E-Government in Poland in public data and opinions of Poles: empirical analysis

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ABSTRACT

In Poland, economic backwardness and communism delayed the transformation of the government into the e-government comparing with Western Europe. Now, it has been gradually developing and the majority of Poles declare to use electronic administration services. Comparing with other Eastern European countries, the Polish e-government is ranked second in the region, but Eastern Europe as a region has the lowest score in the whole continent. There is a noticeable underdevelopment in this part of Europe regarding e-government. The main research goal presented in the article is to diagnose the current state and barriers and opportunities for the development of e-government in Poland. To achieve the goal, the authors use the quantitative and qualitative data analysis based on their own survey made among Poles in 2018 and statistical data provided by public institutions in Poland. The article attempts to answer the question of how does e-government work in Poland from the perspective of citizens and authorities? The issue has been presented in the form of an analysis of empirical data regarding experience and opinions among Poles on electronic administration tools, as well as statistical data regarding information and communication technologies in use by public institutions and households in Poland.

CCS CONCEPTS

• **Applied computing** → **Computers in other domains** → Computing in government → *E-government*

KEYWORDS

e-government in Poland, e-services, public services

ACM Reference format:

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1. INTRODUCTION

Communism and economic backwardness have delayed the introduction of the digital technology in the public administration in Poland comparing with West European countries. Despite the later start, e-government in Poland develops gradually and the majority of Poles have declared to use electronic administration services. When we compare e-government in Poland with other Eastern European countries, we can see that Poland is ranked second in the region (0.7926 according to UN E-Government Survey 2018 [1]), but Eastern Europe as a region has the lowest score in the whole continent. So there is a noticeable underdevelopment in this part of Europe regarding e-government.

Governments in countries around the world have been gradually employing the ICT in services delivered by the public administration. The main goal of the transformation to e-government is to increase the quality and effectiveness of services delivered by the state. As noticed by the OECD, “E-government is now widely recognised as fundamental to reform, modernize and improve the government” [2]. Traditionally, e-government has been understood as the use of ICTs for improving the efficiency of government services and moving them online. Later, the framework of e-government has broadened to include use of the ICT by the government for a wide range of interactions with citizens and businesses, as well as open government data and use of ICTs to enable innovation in governance [1]. According to the definition by Rachel Silcock, “e-government is the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees. It has the power to create a new mode of public services where all public organizations deliver a modernized, integrated and

seamless service for their citizens” [3]. It has been emphasized that e-government services have a great potential in facilitating democratic activities, particularly in decision-making, campaigning, public feedback, opinion polling, or communication [4]. E-government is considered to be the use of new technologies (mainly the Internet) to reach higher level of government. The term e-government is also defined in a more detailed way - as the use of ICT by the public sector to improve the efficiency and effectiveness of the functioning of the public sector, providing citizens and businesses with better access to information and services and to facilitate interaction and exchange information with interested parties. It should be noted that the aim of transforming government into e-government is the guarantee greater opportunity for citizens’ participation in democratic processes [5].

The United Nation have pointed to an increasing role of ICTs and development of a model and policy framework for integrating electronic governance programs with the sustainable development initiative as one of sustainable development goals. Undoubtedly, the implementation of e-governance programs to enhance sustainable development in countries around the world is related with the foundation of the sustainable development concept that comprises a multi-dimensional and comprehensive development which is based on permanence and periodical improvement in the quality of life [6]. One of important elements of sustainable development in a state, region or a city is the focus on process socialization. Active engagement of citizens guarantees better understanding of societal needs, and consequently enhanced efficacy of activities and policies.

Although in general the literature on e-government is sizable, regarding definitions [3, 5, 7, 8, 9, 10, 11, 12] and practice – preparation and reception by citizens [13, 14, 15, 16, 17, 18, 19], the topic is fairly new in Poland. This confirms the fact that until today no research has been implemented in Poland regarding the use of e-government tools by citizens. Moreover, it seems that readiness and openness of citizens to the communication with the government supported by e-tools exceeds the capability of electronic services in the country. For this reason, we have decided that it is insufficient to examine public data available regarding the use of e-government tools, and it is worth surveying citizens and asking them about their experience and expectations in the area. The main research problem described in the article is connected with the question of how does e-government work in Poland from the perspective of citizens and authorities? The issue has been presented in the form of an analysis of empirical data regarding experience and opinions among Poles on electronic administration tools, as well as statistical data regarding information and communication technologies in use by public institutions in Poland. The analysis focuses on several questions included in the survey with the goal of verifying the following hypotheses: 1. Citizens expect public services to be provided via electronic channels. 2. The attitude of Poles towards e-services depends on their sex, age, education and domicile. 3. Openness to electronic democracy tools has been growing together with experience in using them. 4. Barriers for the use of electronic services result from both demographic factors and technological

discrimination. The purpose of the above is to diagnose the current state and barriers and opportunities to develop e-government in Poland. To achieve the goal, the authors use the analysis of quantitative and qualitative data (described in detail in Methodology section) from the own survey among Poles in 2018 and statistical data provided by public institutions in Poland.

2. THE EVOLUTION OF E-GOVERNMENT IN POLAND

Understanding the e-government in Poland is associated with a broader perception of the phenomena (highlighted by European Union or United Nations). This refers more to the processes of transformation and new perception of administration due to the growing popularity of e-government and its benefits. Despite the fact that the article is based on the narrow definition of e-government (reduced to e-services mainly), the authors are fully aware that e-government may (and should be) understood not only as a way of improving and accelerating the process of dealing with official matters, as well as providing citizens with the opportunity to do it without leaving their homes. The latter is not only more convenient, but it is also as a way of involving citizens in democratic processes and public decision-making.

The idea of e-government appeared in Poland about 25 years ago, but in fact the first public discussion on e-Government (in European context) started in 1994 after the European Commission published a report entitled “Europe and the global information society. Recommendations for the Council of Europe” (called “Bangemann Report”). The document indicated key directions for the development of social global information in Europe. In Poland, however, this did not entail any significant activities aimed at implementing e-government solutions in practice. The real beginning of a broader debate on the development of e-government in Poland began after the publishing of the Action Plan for the Development of e-government in 2005–2006.

It should be noticed that it is difficult to discuss the Polish e-government without considering it in the EU context. The development of electronic undertakings implemented by the Polish government was closely associated with the integration processes. Before the EU accession, Poland had to fulfill a number of conditions, which included some related to implementation of e-government solutions [20]. Then, the concept of e-government was explicitly referred to in the Information Society Development Strategy until 2013 [21].

Currently, the development of e-government in Poland is based on documents that indicate directions for the evolution of policies and services. Apart from the “Efficient State 2020 Strategy” [22], the key document related to the implementation of e-Government in Poland is the “Program for the Integrated State Informatization” until 2020 [23]. Additionally, it should be noted that as a part of the “Long-Term National Development Strategy. Poland 2030. The third wave of modernity” [24], adopted by the Ministry of Administration and Digitization, indicated one of the most important goals, namely the “creation of Digital Poland”. A very important document aimed at strengthening of the foundations for the development of a digital country (including broad access to

high-speed Internet, efficient and user-friendly public e-services etc.) is the “Operational Programme Digital Poland 2014-2020” [25].

While focusing on the practical dimension of e-government, it should be noted that currently Polish citizens can use about 600 public e-services on various government platforms and portals. These include Electronic Platform of Public Administration Services (ePUAP), Electronic Services Platform of the Social Insurance Institution (PUE ZUS), obywatel.gov.pl (citizens.gov.pl) portal, biznes.gov.pl portal. Currently, the Portal of the Republic of Poland is under construction, which will ultimately be the gateway to all public information and e-services. It will integrate websites of ministries, central offices and provincial offices and will facilitate access to digital services that the state offers to citizens. Public services can also be used by anyone who can confirm their identity online, e.g. by using a trusted profile (eGO). A trusted profile is also a free tool that serves the purpose of an electronic signature in communication with public administration.

The analysis of data related to the development of digitization and e-government allows us to draw the conclusion that the level of development of Polish e-government is still not satisfactory. As one may see from the European Commission report on e-government development, other countries in Europe have achieved much better results. Although the trend is improving, still Polish citizens do not use the internet in their interactions with public authorities (See: Figure 1).

Figure 1: Percentage of individuals using the Internet for interaction with public authorities in Poland.

Source: Eurostat Information Society Indicators.

When it comes to filing documents with public authorities, the situation looks better, which is due to a rapid increase in the number of citizens who send their annual tax returns via the Internet. This trend has been observed for several years. Since the

possibility of submitting e-tax returns was introduced in 2008, the number of people submitting them electronically has been steadily growing: from 390 e-declarations in 2008, 87,000 in 2009, 3.5 million 5 years after the introduction of the e-tax return (2013) and 9.6 million in 2017 (in 2017, Poland exceeded 50 percent of all tax returns filed), up to 16 million in 2019 (about 5 million more than a year ago). According to the Ministry of Finance, such a good result was due to a new service of Twój e-PIT (Your e-PIT), which the Ministry launched in 2019. Consequently, the National Tax Administration (KAS) has prepared tax returns for taxpayers. Despite initial problems, system overload and difficulties to log-in, the vast majority of taxpayers have chosen this form of filing their tax returns.

Figure 2: Percentage of individuals using the Internet for sending forms to public authorities in Poland.

Source: Eurostat Information Society Indicators.

The filing of income tax returns is the main reason why Polish citizens use digital public services. Comparison of the level of filing with other EU countries (especially old member states) leads to surprising findings, since it is still almost twice lower than in other countries [26].

If we take into account data from the latest UN E-government Survey 2018 report [1], we may note that in two years Poland has advanced from 36th to 33rd place among 193 countries (presented in Table 1). The change can be described as a relative success. However, it should be emphasized that Poland was already ranked 33rd in 2008.

Table 1. EGDI and EGDI Sub-Components for Poland in 2018 and 2016.

	2018	2016	change
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E-Government Development Index (EGDI)	0.7929	0.7211	0.0718
Online Service Index (OSI)	0.9306	0.7029	0.2277
Telecommunication Infrastructure Index (TII)	0.5805	0.5857	-0.0052
Human Capital Index (HCI)	0.8668	0.8747	-0.0079

Source: UN E-Government Survey 2018 and UN E-Government Survey 2016.

In the meantime, it was ranked 47th in 2012 and 42nd in 2014. It is worth emphasizing that the Poland's overall E-Government Development Index is 0.7926. The analysis of individual EGDI components shows that the improvement has not been recorded in every area.

As regards the OSI, in 2018, Poland had the best result in the region, whereas in the case of the TII, the region's leader is Belarus with the score of 0.6881, while the HCI is the highest in the Czech Republic and amounts to 0.8752 [27].

The United Nations rated Polish Internet infrastructure (and access to the Internet) as low. Despite the fact that the coverage of the mobile communication network is above the world average, the fixed broadband Internet access still leaves much to desire in Poland. Therefore, the high-speed Internet coverage is crucial for further digitization of Poland. Undoubtedly, it should help spreading e-services in Poland.

An optimistic factor is that there are many grants offered for the purpose. It is worth noting that the Ministry of Digitization has been taking steps to develop telecommunications infrastructure and access to e-services. Current activities focus on introducing a single login to public websites and portals. A solution called the "national hub" is expected to integrate various government portals and services via electronic banking. The new system should be ready by 2020.

3. E-GOVERNMENT IN POLAND IN 2018: EMPIRICAL ANALYSIS

To diagnose e-government in Poland in 2018, below presented are results of two studies. The first one is the survey involving a representative sample of respondents who completed a questionnaire. The questionnaire consisted of questions and statements referring to political preferences and the participation in elections, as well as the use of the Internet and respondents' opinions on electronic voting and electronic administration. The second study is based on the analysis of statistical data provided by the Polish Central Statistical Office (CSO) – 2018 reports on the use of information and communication technologies by public administration units and households [28].

3.1. E-government in the opinions of Poles

This part of the article presents descriptive statistics accompanied by statistical tests that verify the following hypotheses: 1. Citizens expect public services to be provided via electronic channels. 2. The attitude of Poles towards e-services depends on their sex, age, education, and domicile. 3. Openness to electronic democracy tools has been growing together with experience in using them.

The study is based on the results of the 2018 survey involving a sample of 1717 Poles. The sampling is based on quota and demographic features of the population. In each province, the size of the sample was proportional to its total population. The sampling also took into consideration sex and age. Respondents had a choice between paper and electronic versions of the questionnaire which contained questions and statements referring to their participation in elections and political preferences, use of the Internet, as well as a number of statements on electronic voting and electronic administration. Most of them completed a paper version of the questionnaire, but respondents could also complete the electronic one available for all web users.

3.1.1. Methodology

Results of the research on e-government in the opinions of Poles presented below are based on two statements that refer to their experience with e-services, as well as their declaration to use them more often if possible. At this point, we treat e-government in its narrow meaning, while concentrating on public services only, according to the conception that e-government refers to the delivery of information and services online through the Internet and other digital means [29]. This is consistent with the Silcock's definition (e-government is the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees [3]); however, we have neglected businesses and focused on citizens only (as G2C model consists of the digital interactions between a government and citizens [30]).

The empirical analysis is based on answers given by respondents to the following statements included in the questionnaire:

- I use electronic administration services (e.g. I send documents to institutions over the Internet, I send emails to authorities, I send my tax returns via Internet etc.).
- I would like to have more opportunities to deal with official matters over the Internet in Poland.

Answers were expressed by using the Likert scale, so the respondents could choose one out of five possible options: definitely yes, rather yes, yes, hard to say, rather no, definitely no. While processing results, each option was coded in numbers as follows: definitely yes – 5 points, rather yes – 4 points, hard to say – 3 points, rather no – 2 points, definitely no – 1 point.

The analysis of basic descriptive statistics is accompanied by Kolmogorov-Smirnov tests, Mann-Whitney U tests, Kruskal-Wallis tests, χ^2 tests and Fisher's exact tests. The significance level was determined at the classical cut-off value $\alpha = 0.05$; However, probability results at $0.05 < p < 0.1$ were interpreted as significant at the statistical tendency level. In the case of quantitative variables, a series of non-parametrical Mann-Whitney U tests were performed due to significant differences in the composition of groups compared, whereas in the case of nominal variables, a series of χ^2 tests were performed. Abbreviations used in the tables: AVG – average; SD – standard deviation; U – Mann-Whitney U test result; Z – standardized value; p – statistical significance; r –

effect size. Moreover, the tables 2 and 3 show also results of a series of Kruskal-Wallis tests. Statistically significant results are recorded for almost all items. Non-parametric multivariate analyses were performed due to quantitative differences between groups, followed by χ^2 tests and Fisher's exact tests. Letters are used to mark statistically significant differences at the level of $p < 0.05$ (post-hoc Dunn-Sidak tests).

3.1.2. Results of empirical research

The analysis starts with primary descriptive statistics pertaining to quantitative variables together with the Kolmogorov-Smirnov (K-S) test which verified the normal distribution of variables. According to table 1, all distributions examined differed significantly from the Gauss distribution, as supported by the K-S test. However, the skewness of those distributions remained within the range of -2 to +2. Therefore, we may assume that distributions were not significantly asymmetrical around their median.

The table below (Table 2) contains figures (expressed as percentage of answers) which support a positive verification of hypothesis no 1: Citizens expect public services to be provided via electronic channels; as well as hypothesis no 3: Openness to electronic democracy tools has been growing together with experience in using them. Assuming that statement two (I would like to have more opportunities to deal with official matters over the Internet in Poland) expresses the expectation of the public towards e-public services, we may say that the hypothesis was successfully verified. Nearly 80% of respondents answered "yes" (closely: "definitely yes" or "rather yes") to the statement, and the average for their answers was 4.28. This is even higher result than for the first statement (I use electronic administration services) that got the average of 3.46 (nearly 70% of respondents answered "yes" to this statement). Moreover, the verification of correspondence between answers to these two statements, the correlation was high ($r=0.59$; $p<0.05$). The conclusion is that if someone uses e-government services, the person would like to have more such services offered.

Table 2: Answers to statements regarding e-government.

Statement 1: I use electronic administration services (e.g. I send documents to institutions over Internet, I send email to authorities, I send my tax returns via Internet etc.) (% of answers)							
5	4	3	2	1	AVG	K-S	p
31.45	27.8	5.4	16.43	14.91	3.46	0.26	<0.001
Statement 2: I would like to have more opportunities to deal with official matters over the Internet in Poland (% of answers)							
5	4	3	2	1	AVG	K-S	p
55.37	23.24	9.06	5.68	2.64	4.28	0.33	<0.001

To verify hypothesis no 2: The attitude of Poles towards e-services depends on their sex, age, education, and domicile, a separate analysis for both statements has been provided (see: Tables 2 and 3). The tables below (Tables 3 and 4) show that a non-demographic factor differs the answers to the statements. While

examining results for different sex, it turns out that answers given by women and men do not show statistically significant differences. The average for both groups has a similar value.

It is different, however, when we compare the age of respondents, since it diversifies answers. For both statements, the highest results were noted in groups 35-44 (about 74% of respondents in that group stated "definitely yes" or "rather yes" for the first statement; the average was 3.91; and 90% of respondents in that group answered "definitely yes" or "rather yes" to the second statement; the average was 4.53) and 25-34 (about 73% of respondents in that group stated "definitely yes" or "rather yes" for the first statement; the average was 3.81; and about 90% of respondents in that group stated "definitely yes" or "rather yes" while responding to the second statement; the average was 4.51). Although the groups did not differ regarding the level of statistical tendency, they were different from three other age groups. As regards statistical significance, other differences between groups are negligible. Major differences are recorded in the group 65+ which was statistically significantly different than all other groups. Answers given by the oldest respondents varied and they got the lowest score for the first statement (about 40% of respondents in that group stated "definitely yes" or "rather yes", and about 50% "definitely no" or "rather no"; the average was 2.69), as well as for the second one (slightly less than 60% answers were "definitely yes" and "rather yes", average 3.65). Slightly higher results were recorded for groups of 45-54 (average 3.57 and 4.36) and 55-64 (average 3.28 and 4.09).

We can see that results are inversely proportional (but not linearly) to the age of the surveyed from the oldest to the average age groups. The lowest results regarding all statements are recorded in the oldest group of respondents, whereas the highest in the group of 35-44. The survey does not take into account professional situation of the respondents. However, we may suppose that people at the age of 35-44 are professionally active so e-services are the convenient solution for them (administration offices working hours coincide with professional working hours so they prefer to settle an official matter online). A slight drop from the lowest average can be found in groups of 25-34 and 18-24. This leads to the question about reasons of the situation. The survey does not include this question but we can see a relationship between the results and political activity of young people, which has been broadly described in the literature. It is a legitimate inference that a limited use of e-government services is associated with a specific period in the life of young people. They are not yet independent and they concentrate on different than civic issues. Being students, for example, they care more about the examinations and friends than paying taxes. Although it plays a secondary role in their life [31], social, cultural or ideological heterogeneity of that group reflects the processes of becoming a fully-fledged member of the society. At the same time, the young generation shows unprecedented interest in the ICT. Therefore, we may expect that one they start using public services, they will expect them to be available online.

The next factor analysed is education. The factor contributed to a significant variety of answers to questions. We decided not to include in the table reflecting the analysis the group of uneducated people because it consisted of two people only. As regards the first statement, convergence was the highest in the group of people with higher education, which translated into the highest result (about 71% of respondents in that group stated “definitely yes” or “rather yes”; average 3.77). The group showed statistically significant differences comparing to other groups (except for uneducated respondents). Slightly lower results were recorded in the group of people with middle and post-secondary education (about 57% of respondents in that group stated “definitely yes” or “rather yes”, average 3.33). The group showed statistically significant differences comparing with groups of primary/junior secondary education (about 43% of respondents in that group stated “definitely yes” or “rather yes”, average 2.03) and vocational education (about 40% of respondents in that group stated “definitely yes” or “rather yes”, average 2.61). As regards statistical significance, other differences between groups are negligible. In the case of statement two, four statistically significant differences were recorded. Groups of higher results – with middle/post-secondary (about 82% of respondents in that group stated “definitely yes” or “rather yes”, average 4.33) and higher education (about 90% of respondents in that group stated “definitely yes” or “rather yes”, average 4.45) showed statistically significant differences comparing with groups of primary/junior secondary (only 23% of respondents in that group stated “definitely yes” or “rather yes” while 43% said “definitely no” or “rather no”, average 2.67) and vocational education (about 50% of respondents in that group stated “definitely yes” or “rather yes”, average 3.44). As regards statistical significance, other differences between groups are negligible.

The analysis of the average score in particular groups by education (excluding uneducated people) shows that results are linearly proportional to the level of education. This means that the higher level of the education, the higher number of positive answers given to a statement. Moreover, we may conclude that the use of e-government tools requires some competences that are acquired through education. Well educated citizens are better equipped with skills needed to use e-services (e.g. ICT using or filling out the documents yourself).

The final demographic factor taken into consideration while examining answers to the statements was domicile. A series of Kruskal-Wallis tests showed statistically significant results in nearly all items (see Table 3 and 4). As regards the first statement, the lowest results were recorded in the group of people living in rural areas (about 55% of respondents in that group stated “definitely yes” or “rather yes” while almost 40% of them stated “definitely no” or “rather no”, average 3.20). This group differed from people living in cities with population of 20-100 thou. (about 66% of respondents in that group stated “definitely yes” or “rather yes”, average 3.62), 100-200 thou. (about 64% of respondents in that group stated “definitely yes” or “rather yes”, average 3.59), 200-500 thou. (about 63% of respondents in that group stated “definitely yes” or “rather yes”, average 3.54) and cities which population exceeded 500 thou. (about 68% of respondents in that

group stated “definitely yes” or “rather yes”, average 3.68). Other differences were not statistically significant. As regards the second statement, two statistically significant differences were recorded. The highest level of convergence of answers was recorded in the group of people living in large cities (exceeding 500 thou., about 90% of respondents in that group stated “definitely yes” or “rather yes”, average 4.55). This group showed statistically significant differences comparing with people living in cities up to 20 thou. (about 78% of respondents in that group stated “definitely yes” or “rather yes”, average 4.19). Additionally, a difference at a statistical tendency level was recorded between inhabitants of rural areas (about 77% of respondents in that group stated “definitely yes” or “rather yes”, average 4.15), who had the lowest results regarding this variable, and inhabitants of cities with population of 20-100 thou. (about 83% of respondents stated “definitely yes” or “rather yes”, average 4.35). Other differences were not statistically significant, even at the level of the statistical tendency.

The analysis of average scores recorded by representatives of particular groups depending on their domicile shows that there is no simple linear relationship between the domicile and results of the survey. However, two linear functions can be determined: from inhabitants of rural areas to cities with population of 20-100 thou. and from inhabitants of cities with population of 100-200 thou. to inhabitants of cities with population of 500 thou. Moreover, it's worth to notice that in all locations more people declared their interest in having more opportunities to deal with official matters over the Internet. Additionally, in rural areas, where 55% of respondents indicated using electronic administration services, even 77% of them expressed desire to use those services. Although the survey did not provide any explanation, the analysis mentioned above emphasized certain factors (education and age). This was later ascertained by the analysis of infrastructure resources presented in the next part of the article.

Table 3: Answers to statement: *I use electronic administration services (e.g. I send documents to institutions over Internet, I send emails to authorities, I send my tax returns via Internet etc.) by demographic factors.*

ANSWERS BY GENDER						
	AVG	SD	U	Z	p	r
female	3.42	1.51	350402.5	-0.91	0.362	0.02
male	3.52	1.44				
ANSWERS BY AGE						
	AVG	SD				
18-24	3.40b	1.41	H(5) = 128.44 p < 0.001			
25-34	3.81c	1.32				
35-44	3.91c	1.25				
45-54	3.57b	1.47				
55-64	3.28b	1.50				
65+	2.69a	1.59				

ANSWERS BY EDUCATION						
	AVG	SD				
primary/junior secondary	2.03a	1.19	H(4) = 118.38 p < 0.001			
vocational	2.61a	1.59				
secondary/post-secondary	3.33b	1.44				
higher	3.77c	1.39				
ANSWERS BY DOMICILE						
	AVG	SD				
Rural	3.20a	1.53	H(5) = 26.68 p < 0.001			
City up to 20 thou.	3.47a b	1.43				
City of 20-100 thou.	3.62b	1.43				
City of 100-200 thou.	3.59b	1.44				
City of 200-500 thou.	3.54b	1.50				
Above 500 thou.	3.68b	1.40				

Table 4: Answers to statement: *I would like to have more opportunities to deal with official matters over the Internet in Poland by demographic factors.*

ANSWERS BY GENDER						
	AVG	SD	U	Z	p	r
female	4.28	1.04	358509.0	-0.09	0.931	0.00
male	4.29	1.03				
ANSWERS BY AGE						
	AVG	SD				
18-24	4.51c	0.76	H(5) = 133.84 p < 0.001			
25-34	4.51c	0.83				
35-44	4.53c	0.81				
45-54	4.36b	0.93				
55-64	4.09b	1.15				
65+	3.65a	1.34				
ANSWERS BY EDUCATION						
	AVG	SD				
primary/junior secondary	2.67a	1.27	H(4)* = 154.86 p < 0.001			
vocational	3.44a	1.30				
secondary/post-secondary	4.33b	0.95				
higher	4.45b	0.90				
* skipped uneducated						
ANSWERS BY DOMICILE						
	AVG	SD				
Rural	4.15a	1,12	H(5) = 29.64 p < 0.001			
City up to 20 thou.	4.19a	1,07				
City of 20-100 thou.	4.35a b	1,03				

City of 100-200 thou.	4.31a b	1.01	
City of 200-500 thou.	4.30a b	1.04	
Above 500 thou.	4.55b	0.77	

Considering this part of the empirical analysis, based on the opinions and declarations of Poles, we may describe the e-government user in Poland: he or she (gender is not relevant here) is middle age, about 35-44, well-educated (high school graduate) and lives in a city above 500 thou. citizens. People who do not use public services via the Internet are 65 plus (gender is also not relevant) with low education, living in rural areas. While we indicated the significance of those factors, we can say that age, education (or wider – competences) and also domicile may support or disturb in the access to e-government.

3.2. E-government in Poland according to official statistics

This part of the article presents the empirical analysis that verifies hypothesis no 4: barriers in the use electronic services result from demographic factors and technological discrimination. Some parts of the analysis will allow to confirm hypotheses discussed earlier.

The statistical data used in the analysis comes from reports provided by Central Statistical Office (CSO) in Poland – the reports come from 2018 and concerns the use of information and communication technologies in public administration units and households [28]. This completes the diagnosis of the current state of e-government in Poland by presenting the information about using of information and communication technologies in public administration units as well as in households. Moreover, the data help to recognize barriers and opportunities for the development of e-government in the country.

3.2.1. Methodology

Results of the research on e-government in the opinions of Poles presented below are based on 2018 reports by the Central Statistical Office [28]. Based on these data, below presented are descriptive statistics on the use of ICT, mainly the Internet, by state and local administration and households. The latter includes households including at least one person at the age of 16-74, except people living in group facilities, such as student dormitories, workers' hostels, social care homes, orders, hospitals, barracks, correction facilities etc. The public administration study included central and local administration.

3.2.2. Results of empirical research

The use of the broadband Internet is a precondition for the efficiency of e-administration services. In 2018, the DSL Internet access was mostly available in local administration offices which accounted for 72.2% of the total, of which communes 75.1%. Central government administration bodies preferred access to the world-wide web other than broadband links – 91.1%; they all provided their employees with remote access to resources. Public administration also offers mobile access to the Internet as a

complementary solution. There, results were higher, since 98.2% of central public administration entities provided their employees with mobile devices having access to the Internet for professional purposes, the same access was offered by 79.7% of central public administration bodies (including all Marshal Offices).

Interestingly, the further part of the questionnaire included questions about difficulties/barriers limiting or preventing the use of the mobile Internet access. Respondents most frequently expressed their concerns about security (i.e. disclosure, destruction or falsifying data) – 26.2% of local administration entities and 23.2% central administration bodies, as well as problems to connect through the mobile phone network to gain access to the Internet – 20.9% and 21.4% respectively. Many respondents pointed that they do not need to have a mobile access to the Internet for professional reasons and technical obstacles or high cost of integration between the mobile access to the Internet and business software (applications) used by the administration (e.g. incompatibility). This, however, applies solely to the local administration (20.3% and 18.8%; results for central administration were 0.9% and 13.4% respectively). The above seems to fit into the group of factors promoting the development of e-administration, as referred to by Robert Perdal [5]. He distinguished two groups of factors, internal and external. External factors promoting the development of e-administration at the local government level included: postmodernization trends, globalization, development of information society, socio-economic development, accessibility of IT infrastructure for citizens and companies, attitude, knowledge and skills among citizens and companies, size of an administration body, legal and organizational setup and political situation. Internal factors include: attitude of the government, leaders and managerial staff, vision and strategy for the development of e-administration, accessibility of IT tools, human resources, financial situation, collaboration and partnership, and public e-services.

While examining the last of the factors, we should analyze the accessibility of public services via the Internet. If we consider the provision of information as kind of a public service (most passive but still important), it is worth to examine the content and accessibility of public administration websites. Websites developed to WCAG 2.0 (Web Content Accessibility Guidelines (WCAG) criteria has become a global standard for website accessibility), translates into its common accessibility for users regardless their disability, age, and equipment and software used. In 2018, three fourth of public administration websites met WCAG 2.0 requirements at the AA level. The index had the highest value of 93.8% for Marshal Offices. However, the content of their websites was chiefly that of the information bulletin.

As regards a more active form of public services, we need to examine the number of matters people could deal with over the Internet. In 2018, 96.6% public administration bodies provided electronic services to citizens. The largest number of them offered e-services in the area of civic matters (81.9%). Access to services via the Internet was provided by all Marshal Offices. Figures concerning e-services provided are included in table 5. It is worth emphasizing that despite the fact that many services are classified as e-services, in practical terms they are not completely digital. In

certain situations, a visit in the office to collect a document of to put a signature was necessary, and only a form could be send over the Internet. A showcase example, and at the same time one of the first e-services offered, is the payment of taxes. For several years, mandatory annual tax returns can be filed through a computer program of e-deklaracje, and since 2019 an electronic version of a tax return is developed by the Ministry of Finance and available online.

Table 5: Public services available via Internet in Poland.

	STATE ADMINISTRATION	LOCAL ADMINISTRATION
Website made to WCAG 2.0	81.3%	91.1%
Website adjusted to mobile phones and other mobile devices	74.8%	74.8%
Services offered via Internet in area of civic matters	49%	83.1%
Services offered via Internet in area of work	25%	13.2%
Services offered via Internet in area of enterprise	15%	41.7%
Services offered via Internet in area of taxes	5%	51.6%

Further analysis focuses on verifying the use of e-services by citizens and defining access barriers. In 2018, people who used public administration services via the Internet in the past 12 months accounted for over 35% of the total population of 16-74 (it converges with information from our survey as regards people who answered “definitely yes” to the first statement: I use e-administration services – 31.5%). Most frequently people use public services by looking for information on the website (24.40%), downloading official forms (22%), and sending official forms (24.60%), including tax returns (20.50%). In recent years, the group of people downloading forms and sending them back after filling in has been growing. Types of e-services used by citizens is shown in figure 3. Interestingly, demographic factors examined in the reports show similar convergence, as described in the first study: gender is not important, and age has a similar influence as expressed in opinions by Poles (the oldest use e-services less, whereas the most willing to use them are people of 25-34 and 35-44). A linear relationship has been recorded as regards education (the higher the education, the more often people use e-services) and domicile (people from larger cities use e-services more often, whereas people living in rural areas least often).

Figure 3: Types of e-services using by citizens.

Source: Central Statistical Office.

While trying to determine barriers to e-services, we should examine data pertaining to the access to the Internet in households. In 2018, 84.2% of households had access to the Internet. The group was larger than in the previous year by 2.3 percentage points and by 8.4 percentage points than in 2015. During the year concerned, the number of households with the broadband access to the Internet increased by 1.7 percentage points. Among all demographic features examined so far, the survey concentrated on domicile only.

While taking into consideration the class of domicile, the percentage of households with the access to the Internet was higher in cities than in rural areas (table 6). We may conclude that the lower use of e-services in rural areas is the result of limited access to the Internet.

Table 6: Access to the Internet in the households by domicile.

	HOUSEHOLDS			
	with Internet access		no internet access	
	quantity	%	quantity	%
Rural	3396851	82	741754	17,9
City up to 100 thou.	3463875	82,7	721049	17,2
Above 100 thou.	3776795	87,8	522099	12,1

The survey included questions about reasons of not having the access to the Internet. In 2018, and in previous years, the main reason of not having the access to the Internet at home was the lack of need to use it (10.3%). The second major reason was the shortage of relevant skills (8.1%), high cost of equipment needed (3.65) and excessive cost of Internet access (2.7%). Apart from the dislike towards the Internet, the shortage of skills is also interesting from the point of view of the study. It has confirmed the conclusion of the first part of the analysis that e-government tools require some competences that are acquired through the education.

Summarising, we may say that barriers to the use of e-government includes both technological exclusion (lack of access to the Internet), and demographic factors, such as age, skills and

domicile. Elderly people living in rural areas, who do not have skills to use the Internet, and do not have access to it, is a group excluded from the possibility of using e-services.

4. CONCLUSIONS

Since the development of electronic services in Poland coincided with the country's membership in the EU, the transition to e-government was based on the implementation of policy papers and practices fostering digitalization of the public sector in the European Union. Currently, the development of e-government in Poland is based on documents, that indicate directions of evolution of policies and services which goal is the Digital Poland. Polish citizens can use about 600 public e-services located on various government platforms and portals.

It is worth emphasising that benefits of using the Internet and e-services most often included shorter time needed to deal with specific matters (three fourth of public administration bodies). Other benefits are no need for citizens to provide data which the administration already have (67%), increase in the number of e-services (65%), better citizen satisfaction observed by administration staff (63%), simplification of procedures (57%) and larger number of citizens served (44%).

The main goal of the article was to diagnose the current state and barriers and opportunities to develop e-government in Poland. Based on the opinions of Poles and information provided by public administration, we can assess the current state of e-government in Poland as only partially satisfactory. Furthermore, conscious use of e-services is a significant issue. Moreover, information from tax offices regarding tax returns sent via the Internet is more valuable than the one provided by the Central Statistical Office (particular figures correspond with those obtained in our own study).

After the verification of the hypotheses, we can say that the first hypothesis is confirmed, since citizens expect public services to be provided via electronic channels. Nearly 80% of respondents answered "yes" to the statement: *I would like to have more opportunities to deal with official matters over the Internet in Poland*, and the average for their answers was 4.28. The third hypothesis, which stated that openness to electronic government tools has been growing together with experience in using them, is confirmed by positive correlation between experience with e-services and declaration to use it more often. Once someone uses e-government services, the person would like to have more such services offered.

The second hypothesis regarding the attitude of Poles towards e-services according to their sex, age, education, and domicile has been partially confirmed. While examining results for different sex, it turns out that answers given by women and men do not show statistically significant differences, so it is not a factor differentiating opinions on e-government. A significant factor in the survey is age - the lowest results were recorded in the oldest group, whereas the highest in the group of 35-44. Additionally, the level of education is important and linearly proportional to the attitude towards e-services. The higher level of education, the more positive attitude people have, which leads to the conclusion

that the use of e-government tools requires some competences that are acquired through education. Well educated citizens have better skills to use e-services (e.g. use of ICT or filling out forms). Regarding domicile, we can say that there is no simple linear relationship between domicile and results of the survey; However, domicile is significant for the highest and the lowest results. The group of people living in cities of 500 thou. showed the highest results while those living in rural areas have been the least familiar with e-government.

The verification of hypothesis 4 is also positive. Barriers to the use electronic services result from demographic factors and technological discrimination. The data analysis leads to the conclusion that the barriers to the use of e-government are both technological exclusion (lack of access to the Internet) and demographic factors, such as age, skills and domicile. Elderly people living in rural areas, who are not able to use the Internet, and especially without the Internet access, are excluded from e-services.

The above has been confirmed by the e-government users profile: a respondent (gender is not relevant here) of 35-44, well-educated (high school graduate) living in a city with population above 500 thou. Those who do not use public services via Internet are people older than 65 (gender is not relevant as well) with a low level of education and living in rural areas. Considering the significance of these factors, we can say that age, education (or competences) and domicile promote or restrict the access to e-government.

Considering international rankings, Poland is still not doing very well as regards e-government. Fortunately, there are many opportunities to raise funds for the development of e-services which can be used by authorities. Although the process is sluggish, but the objectives specified in e-government strategies are promising and bode well for the improvement of the rating.

It should be noted that no research into the quality of e-services in Poland has been performed. The weakness of Polish e-services is that they are not fully transactional, and while implementing, for instance, tax return system in 2019, a large number of technical errors needs to be eradicated. This confirms the need for further digitalisation of the public sector in Poland, as well as focusing on the improvement of the quality of e-government tools.

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