assigned to the category of low use of e-government services.

Looking at the value of the Perkal index from 2022, it is noticeable that only the voivodeships of Zachodniopomorskie, Dolnośląskie, Wielkopolskie, Kujawsko-Pomorskie, Lubelskie, Małopolskie and Śląskie achieved a higher index than in 2014.

Considering the border years of 2014 and 2022, it was noted that the largest recorded differences include 11 ranking places in the Wielkopolskie Voivodship, 6 ranking places in the Lubelskie Voivodship and 5 ranking places in the Kujawsko-Pomorskie Voivodship. These voivodships advanced to higher positions in 2022 compared to 2014. On the other hand, in Małopolskie and Opolskie voivodeships there was a drop from a higher position in 2014 to a lower position, which had a negative impact on the position of these voivodeships in 2022 and the difference was 7 places in the ranking.

To sum up, it should be stated that belonging to classes is variable, and a positive trend is that the number of voivodeships included in the lowest utilization class is decreasing.

4. Conclusions

On the basis of the conducted analysis, an intensive development of e-government in Europe can be observed. Denmark and Finland are characterized by the highest indicator of the development of e-administration services in Europe and in the world. In turn, the lowest rate in 2022 is in Bosnia and Herzegovina, Macedonia and San Marino, which may result from the opportunities that EU citizens have in the conscious and widespread use of information and communication technologies [Gąsiorek, 2017: 142]. The analysis and assessment of the development of e-government services in the EU leads to the conclusion that there are significant disparities between Member States. Spatial inequalities in

the level of development of electronic administrative services may be evidenced by the number and size of territorial units.

The level of development of e-administration services in Poland is higher than the average European index by 0.2335, but the interest in downloading and sending completed forms is too low. The best position in this respect in 2022 was taken by the Mazowieckie Voivodeship, and the weakest by the Podlaskie Voivodship. This situation may result from the fact that society does not have much confidence in sending documents electronically, because some procedures require personal appearance at offices (e.g. in the case of missing documents). Another shortcoming may be the lack of sufficient competence and concern for the security of personal data. An intuitive smartphone application that saves time and, above all, a free and easy way of data authentication could increase interest in e-services [Kokot-Stępień, Piersiala, 2019: 102].

From the research conducted, it can be concluded that these indicators will gradually increase in the coming years, because more and more offices accept applications only electronically (e.g. ARiMR – applications for area payments, Tax Office – PIT declarations).

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