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# DEVELOPMENT OF THE INFORMATION SOCIETY IN POLAND, TAKING INTO ACCOUNT SPATIAL DIVERSITY

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**Purpose:** A feature of the information society is the widespread use of information and communication technologies in both business processes and everyday life. The condition for the universality of these solutions is to ensure access to high quality information and communication technologies throughout the country. The aim of the article is to assess the availability and use of information and communication technologies in the voivodeships of Poland.

**Design/methodology/approach**: The methodology of the article is based on descriptive analysis of the information society in Poland. The scope of the considerations concerns the spatial diversity in the availability of information and communication technologies in Poland from the perspective of citizens and businesses per voivodeship. The research used secondary data made available by the Statistics Poland, including the Local Data Bank, Eurostat and the Digital Agenda for Europe. Due to the availability of comparable statistics, 2015 and 2019 were analyzed.

**Findings:** The level of development of the information society in Poland systematically increases. However, Poland is among the countries with the lowest rate of digital economy in the EU. The development of online services comes out as the best developed, while the telecommunication infrastructure falls at the other end of the spectrum. The analysis of selected data concerning the development of the information society in Polish voivodeships indicates that there are differences in the access of the communities of individual regions to high quality information and communication technologies. In particular, inequalities in access to and use of broadband Internet were found. The diversity, which can be described as a digital divide, is particularly characteristic in the relationship between Western Poland and Eastern Poland and is evident in the use of eGovernment services.

**Social implications:** The existence of spatial diversity may affect the implementation of the development priorities of the country and the EU. Public administration is in the period of transition from the traditional way of dealing with the matters of citizens and enterprises to modern — electronic implementation of public services, which requires the state not only to provide access to modern technologies, but also to invest in digital skills of administration employees and society.

**Originality/value:** The results of the conducted analysis may provide guidance for national and regional economic policy entities in terms of shaping forms of public support for development of information and communication technologies in the next development programming perspectives.

**Keywords:** information society, information and communication technologies, regional diversity.

**Category of the paper:** research paper.

## 1. Introduction and methodological assumptions

In his scientific deliberations, the futurologist Alvin Toffler referred to three overlapping waves of civilization, which, according to him, are inseparably connected with technology. The modern world participates in the third wave (after the agricultural and industrial wave) directly related to the emergence of new technologies enabling unrestricted communication between individuals thanks to the development of services and the move-away from mass production (Toffler, 2006). Information and communication technologies gave rise to a new society that makes widespread use of state-of-the-art technologies in everyday life, both in the social or professional aspects of it. The development of the information society, occurring at different speeds around the world, has been observed since the second half of the twentieth century. The leaders in the development of the information society are Denmark, Australia and South Korea. Development processes vary from country to country. Poland as a Member State of the European Union is characterized by a rather low development of the information society. The indicator for the digital economy and digital society ranks Poland in the last place in the European Community. Connectivity, use of Internet services and digital integration are the most challenging areas here. The area of human capital and digital public services which are of importance for society is also a major challenge, as Poland ranks the EU average. The spatial diversity in access to high quality information and communication technologies in the country are also of significance. The aim of this article is to assess the availability and use of information and communication technologies in the voivodeships of Poland. The methodology of the article is based on descriptive analysis of the information society in Poland. Spatial diversity is considered from the perspective of citizens and businesses. Due to the availability of comparable data, the years 2015 and 2019 were analyzed. The research used data made available by the Statistics Poland (GUS), including the Local Data Bank, Eurostat and the Digital Agenda for Europe.

The following indicators were analyzed:

- Percentage of computer users, including regular users;
- Percentage of households with Internet access at home;
- Percentage of people using the Internet regularly;
- Persons using public administration services via the Internet in the past 12 months (%);
- Percentage of electronic applications for the “Family 500+” programme;
- Companies with broadband Internet access (%);

- Companies which use their website to present catalogs, products or price lists (in %);
- Companies receiving orders via computer networks (website, EDI systems) (%);
- Companies using the Internet to contacts public administration entities to return completed forms electronically (%).

## 2. Information society as a determinant of the knowledge-based economy

In highly-developed countries, post-industrial societies are characterized by a widespread social and economic use of knowledge, especially in the area of technology and information technology, thus creating knowledge-based economies, with a digitized society or an information society. The term information society began to be used in the 1960s. The term was used, i.a., by the Japanese sociologist Tadao Umesao, who is considered to be the precursor in the use of the term (Goban-Klas, and Sienkiewicz, 1999). In Europe it was not until 1994 that the public debate on the information society began and this year is considered to be the beginning of the development of the information society. This is linked to the publication of the Bangemann Report *Europe and the Global Information Society*. *Recommendations to the European Council* (Demczuk, 2016). Since then, the term information society has been constantly analyzed and its essence has been defined in various ways.

The information society is a broad category in which knowledge and information play the leading role. "The concept of the information society can be defined as a socio-economic formation in which the productive use of the resource information and knowledge-intensive production plays a predominant role" (Bliźniuk, and Nowak, 2005, p. 40). Similarly, following L. Koćwin, it can be assumed that the information society is one whose information sector (gathering, processing and transferring information) has an advantage over the industrial sector in the economy, and the most appreciated values are access to information, possession of information and education (Koćwin, 2019, p. 98).

This paper adopts the approach used by the Statistics Poland. It is assumed here that the term generally means a society at such a stage of technical and organizational development that the level of sophistication of information and communication technologies achieved in that society provides technical, economic and educational conditions for the widespread use of information in the manufacture of products and the provision of services. Citizens have universal access to and the ability to use information technology in their professional and social activities to improve and update their knowledge, to benefit from cultural, health, leisure and other services that contribute to the improvement of quality of life. Therefore, the widespread use of information and communication technologies in all spheres of life, both personal and business a feature of the information society.

It should be stressed that in the information society, citizens not only have universal access but also the ability to use modern technologies in professional and social activities. If this was not the case, individual citizens or entire social groups would be at risk of so-called digital exclusion. This phenomenon is understood as the division of society into groups that have access to information and communication technologies, are able to use them and apply them on a daily basis, and people without such access and skills, who do not use them in their social and business life. The occurrence of digital exclusion leads to socio-economic disparities between regions and countries. The most vulnerable to digital exclusion are older people, age 55+, retirees and pensioners, people with disabilities, people from the poorest families, with lower education and farmers (Batorski, 2009; Mossberger et al., 2003).

The European Union attaches considerable importance to the development of the information society. Smart development based on knowledge and innovation is a priority of economic policy of the EU as well as that of Poland. One of the pillars of the Europe 2020 strategy — Digital Agenda made universal access to digital goods a priority for socio-economic development and a tool aimed at minimizing digital exclusion. An important element of the Strategy is to ensure access to high quality ICT infrastructure, and the created development of broadband networks facilitates functioning of enterprises, citizens and public administration. ICT infrastructure is defined as a determinant of the knowledge-based economy, alongside such factors as human capital, universities and scientific and research institutions as well as financial and credit institutions. Hence, there are numerous programmes co-funded by the EU budget supporting key areas in the Member States for smart development, socially inclusive population groups thus far having hindered access to modern technologies.

Numerous information society development programmes are implemented in Poland. They are aimed at promoting modern digital technologies that determine the innovativeness and competitiveness of the economy. Their use in the public and business sectors is nowadays a priority for social and economic development. Thus, the programme “From Paper to Digital Poland” is aimed at the development of the e-state and digitization of economy. It is part of the Strategy for Responsible Development, which assumes that modern eGovernment is a crucial element of an efficiently functioning state, i.e. the basis for sustainable development. The concept of building the information society in Poland, contained in the aforementioned document, assumes that increasing the supply of digital services and their use by the society will serve, apart from measures related to the development of digital content and broadband networks, the development of the society's e-competence as well as ensuring universal and open access to public institution resources. The actions in this respect are aimed at the development of basic competences enabling the use of the Internet, including in particular eGovernment services and market services together with ensuring network security (Strategy for Responsible Development, 2017, p. 223). For the next one — Operational Programme Digital Poland for 2014-2020, 8 billion PLN have been allocated from the EU funds, which together with the national funding results in over 10 billion PLN for the digitization of the country. These are

investments in high-speed Internet, e-services and digital competences of Polish citizens. The aim of the programme is to use the digital potential to improve the quality of life, implemented by means of three priorities: digital skills, building infrastructure and creating e-services and online resources. The program supports the creation of local digital activity centers in libraries, community centers and other places where people can take their first step into the digital world. In addition, the EU funds allocated for the development of public e-services, digitization of resources and development of digital competences are available under the Regional Operational Programmes.

A strategic document here is the National Broadband Plan which aims to remove legal barriers, develop a digital society and create a homogeneous digital market in the country, setting out actions and measures to ensure universal broadband access to the Internet. The to-priority objectives implemented through the National Broadband Plan are the development of telecommunications network and infrastructure and stimulation of demand for high speed access services. The key challenge for the development of digitization in Poland is to provide broadband infrastructure available throughout the country. In addition, the government's intention is to provide citizens with an ICT infrastructure that will be cheaper and offer higher data transfer speeds for its users. The program also refers to the Internet of Things, which could bring users a number of new services such as smart homes, smart cities, etc. Provision of M2M (Machine to Machine) connectivity is an increasingly common phenomenon in the world. It brings solutions such as intelligent parking, traffic optimization, intelligent lighting, forest fire detection and flood risk monitoring (Ministry of Digital Affairs, https://www.gov.pl/web/cyfryzacja, accessed on 2.06.2020).

## 3. eGovernment public services

An important area of development of information society is eGovernment. The analysis of the literature on the essence of eGovernment leads to the conclusion that it is an appropriate concept for a number of scientific fields (law, administration, IT, economics, management) and means the use of ICT in the activities of public administration units in order to increase accessibility and quality of public services (Jedlińska, and Rogowska, 2016; Kapler, and Piersiala, 2014; Alzahrani et al., 2017). The state is providing an ever-growing number of e-services to its citizens: a lot can be done over the Internet, without visiting a government office. The computerization of a number of administrative processes is ongoing, providing an increasing number of electronic services in various sectors of state activity. The degree of their complexity is very diverse, according to the processes handled. Thus, it is possible to pay taxes or start a business, and to deal with local affairs by using e-services provided by local governments.

There are several independent platforms providing electronic public services in Poland. According to data from the Ministry of Digital Affairs, citizens can use several hundred public e-services located on various government platforms and websites (Ministry of Digital Affairs https://www.gov.pl/web/cyfryzacja/narodowy-plan-szerokopasmowy, accessed on 2.06.2020). These include: Electronic Platform of Public Administration Services (ePUAP), Electronic Services Platform of the Social Insurance Institution (PUE ZUS), obywatel.gov.pl website, biznes.gov.pl website. The problem here is the dispersion of services on different platforms, which leads to confusion among citizens. Therefore, the website of the Republic of Poland — gov.pl is being created, which will ultimately be the gateway to all information and e-services. It will integrate the websites of all ministries, central and voivodeship offices and will facilitate access to digital services that the state offers to its citizens. The administration provides, modernizes and builds new e-services, which allow to deal with official matters from any place and at any time, without leaving home. Public services can be used by anyone who can confirm their identity on the Internet. This can be done, for example, by using the Trusted Profile (eGO). The Trusted Profile is also a free tool that serves as an electronic signature in communication with public administrations. After the integration of thematic websites with the Polish government website, the gov.pl electronic account will be the key to all digital administration services. As of June 2020, services located on the websites biznes.gov.pl and obywatel.gov.pl are accessible through gov.pl. The first website, it informs how to set up and run one's own business as well as enables to complete all necessary formalities online. It is a source of information for people who run a business or plan to start one. The second, provides information on dealing with popular official matters. It offers popular e-services for citizens, such as: obtaining a copy of a marital-status record, an identity card, checking the number of traffic penalty points or any data in state registers or sending a letter to a government office.

It is worth mentioning that public service websites are addressed to various recipients, including entrepreneurs:

- (ceidg.gov.pl — Central Register and Information on Economic Activity (CEIDG) — electronic business register;
- ekrs.ms.gov.pl/s24/ — website allowing to submit an application for entry to the National Court Register of a limited liability partnership, general partnership and limited partnership;
- ekw.ms.gov.pl — Electronic Land and Mortgage Register system, website allowing to, i.a., view the content of land and mortgage registers and apply for a copy;
- emp@tia — an information and service website, allowing to, i.a., become acquainted with information about social assistance benefits, family benefits, maintenance fund, as well as submit applications e.g. for the 500+ benefit;
- epuap.gov.pl – Electronic Platform for Public Administration Services (ePUAP) — a website allowing to handle a multitude of official matters with a variety of government offices without leaving home;

- finanse.mf.gov.pl — a tax website for anyone who wants to file a tax return online or obtain information about taxes;
- geoportal.gov.pl — provides access to geospatial data and topographic maps(mapy.geoportal.gov.pl);
- and others (Ministry of Digital Affairs https://www.gov.pl/web/cyfryzacja, accessed on 2.06.2020).

The aim of developing eGovernment services is to take advantage of the opportunities offered by available digital technologies on an economic scale, which can bring a number of benefits. Electronization of the processes of providing services to citizens and entrepreneurs, as well as the administration itself, in accordance with the intentions of the Strategy for Responsible Development is to improve the functioning of the state, i.e. to contribute to the improvement of the functioning of the administration, reduction of service costs and improvement of the efficiency of operation of businesses. The top-priority issue is the quality of public services, since according to the European Commission's definition, eGovernment is the use of information technologies that increases the quality of public services and makes the public sector open, transparent, citizen-friendly and efficient (Bogucki, 2005). This is done by means of constantly introduced and modernized e-services, which are a new formula for providing services, and thus for meeting needs with the use of the Internet. The virtual form of service provision allows for greater standardization of services, thanks to which e-services enable effective execution of procedures. In addition to improving the transaction flow, they offer many other new opportunities, such as: a new way to deliver existing services, perform operations based on real time data, user-oriented — without restrictions with regards to the number of e-services, better tailored to the needs of their recipients, ensuring greater satisfaction and loyalty to their provider, and are available on demand. Remote handling is less time-consuming for both the citizen and public administration. Digitization of the processes also reduces their costs (e.g. through web-based applications instead of paper forms).

However, e-services are unequal in a number of ways. There is a large variation in the usability in different types of services available. Some of them consist solely of providing information to citizens/users via websites, while others allow to do things completely remotely, via electronic means. This is determined by the difference in the level of maturity of the e-service. Literature provides various classifications of e-services due to their maturity. The classification proposed by the European Commission features a five-level maturity scale which reflects the range of activities that a citizen can do electronically with a given service (Capgemini Report, 2010):

- Level 1 — informational level — public administration institutions make public information available to citizens and entrepreneurs on websites without the possibility of initiating and arranging services electronically.

- Level 2 — unilateral interaction — stakeholders communicate with authorities by electronic means, however this communication is unilateral, e.g. forms can be downloaded from a public administration unit without the possibility to initiate and arrange the service electronically.
- Level 3 — bilateral interaction — availability of online forms, possibility of initiating a case by electronic means through interactive filling in and sending electronic documents to a public administration unit, it is necessary to ensure the authentication of a citizen or an entrepreneur in an ICT system.
- Level 4 — transactional — involves the possibility to perform all activities necessary to deal with a given official matter entirely via electronic means, i.e. to obtain a response of a government office by electronic means including the issuance of a decision and the possibility to pay for the service online, the citizen does not have to perform any activities in paper form.
- Level 5 — personalization — ensures that the official matter is handled electronically and at the same time introduces personalization of the service, i.e. automatic delivery of specific services, personalized for and not initiated by the user (e.g. decision on property tax assessment). This highest level of maturity assumes that electronic application forms will be initially filled in by the office (e.g. first and last name, address data, PESEL no., REGON no.).

## 4. Availability and use of information and communication technologies in Poland and the EU

The transition from paper to digital Poland is a complex and lengthy process. Information and communication technologies are being implemented, in particular since Poland's accession to the EU. The results of activities undertaken for the benefit of digitization in its broadest sense are evaluated and presented in rankings implemented by various institutions. In the United Nations ranking on the development of eGovernment services published in 2018, Poland was ranked 33rd out of 193 countries. Countries were ranked according to the eGovernment Development Index — EGDI, which consists of three components measuring the level of development of online services, ICT infrastructure and human capital. The leaders with regards to eGovernment development in 2018 are Denmark, Australia and South Korea (United Nations eGovernment Survey 2018, p. 231–232). Considering the European Union in this ranking, the leaders with regards to eGovernment development are the already mentioned Denmark, Sweden and Finland (EGDI for these countries was respectively: 0.915, 0.8882 and 0.8815). The least developed countries in terms of eGovernment development in the EU are Lithuania, Croatia and the Czech Republic (EGDI was respectively: 0.6996, 0.7018 and 0.7084).

The distance between the Member States is quite significant at 1.3. Poland, compared to the rest of EU countries, was in the second half of the ranking, on 16th position with the result of 0.7926. Taking into account the examined components, the development of online services came of the best, while the ICT infrastructure was the weakest link here.

The progress of Member States in the development of the digital economy and society in the EU is measured by the DESI — eGovernment Development Index (Digital Economy and Society Index DESI, https://ec.europa.eu/digital-single-market) defined by the European Commission. It monitors the development of the uniform EU digital market. It is a complex indicator that measures progress in digitization in five areas:

1. connectivity — fixed broadband networks, mobile broadband services, broadband speeds and prices,
2. human capital — Internet use, basic and advanced digital skills,
3. use of the Internet — Citizens' use of online content, communication and carrying-out transactions over the Internet,
4. technology integration — digitization of businesses and e-commerce,
5. Digital Public Services — eGovernment.

The grading scale ranges from 0 to 1. The higher the value of the index, the higher the ranking of the digitization of a given country. The rate of digitization in Poland, according to the Digital Economy and Digital Society Index, is below the European Union average (Figure 1).

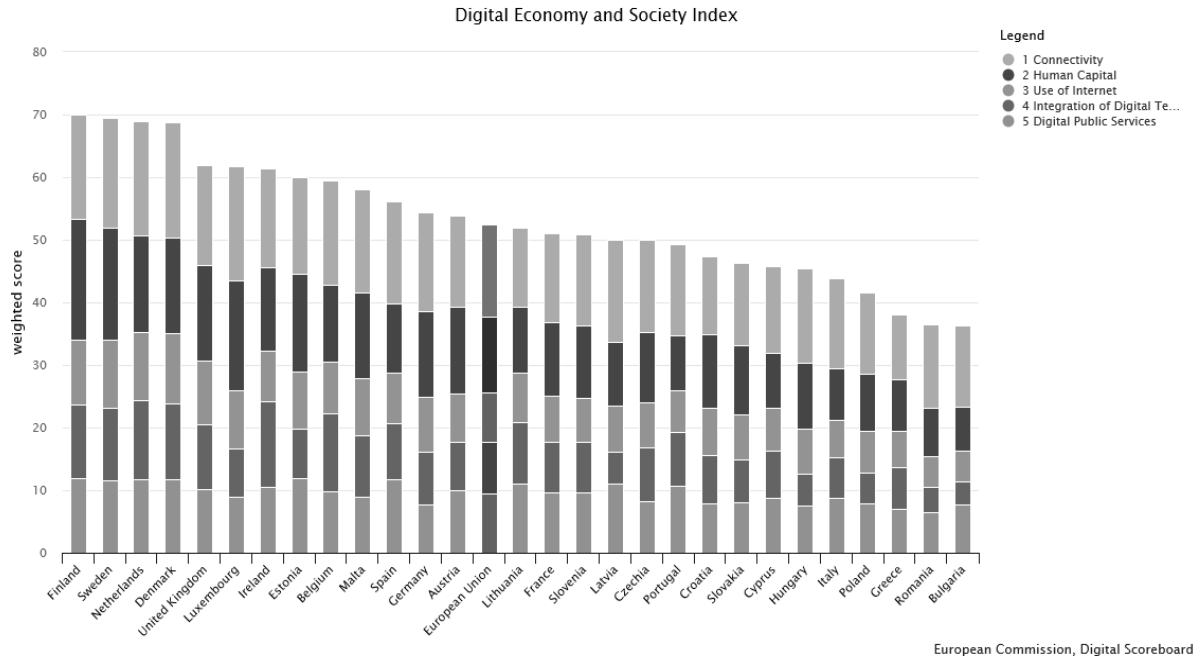


**Figure 1.** DESI 2019 in the European Union(28). Source: Digital Economy and Society Index, Adapted from: https://digital-agenda-data.eu/datasets/desi/visualizations, accessed on 2.06.2020.

Despite significant progress in the digitization of the society and economy in Poland in terms of the implementation of high-speed Internet connections or the use of mobile broadband services, the country is among the lagging EU countries. DESI for 2019[1] was 41.63 and ranked Poland 25th in the EU-28. The EU-28 average at that time was 52.45. In 2014–2019, the result improved, as did the EU average. Poland sees a year-on-year increase in the index, but in 2015 the country fell from 24th position to 25th and this was the position it occupied in the following years. The lack of advancement in the ranking is a result of complex conditions. The components taken into account in the calculation of the index allow the identification of priority areas of the digital economy that require specific actions and investments. Although the level of usage of mobile broadband services in Poland is the highest in the EU, connectivity, use of Internet services and digital technology integration remain the areas with the greatest challenges (Digital Economy and Digital Society Index 2019. Country Profile 2019. Poland, p. 3). In turn, there has been a little improvement in human capital and digital public services, however Poland is still below the EU average. The greatest distance to the EU-28 average divides Poland in the fourth component, i.e. in technology integration. In 2019, this sub-index for Poland was 4.96 while for EU-28 it was 8.21. The weakness here is that still one fifth of the Polish population does not use the Internet and almost half of the population does not possess basic digital skills. Although there is an increasing number of ICT professionals and graduates on the market, their number remains below the EU-28 average. The situation is similarly unfavorable for companies that are in favor of using new technologies, but according to the digital usage rate, 56% of companies have a very low level of digitization, compared to 46% in the EU. Highly digitized companies account for 12% in Poland and 18% in the EU. The greatest progress can be seen in the area of digital public services, where Poland has improved its results with regard to the use of pre-filled forms, the provision of online and eHealth services as well as the use of open data.

The countries with the highest levels of digitization and information society development are Finland, Sweden, the Netherlands and Denmark and, as mentioned above, are among the world leaders in this respect. On the other hand, the countries with the lowest rate of development in the digital economy are Bulgaria, Romania, Greece and, as already mentioned, Poland. In terms of connectivity, access to ultra-fast broadband connections (at least 100 Mbps) was available to nearly 20% of EU households, a fourfold increase compared to 2014. In the area of human capital, Member States are guilty of a lot of neglect. 35% of professionally active citizens do not have basic digital competences and only 31% of professionally active citizens possess advanced online skills. The Internet usage component sees a moderate growth. Nearly 83% of EU-28 citizens use the Internet at least once a week, compared to 75% in 2014.

[1] In order to improve methodology and take into account the latest technological developments, a number of changes have been made to DESI for 2019. Therefore, DESI for previous years has been recalculated for all countries, which means that the results of individual countries and their ranking may have changed compared to previous publications

More than 35% of citizens in the 65–74 age group declared that they had never used the Internet. In the penultimate area of DESI — the use of digital technologies, an increasing degree of digitization is observed in relation to enterprises. Cloud services were used by nearly 18% of enterprises, while in 2014 it was 11%. There was also a significant increase in the use of social networking sites by enterprises — 21% compared to 15% in 2014. Digital public services present a positive picture of digitization in the EU-28 on average. Nearly 64% of EU citizens use digital public services over the Internet to send forms and documents to public government offices. For comparison, in 2014 this percentage was 57%. According to DESI 2019 digital economy and society index report, EU countries have made significant progress in building digital competitiveness, but not enough to significantly improve broadband connectivity in the European Union in terms of rapidly growing demand from businesses and citizens. One of the major challenges the European Union faces is to ensure that citizens have access to digital competences adapted to the modern labor market (Digital Economy and Digital Society Index 2019. Country Profile 2019. Poland).

## 5. Spatial diversity in the accessibility and use of information and communication technologies from the citizen's perspective

The Internet is considered a key structural element of the information society. The starting point here is access to the computer and an Internet connection. The data made available by Statistics Poland (GUS) show a systematic increase of the number of Polish households with at least one computer — in 2019 it was 83% (Społeczeństwo informacyjne w Polsce w 2019 r.) The diversity between voivodeships is quite significant. The distance between the region with the highest percentage of computer owners — Podkarpackie and the region with the lowest percentage — Lubelskie is 12.9 percentage points.

More and more people use computers. Between 2015 and 2019, Poland saw a 10.1 percentage point increase in computer users. In 2019. 83.6% of people used a computer. In the regions, this index took the lowest values in Lubelskie, it was the only voivodeship where it was below 80% reaching 74.5% (Figure 2). In turn, in the Pomorskie voivodeship it reached 87.8%, which means a distance between these regions of 13.3 percentage points.

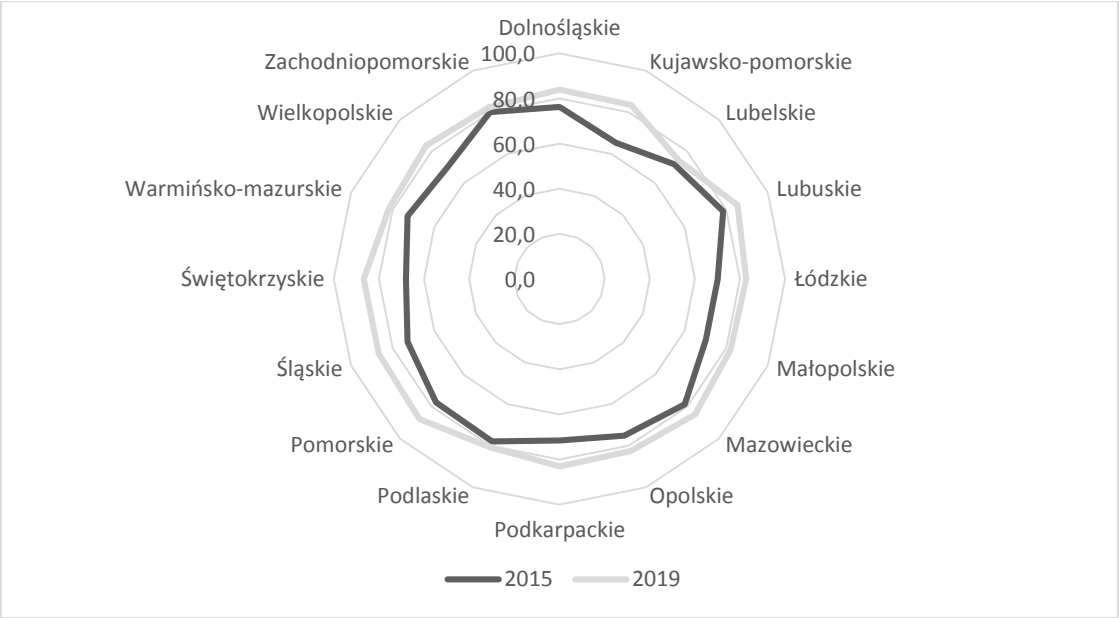


**Figure 2.** Percentage of people using computers in 2015 and 2019 per voivodeship. Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015 oraz 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015 and 2019.

The distance is further widened when the percentage of people using a computer regularly, i.e. at least once a week is taken into account (Figure 3). It amounts to 18.8 percentage points between the above-mentioned voivodeships. (in Lubelskie voivodeship the indicator is 61.3% and in Pomorskie voivodeship — 80.1%, making it a definite leader). A similarly low level of regular computer use is observed in Warmińsko-Mazurskie voivodeship (67.3%), while in the remaining regions it is between 70-76%.

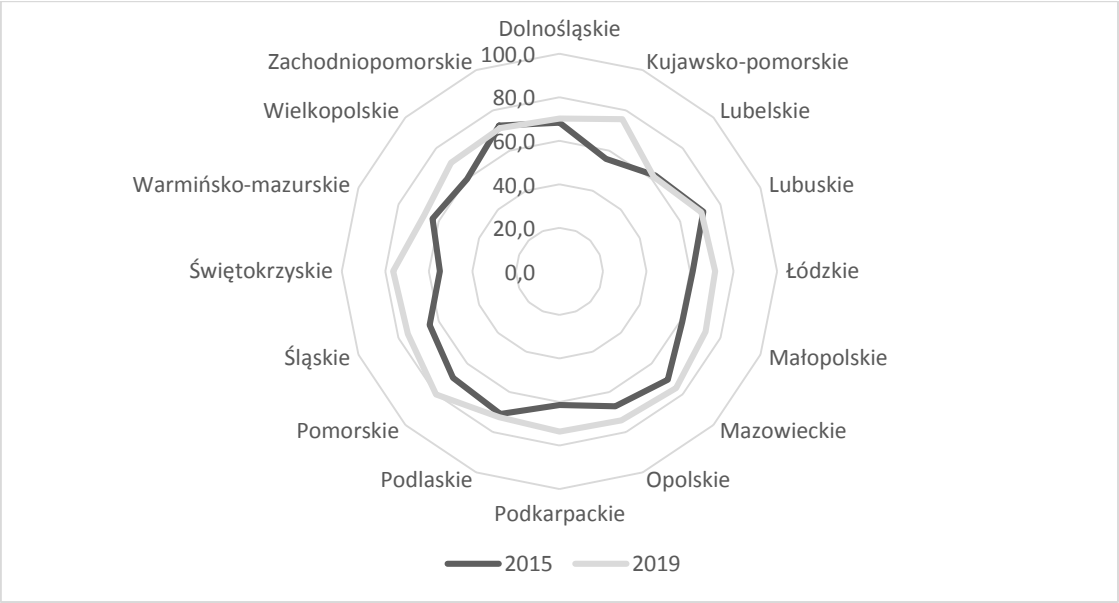


**Figure 3.** Percentage of people using computers regularly in 2015 and 2019 per voivodeship. Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015 oraz 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015 and 2019.

Access to the Internet (connection to the Internet using any device, including smartphones) is the starting point for assessing the quality of network connections. 87% of households had access to Internet connections (2019), while in 2015 it was only 76%. Taking into account the types of Internet connections, in 2019, fixed broadband was the most common, with 62.3% of households having access to it. This is not a satisfactory result compared to the EU average which was 77.6%. The leader in terms of fixed broadband connections is the Netherlands, where the rate was 97.9% (Digital Agenda https://digital-agenda-data.eu/charts/analyse-one-indicator-and-compare-countries#chart, accessed on 2.06.2020).

Having an Internet connection at home is territorially diverse (Figure 4). The leaders in Internet access are Wielkopolskie and Świętokrzyskie voivodeships (89.8% and 89.7% respectively).

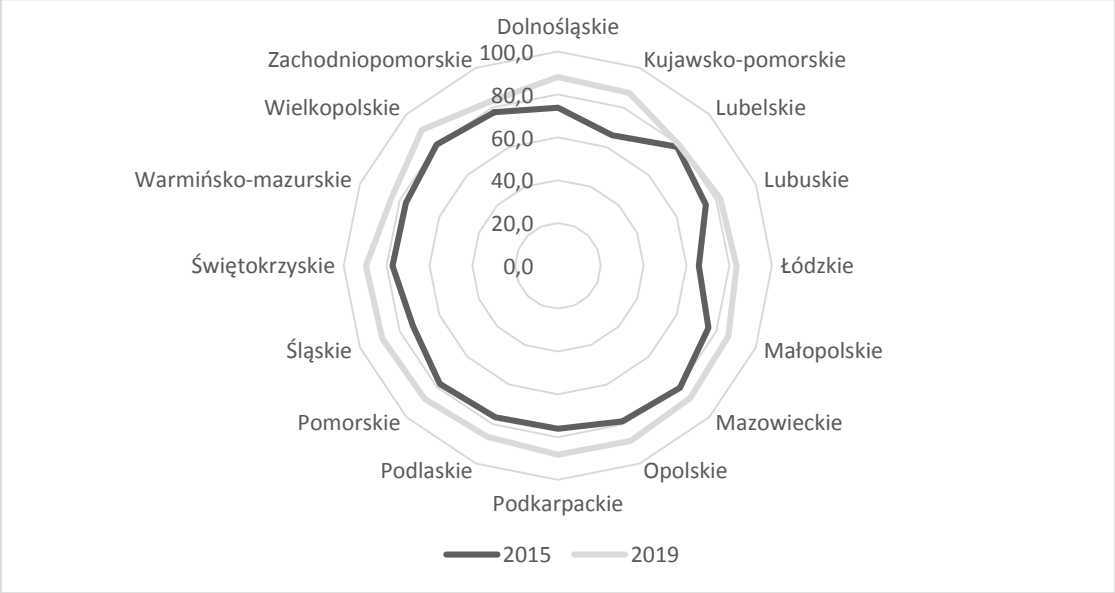


**Figure 4.** Percentage of households with access to the Internet in 2015 and 2019 per voivodeship. Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015 oraz 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015 and 2019.

Lubelskie voivodeship ranks lowest in this respect, where households with Internet access constitute 79.9% of all households. It is at the same time the only voivodeship with a rate below 80%. In Poland, the declared reasons for not having access to the Internet at home were varied. However, it most often results from the lack of need for having an Internet connection at home (68%). At the same time, the lack of need for having an Internet connection at home is much more commonly reported by residents of eastern Poland than central and western Poland. In eastern Poland, as much as 70% indicate such a reason (Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015). The results of the Central Statistical Office's research show that Poles have certain restraints with regards to using the Internet, which may be caused by a lack of digital skills. Only 46% of 16-74 year-olds have basic digital skills, while the EU average is 57% (DESI 2019, Digital Economy and Digital Society Index 2019. Country Profile 2019.

Poland). In 2019, over ¾ of households in Poland had access to broadband Internet. In 2018, Poland ranked below the EU average with a difference of 7 percentage points and with a difference of 18 percentage points compared to the leader — the Netherlands, where 97% of households had broadband Internet access [23]. In 2019, 78% of Poles use the Internet at least once a week (including those using it daily), while the EU-28 average in this respect is 85%. The leaders in Internet usage rates are Denmark, the Netherlands, Sweden and the UK (95% each) (Eurostat, https://appsso.eurostat.ec.europa.eu).

The information society not only has access to good quality equipment and Internet connections, but above all, it makes widespread use of the Internet. In 2019, 78% of Poles aged 16–74 used the Internet on a regular basis, however a diversity depending on age, economic activity, education level and place of residence was recorded. The rate of regular Internet use increased by 3 percentage points compared to 2018. At that time, the EU average was 83% with Denmark being the leader among the Member States (95%).

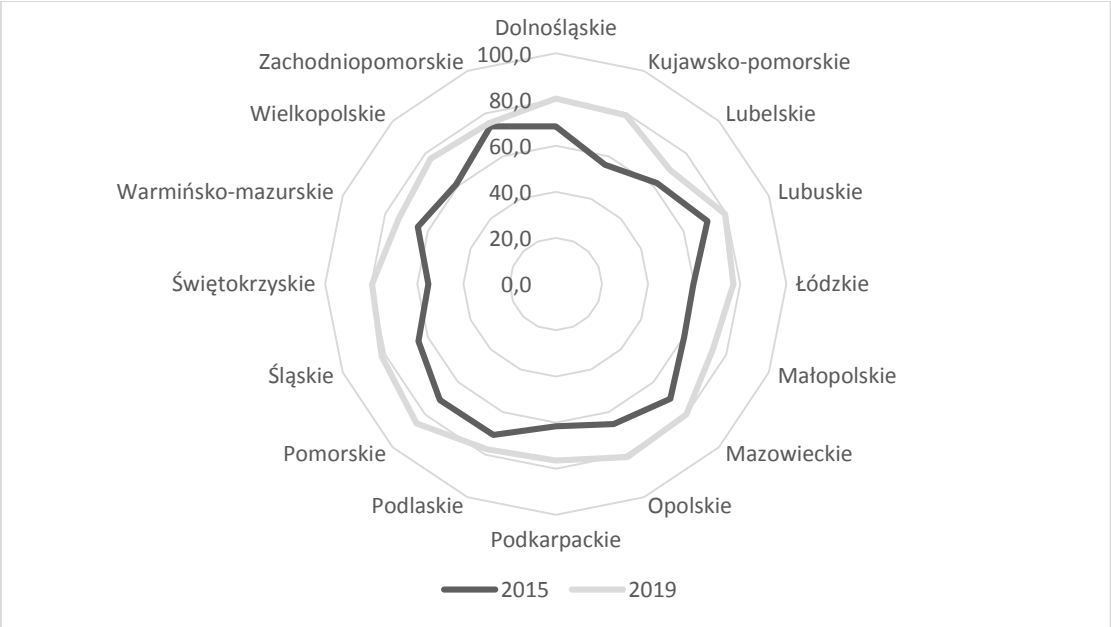


**Figure 5.** Percentage of people using the Internet on a regular basis per voivodeship in 2015 and 2019. Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015 and 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015 and 2019.

In territorial terms, the highest percentage of people regularly using the Internet was recorded in Pomorskie voivodeship (85.4%) (Figure 5). The smallest share of regular Internet users, similarly as in case of households with Internet access, is Lubelskie voivodeship (70%). The difference between the leader and the lowest ranking region in this respect is significant, amounting to 15.4 percentage points. Between 2015 and 2019 there a noticeable increase in Internet use was recorded. The index increased by 13.5 percentage points. The highest increases at that time were recorded in Świętokrzyskie and Kujawsko-Pomorskie voivodeships, where the index increased by 24.4 and 23.4 percentage points respectively.

As mentioned above, Polish citizens can use several hundred public e-services. This is important not only from the economic point of view, but also for the quality of life of the society (Rudnicki, and Jabłoński, 2011). The development of ICT, including the Internet, has provided an opportunity to use a new approach to communication between the citizen and the state.

A number of new solutions and services have been introduced, thus changing the way citizens and the state communicate. Thus, according to Statistics Poland nomenclature, the use of eGovernment services includes, i.a., the use of websites concerning: civic duties (e.g. submission of tax returns), official documents (e.g. ID cards), public education services (e.g. recruitment to universities), public health services (e.g. hospitals), excluding manually typed e-mails. More than 1/3 of the population aged 16–74 used public eGovernment services in 2019. In the years 2015–2019, there was a significant increase in the use of these services by Polish citizens. As early as in 2015, only ¼ of citizens used public eGovernment, which means an increase of 13.7 percentage points. In spatial terms, the highest growth was recorded in Pomorskie, Kujawsko-Pomorskie and Śląskie voivodeships (by 26.1, 21.8 and 21.1 percentage points respectively) (Figure 6).

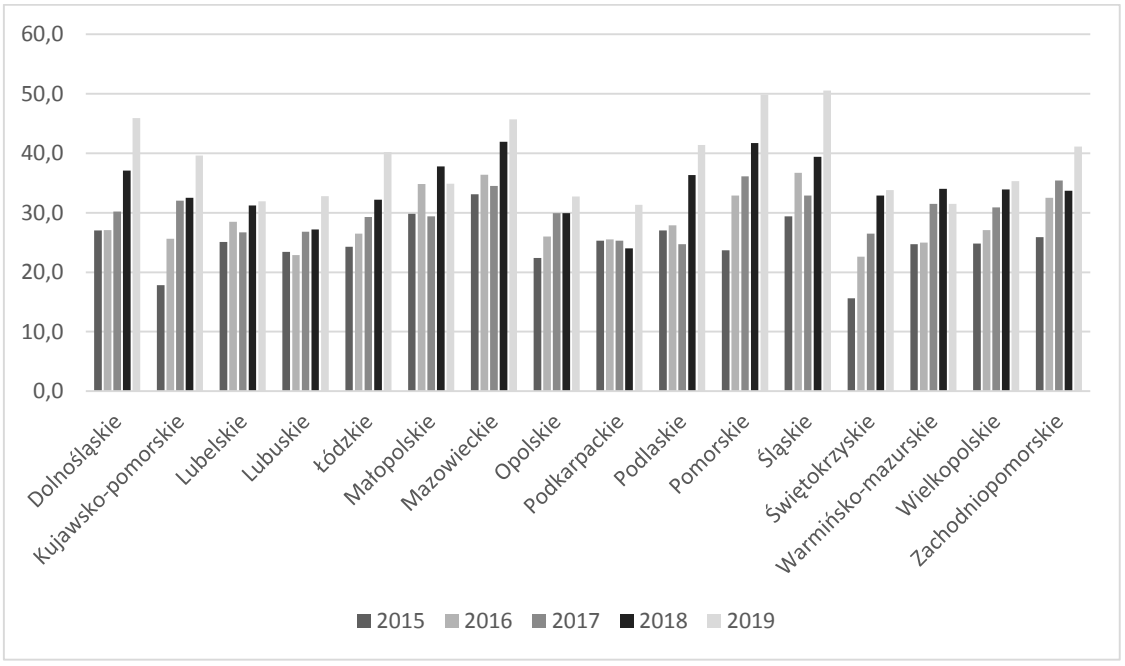


**Figure 6.** Persons using public administration services via Internet in the past 12 months in the period 2015-2019 per voivodeship (%). Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015, 2012-2016, 2013-2017, 2014-2018 and 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015, 2016, 2017, 2018 and 2019.

Śląskie voivodeship is the leader among the regions in the last examined year. 50.5% of its residents used eGovernment services. There is a large distance between the regions with the highest and lowest percentage of citizens using eGovernment services (Figure 7). The lowest ranking voivodeship — Podkarpackie achieved a result of 31.3%. This means large inequalities in this area of information society development (the distance is 19 percentage points). The three lowest ranking regions, where the index does not exceed 32%, represent eastern Poland.

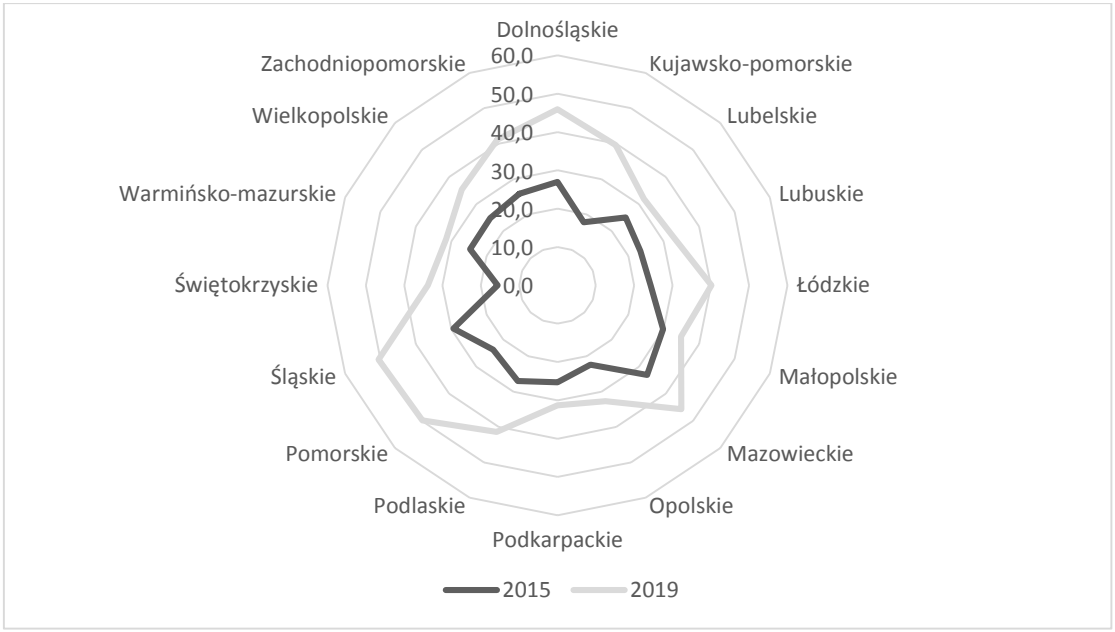


**Figure 7.** Persons using public administration services via Internet in the past 12 months in 2015 and 2019 per voivodeship (%). Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2011-2015 oraz 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2015 and 2019.

One of the public services which has seen a dynamic increase in its online use by citizens for contacts with the public administration is submitting applications to the "Family 500+" programme. Of all the application submitted in 2019, 2/3 were submitted electronically (Figure 8).


**Figure 8.** Percentage of electronic applications for the "Family 500+" programme in 2016 and 2019. Source: own elaboration based on: Społeczeństwo informacyjne w Polsce Wyniki badań statystycznych z lat 2012-2016 and 2015-2019, Statistics Poland, Statistical Office in Szczecin, Warsaw, Szczecin 2016 and 2019.

The highest percentage of applications submitted via the Internet was recorded in the Śląskie voivodeship — 76.6%, while the lowest — in the Świętokrzyskie and Podkarpackie voivodeships — 53.8% each. At the same time, between 2016 and 2019 a more than a 4-fold increase in applications submitted via the Internet was recorded in 4 voivodeships (Świętokrzyskie, Podkarpackie, Lubelskie and Warmińsko-Mazurskie). These voivodeships also represent eastern Poland, which gives a positive picture of dynamization of the development of the information society.

Poles interact with eGovernment much less frequently than citizens of other EU Member States. The active use of eGovernment remains relatively low. In the case of submitting electronic forms, this option is used in the EU by 34% of people total, compared to 25% in Poland. As regards searching for information on the websites of public administration, which is the most frequently reported service, in the EU 44% of citizens made such an indication, while in Poland it was only 24%. To sum up, there is a significant progress in the use of information and communication technologies. However, inequalities in access to broadband Internet and its use between Polish regions are becoming apparent. The diversity, which can be described as a digital divide, is particularly evident when comparing western Poland and eastern Poland with regards to the use of eGovernment. Public investment is needed to bridge the digital divide in areas with the least developed broadband networks.

## 6. Spatial diversity in the accessibility and use of information and communication technologies from an entrepreneur's perspective

The development of the information society is inseparably linked to the use of ICT achievements by enterprises. Polish companies are already commonly using computers with access to the Internet in their operations, realizing that the improvement of work efficiency and the use of modern technologies is closely related to equipping companies with computers. In 2019, computers were used by 96.8% of companies and the percentage of those with Internet access exceeded 96%, and was only 1 percentage point lower than the EU average. This means that companies see the benefits of using a global network. In spatial terms, in 2019 the highest rate of Internet access was recorded in Dolnośląskie (98.8%) and the lowest in Świętokrzyskie (93.3%) voivodeships. The situation is similar with regard to broadband Internet access. In 2019, 96.3% of enterprises had access to the Internet via a broadband connection. Access to a broadband connection is fairly evenly distributed in 2015 and 2019 (Figure 9).

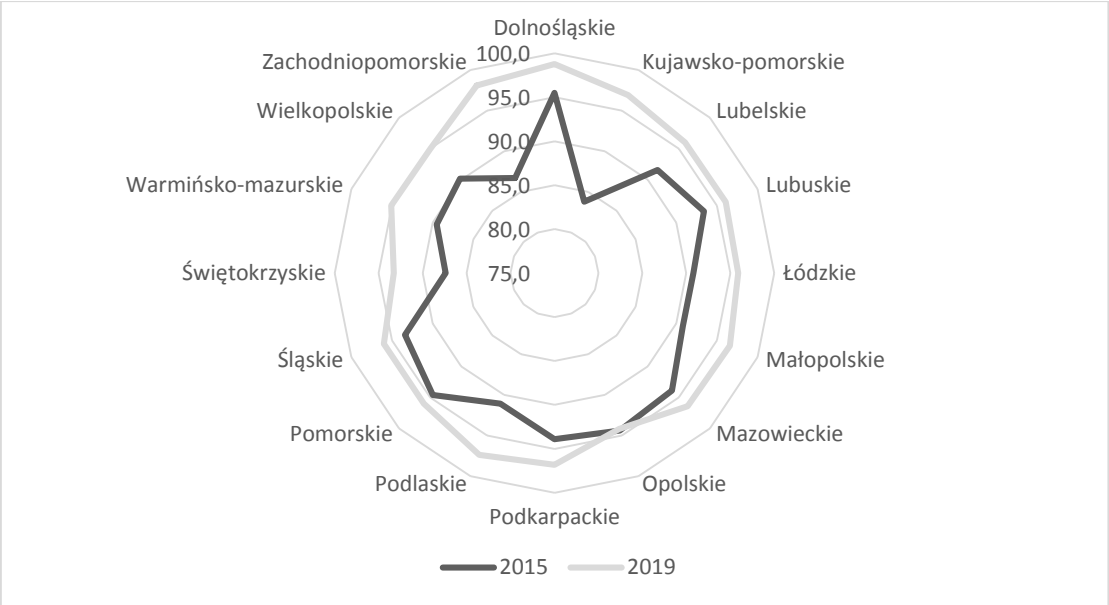


**Figure 9.** Enterprises with broadband Internet access per voivodeship in 2015 and 2019 (%). Source: own elaboration based on: Local Data Bank, Statistics Poland, accessed on 3.06.2020, https://bdl.stat.gov.pl/BDL/.

There are no significant territorial differences. In Dolnośląskie and Zachodniopomorskie voivodeship there was the highest number of business entities with broadband Internet access in 2019 (98.8 and 98.1 respectively). The least favorable situation in this respect was recorded in Świętokrzyskie (93.3%) and Opolskie (94.2%) voivodeships. However, the distance between the leader in broadband Internet access and the last-ranking region is 5.5 percentage points.

An increasing number of companies have their websites and see them as marketing tools. Modern technologies enable, apart from performing typical presentation functions, also placing orders and checking the status of their realization. In 2019, over 2/3 of Polish enterprises had their own website. The EU average in 2018 was 77%, while in Poland it was 67% and in Finland 96%. Its most frequently used function is to present products, catalogs or price lists of products and services. Over 66% of Polish non-financial sector companies reported using this functionality in 2019. The largest increase in the use of the websites in question, in the years 2015–2019, occurred in Lubuskie and Małopolskie voivodeships (by 18.5 and 10.5 percentage points respectively), while in Kujawsko-Pomorskie a negative difference was recorded (-1 percentage point) (Figure 10).

There is also a distance between voivodeships in terms of the use of websites in enterprises. In Mazowieckie voivodeship, 70.1% of companies indicate the most common destination of the sites, while in Świętokrzyskie voivodeship only 59.2%, which means a distance of 12.1 percentage points between regions.

In 2018, 15.7% of companies were conducting sales via the Internet. In relation to the EU, in 2017 20% of companies in the EU received orders via computer networks, while in Poland it was only 14%. This is 2.5 times less than in Ireland, where 35% of companies sell goods online.

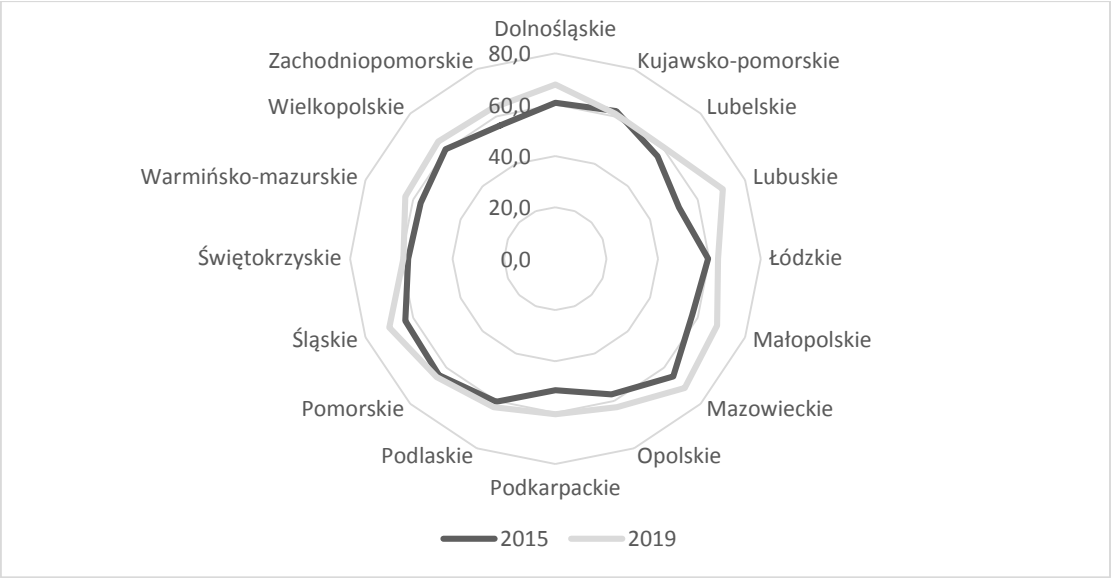


**Figure 10.** Companies which use their website to present catalogs, products or price lists per voivodeship in 2015 and 2019 (%). Source: own elaboration based on: Local Data Bank, Statistics Poland, accessed on 3.06.2020, https://bdl.stat.gov.pl/BDL/.

In four voivodeships the percentage of business entities accepting orders via computer networks was higher than the national average. In the Mazowieckie voivodeship, the index assumed the highest value of 19.4%, in the Dolnośląskie, Wielkopolskie and Małopolskie voivodeships it assumed values in the 16-17% range (Figure 11).

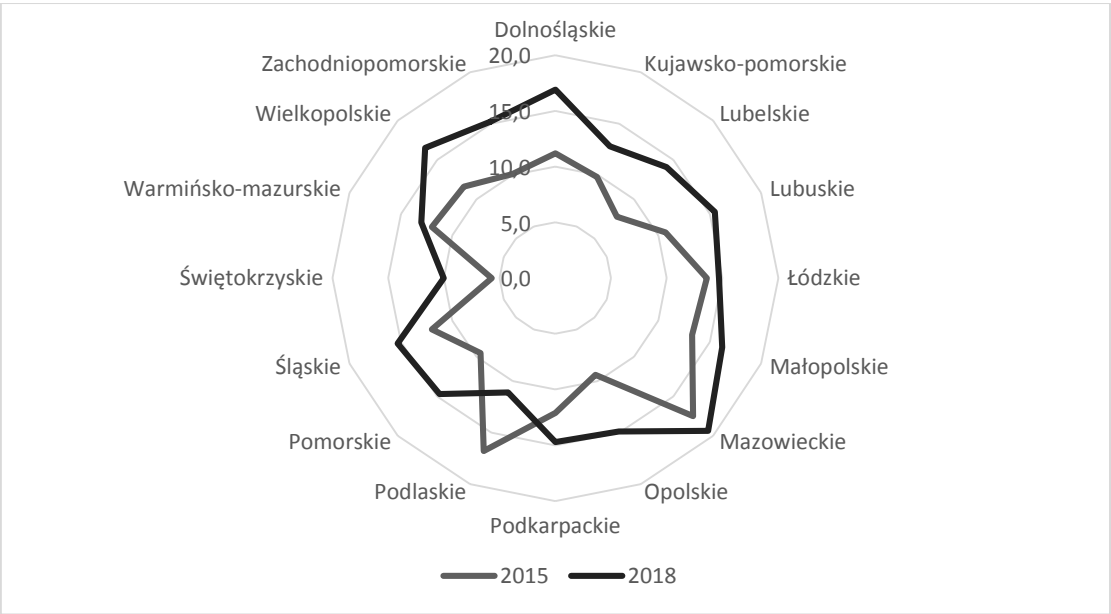


**Figure 11.** Companies receiving orders via computer networks (website, EDI systems) per voivodeship in 2015 and 2018 (%). Source: own elaboration based on: Local Data Bank, Statistics Poland, accessed on 3.06.2020, https://bdl.stat.gov.pl/BDL/.

At the same time in Świętokrzyskie, Podlaskie and Kujawsko-Pomorskie voivodeships it did not exceed 13%. In the Świętokrzyskie region, which is clearly behind other voivodeships, almost 2 times less companies accepted orders via computer networks than the leader — Mazowieckie voivodeship. The increase in the popularity of social media results in them being commonly used by companies for business purposes, as a communication channel for

promoting products and brands. In 2019, every third company in the country used at least one social media outlet. Social media are most often used by companies from the Mazowieckie region, and least commonly used in the Świętokrzyskie region. The most popular are social networking sites, the use of which was reported by 35% of companies.

Use of Wiki tools is the least common. The percentage of companies using social networking sites was the highest in Mazowieckie voivodeship (43.2%), while the lowest among companies from the Świętokrzyskie voivodeship (25.5%).

Of the numerous services offered to entrepreneurs via the Internet, eGovernment deserves special attention. This area sees a growing activity of entrepreneurs. Filling in and sending documents online saves time, which meets with increasing appreciation of companies. In the years covered by the analysis, the percentage of entrepreneurs active in this area increased systematically. In 2019. 95% of enterprises used eGovernment, most often to return filled-in forms. The highest percentage of companies benefited from such contacts with public administration in the Dolnośląskie and Zachodniopomorskie voivodeships (over 98%) (Figure 12).

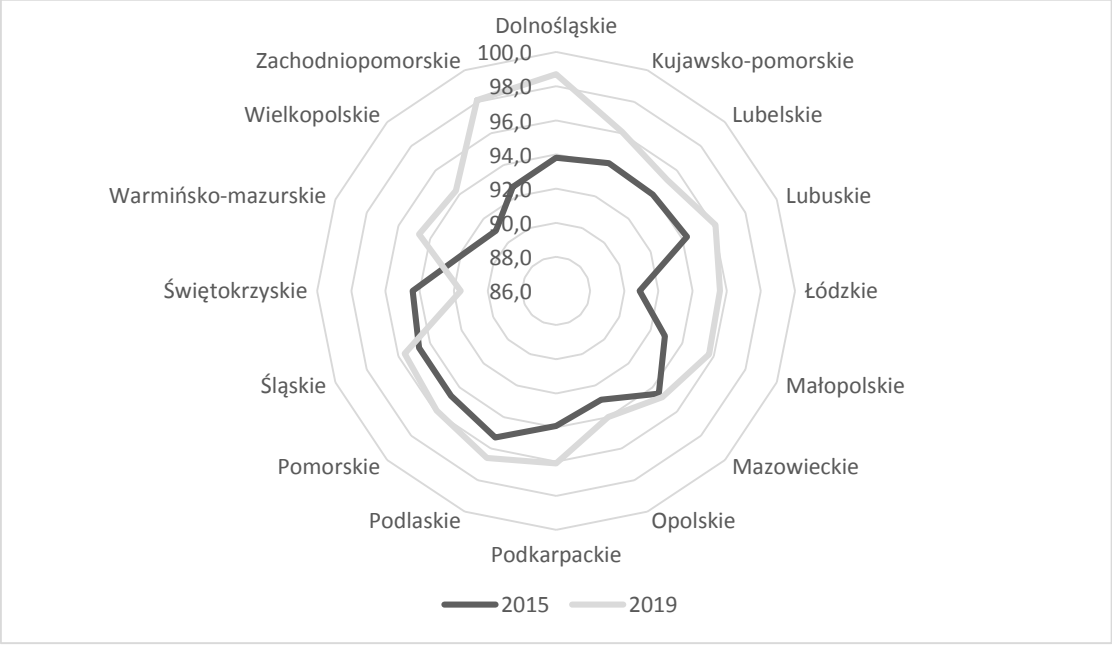


**Figure 12.** Companies using the Internet to contacts public administration entities to return completed forms electronically in 2015 and 2019 (%). Source: author's own elaboration, based on: Local Data Bank, Statistics Poland, accessed on 3.06.2020, https://bdl.stat.gov.pl/BDL/.

In Świętokrzyskie it was just below 92%. In addition, there has been a decrease in the use of services to return forms between 2015 and 2019 in this region. The highest increase in the percentage of returned forms was recorded in Zachodniopomorskie voivodeship — by 5.5 percentage points.

Eurostat uses the so-called digital intensity index of companies calculated based on statistics on use of information and communication technologies, which synthetically reflects ICT usage. The index allows to classify companies to groups with very low, low, high or very high digital intensity. In 2018, the highest percentage of companies with a very high or high digital intensity

index was recorded in Denmark (49.5%) and the lowest in Bulgaria (8.6%). In Poland, it was 12.5%, i.e. 5.6 percentage points below the EU average (Eurostat, https://appsso.eurostat.ec.europa.eu, accessed on 2.06.2020).

To sum up, the use of the Internet in business results from its undoubted advantages: global reach, lack of bureaucratic restrictions or the possibility of establishing international cooperation. Obtaining information via the Internet can provide companies with new suppliers, new orders, financial settlements and in the long term — increase their competitiveness. Polish companies dynamize the use of ICT in business processes, but this occurs not without regional differences.

## 7. Conclusion

The level of development of the information society in Poland is steadily increasing, which is confirmed by EGDI and DESI values. However, Poland is among the countries with the lowest rate of digital economy in in the European Union.

The analysis of selected data concerning the development of the information society for both households and enterprises indicates a clear progress in the use of information and communication technologies. Between 2015 and 2019, quite significant progress in Internet access, including broadband has occurred. Citizens' access to information and communication technologies, although increasing, is still quite spatially diverse. The disproportions are revealed in particular in the percentage of computer-owners with access to broadband Internet connection. The diversities, which can be described as a digital divide, are particularly evident when comparing western Poland and eastern Poland. It should be stressed that access to fixed broadband Internet connections in Poland is far behind the EU average.

The availability of Internet use should be assessed positively on a national scale. There is a clear progress with regards to regular use of computers and the Internet. An increasing number of citizens and businesses take advantage of the new approach in communication between the citizen and the state. However, spatial analysis reveals large diversity. Disproportions are particularly evident in the use of eGovernment services.

The existence of inequality in the development of the information society may affect the implementation of the development priorities of the country. Public administration is in the period of transition from the traditional way of dealing with the matters of citizens and enterprises to modern — electronic implementation of public services, which requires the state not only to provide access to modern technologies, but also to invest in digital skills of administration employees and society. Continuous and accelerating economic and social change means that the state's approach to developing the digital society should be dynamic. Therefore, it seems necessary to take measures to improve digital public services

(e.g. by providing skills-enhancing training), on the one hand, and on the other, to further promote the use of eGovernment services and the benefits of eGovernment. Public investment is needed to bridge the digital divide in areas with the least developed broadband networks.

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