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EVALUATING THE CURRENT STATE OF DIGITAL ERA GOVERNANCE APPLICATION IN LOCAL GOVERNMENT UNITS IN THE MAŁOPOLSKA REGION

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A B S T R A C T

The study aims to determine the implementation degree of Digital Era Governance (DEG) in selected local government units (LGU) of Małopolskie Voivodeship and to show differences in the effectiveness of digitalisation in LGUs depending on the level of local government, i.e., the county and the municipality. The study employs a model of digital maturity intended specifically for public administration. This model assesses six dimensions of digital maturity, namely, digitalisation-focused management, openness to stakeholders' (partners') needs, digital competencies of employees, digitalisation of processes, digital technologies, and e-innovativeness. The study results indicate that the examined local government units in the Małopolska region suffer from a low level of digital maturity. In particular, the results show that the implementation of digital technologies and the digital competencies of staff are the most developed dimensions of digitalisation in the examined local government units. In turn, e-innovation and process digitalisation are the least developed areas and require further improvement. Additionally, digital maturity is lower at the municipal than county level. These findings confirm the thesis that New Public Management affects the development of local government and highlights the increasing role played by Digital Era Governance. In contrast to most studies on public administrations, this study focuses on the local government level. It employs the original model of digital maturity in the field of public administration. This study intends to contribute to the concept of Digital Era Governance by focusing on the digitalisation of LGUs.

K E Y   W O R D S
digitalisation, local government unit, public sector, the Digital Era Governance concept

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INTRODUCTION

Over the past few decades, the digitalisation of public services has been the subject of extensive research. The basic objective of these analyses has been to demonstrate how digital technologies (service automation, data mining, machine learning) and modern tools and methods of communication and information transfer (e.g., social media, applications, podcasts, chat, etc.) are used to improve the quality and efficiency of services by shortening the time required for their implementation, increasing the

existing range of services, and to enhance the transparency or smoothness of their provision (e.g., Layne & Lee, 2001; Norris & Reddick 2011; Matheus, Janssen, & Maheshwari, 2018). Increasing automation in these areas, combined with the use of information technology in the creation and distribution of public services, are central issues for New Public Management (NPM) (Hood, 1991) and Public Governance (PG). While in the case of NPM, the reference point is citizens as consumers, for PG, the focus is on citizens as stakeholders (Izdebski, 2007). The basic PG assumption is the inclusion of citizens in governance processes aiming to achieve public value and thus satisfy the needs of various stakeholder groups. One means of implementing the goals of NPM and PG is e-government (electronic administration), which assumes the use of information and communication technologies in bringing about organisational change and promoting new skills to improve the quality of public services and greater citizen involvement in and support for state policy (Grodzka, 2007). It is worth mentioning that in past years, some other perspectives on e-governance developed, like m-government (Burksiene et al., 2019).

The impulse for implementing digital solutions in the public sector (in the mid-1990s) came from the expansion of electronic commerce, as a result of which citizens now enjoy almost unlimited access to knowledge and an ever-wider range of online services and thus, nowadays, expect similar standards in terms of access to public information and public services (Śledziewska & Włoch, 2020). The COVID-19 pandemic, the financial upheaval of the first decade of the 21st century, the current energy crisis, inflation, an ageing population, migrations, and climate threats have given rise to new social problems and posed new challenges to the public administration. They have provided an incentive for redefining public policies and expanding the regulatory role of central and local government units. Based on the public administration theory and its functioning, these developments have highlighted the shortcomings and the strengths of the public management models applied to date. These challenges are addressed by the concept of the Neo-Weberian State, which endeavours to combine the most effective solutions applied in previous theories and concepts of public management. Another consequence of the changing situation has been the emergence of Digital Era Governance (DEG), which is a product of the digital revolution and its more advanced version, i.e., "Essentially Digital Governance" or the "Essentially Digital" Model of Governance (EDGE). The EDGE model places digital technologies at the centre of management, setting out the principles of public administration in the era of social media, cloud computing, robotisation, and big data. It also identifies organisational cultures that may promote EDGE practices (Dunleavy & Margetts, 2015). The key features of DEG and EDGE are reintegration (concerning the construction of public administration), customer orientation and digital change (including technological, social and cultural adjustments to digital change). Common to both concepts is a doubt about how the public administration has been operating so far and the pressure to open it up internally and externally towards simplification, automation of daily work and flexibility in delivering public services (Białożyt, 2017).

Dunleavy et al. (2006) point out that technology does not per se change public institutions but rather shapes how they function and their work practices. They consider the effects of technological change in a broader context, focusing on organisational, cultural and social change. This multifaceted approach makes it possible to track the consequences of digital transformation. This thesis is also supported by Meijer and Bekkers (2015), claiming that research on digital transformation effects should strive to understand how technology affects social constructs and government, consider, and understand social attitudes, the behaviours of individual participants, interests, values, positions and local and institutional connections. As a consequence, digital transformation should be understood from the perspective of an organisation as a whole, without losing sight of the fact that IT is not a means of supporting change per se but rather a means of processes, people, politics and in particular, leadership. The authors of this study have considered these factors by analysing the impact of digital maturity on local government units in the Małopolska region.

Assessing an organisation's digital maturity is an increasingly popular topic for researchers. As part of a systematic literature review on the digital transformation of business organisations, Jedynak et al. (2021) regarded the digital business model as an aggregate synonymous with the use of such digital technology tools as the Internet of Things, blockchain, machine learning, cloud computing, wireless communications, ICTs, Big Data, and Multi-sided platforms. In addition, they point out that employees and their skills, experiences, knowledge gaps, skill mismatches, engagement, and behavioural changes play a significant role in the digitalisation of an organisa-

tion. When estimating an organisation's level of maturity, the following three categories must be considered: people, processes, and preparedness.

A review of numerous studies on public sector digitalisation reveals the predominance of analyses conducted at the state (central) administration level (Miazga et al., 2022). So, the following research question has arisen: to what extent is digitalisation in local government units developed? This question is justified by the lack of any distinction between the local and central levels in research on digitalisation in public administration in the European Commission in Digital Economy or the Society Index (DESI) reports since 2014. The present study aims to determine the degree of implementation of Digital Era Governance (DEG) in selected local government units (LGU) in Małopolskie Voivodeship. To assess the level of digital maturity in these entities, the authors employed an original digital maturity model. Another aim of the article was to show differences in the effectiveness of digitalisation in LGUs depending on the local government level, i.e., the county and the municipality. This study intends to contribute to the Digital Era Governance concept by focusing on LGU digitalisation.

The remaining part of the article is as follows. The next part reviews the literature regarding the digitalisation of public administration in Poland and progress in the digitalisation of public services in Poland at the local government unit level. Then, the research methods and research results are described. Finally, the results are discussed with previous literature and conclusions are presented.

1. LITERATURE REVIEW

1.1. DIGITALISATION OF THE PUBLIC ADMINISTRATION IN POLAND SET AGAINST THE BACKGROUND OF OTHER EUROPEAN UNION COUNTRIES

Digitalising public administration services is part of the EU's broader Digital Single Market Strategy (Communication from the Commission…, 2015). In the case of Poland, the framework for digitalisation in this area has also been defined in, e.g., the Strategy for Responsible Development of 2017 and the strategic document the Programme for the Integrated Informatisation of the State 2019–2022. The latter sets out several activities aimed at develop-

ing the public administration in Poland through modern digital technologies and fostering conditions that facilitate communication between citizens and the public administration using information resources and implementing measures designed to adapt digital solutions to its needs and make them accessible. The Strategy's main objective is to modernise the public administration and streamline the state's functioning with digital technology, which, in turn, is aimed at improving the quality of communication between citizens and other public administration stakeholders. As part of this main objective, several more specific objectives were defined, focusing on three areas of intervention: reorienting the public administration towards services intended for the needs of citizens, implementing horizontal tools that support public administration activities, and developing the digital competences of citizens, public administration employees and ICT specialists (Program Zintegrowanej Informatyzacji Państwa 2019–2022).

The governments of European Union Member States can assess the level of their e-development based on rankings that measure digitalisation in public services. DESI (Digital Economy and Society Index) is one such ranking applied in the European Union. Since 2015, the European Commission has been charting the Member States' progress in the field of digitalisation through its Digital Economy and Society Index (DESI) reports. The DESI quantified data contained in the DESI country reports is comprised of five dimensions for evaluating a country's digital economy and society, namely: connectivity, which includes fixed broadband uptake, fixed broadband coverage, mobile broadband and broadband prices; human capital for assessing the skills of Internet users and advanced skills; the use of online services, expressing the level of citizen's use of online services and their online transactions; and integration of digital technology for assessing the digitalisation level of business and e-commerce as well as digital public services, which, in turn, reflects the level of e-administration in a particular country. The Digital Public Services indicator comprises five criteria for assessing the digitalisation of the public sector: e-government users, pre-filled forms, digital public services for citizens, digital public services for businesses, and open data. Table 1 shows the DESI index for Poland over the last six years.

In terms of digital public services, Poland, despite stepping up its efforts to digitalise its public sector, especially in 2020, remains at the lower level of the

Tab. 1. Digital public services in 2017–2022

YEAR	RESULT — POLAND	RESULT — EU average	POLAND'S POSITION IN THE EU RANKING
2017	45.4	54	19
2018	45.2	57.9	25
2019	52.5	62.9	23
2020	67.4	72	20
2021	55.1	68.1	22
2022	55.8	67.3	22

Source: Digital Economy and Society Index (DESI). Poland. Country Report (2019, 2020, 2021, 2022).

Tab. 2. Leaders and outsiders in digital public services in 2021

INDICATOR DIGITAL PUBLIC SERVICES	LEADERS	OUTSIDERS
E-government users	Sweden, Denmark, Finland, Ireland and the Netherlands fared very well, with over 90 % of Internet users (aged 16–74) choosing government websites when interacting with the public administration	Romania, Bulgaria and Italy fared less well in this dimension and were the only three countries where the percentage of citizens interacting with the public administration was below 50 %
Pre-filled forms	In 2021, the best performers were the Netherlands, Lithuania, Finland, Estonia, Malta, Denmark and Sweden, all of which achieved scores above 85 points	The worst-performing countries were Romania (below 20 points), Cyprus and Croatia (below 40 points)
Digital public services for citizens	Malta, Luxembourg and Estonia performed best in this area, achieving more than 90 points	Romania, Greece, Cyprus, Poland and Bulgaria scored less than 60 points
Digital public services for businesses	In total, seven countries (Ireland, Estonia, Malta, Luxembourg, Spain, Lithuania and Finland) scored more than 90 points (out of 100)	Romania, Greece, Croatia and Poland scored less than 70 points
Open data	A total of 11 countries (France, Ireland, Spain, Poland, Estonia, Austria, Italy, Slovenia, the Netherlands, Cyprus and Denmark) scored above 90 %	Slovakia, Malta, Belgium and Hungary scored below 60 %

Source: Digital Economy and Society Index — Digital public services (2022).

EU rankings, and its performance deviates significantly from the EU average. In the last year in the series, i.e., 2022, e-government services were used by 55 % of Internet users (an increase over the previous year), and this result was slightly closer to the EU average of 64 %. In the case of pre-filled forms, Poland's score (74/100) is considerably higher than the EU average (64/100), but when it comes to citizens' access to digital online services, Poland's score (57/100) is still poor when compared with the EU average (75/100). The same is true when it comes to businesses' access to digital public services in Poland (70/100): the EU average is 82/100. What is noteworthy about this indicator is Poland's increasing maturity in terms of access to open data (95 %), which is well above the EU average of 81 % in 2022 (Digital Economy Index…, 2022).

Estonia, Finland, Malta, and the Netherlands are the leaders in terms of digital public services, while Romania, Greece, Bulgaria and Slovakia are the poorest performers (Table 2).

Estonia is the EU leader in terms of digital public services. Almost 90 % of Internet users in that country have access to e-government services. Its scores for digital public services of 92/100 for citizens and 98/100 for businesses are close to the maximum and well above the EU average. Pre-filled forms are also widely used in Estonia, and the authorities in that country are making many datasets available as open data. The country is often ranked as one of the most digitalised nations in the world and is often referred to as e-Estonia. The priority is now shifting in that country towards the quality and human-centric nature of these services. This is reflected in the recently announced Estonian Digital Agenda 2030, which sets a target of 90 % on the Digital Economy and Society Index (DESI) 2022 Estonia (Digital Economy and Society Index — Digital public services, 2022).

When discussing the tools for assessing the level of digitalisation in public administration, it is also important to bear in mind that in 2017, the European Commission published the European Interoperability Framework (EIF), which offers specific guidance in the form of 47 recommendations on how to create interoperable digital public services. Three pillars of the EIF were developed, which formed the basis of the EIF Monitoring Mechanism, which was designed to assess the level of EIF implementation in Member States. It is founded on a set of 71 Key Performance Indicators (KPIs) grouped under the three main EIF pillars: principles, layers and the conceptual model (Interoperability Framework Monitoring Mechanism, 2021). It is worth noting that this tool not only allows for a self-assessment of each country but also makes it possible to indicate possible areas of improvement.

Given its ambitious goal of ensuring that all key public services are online by 2030, the digital transformation of governments remains a top priority for the European Union. In this context, interesting conclusions can be drawn from the "eGovernment Benchmark 2022" report prepared by the consulting company Capgemini. In research conducted by Capgemini's consultants, the maturity of e-government was assessed according to four basic elements: user orientation, transparency, availability of technological improvements and international services. According to Capgemini's study, the European leaders in this field were Malta and Estonia, which confirms the conclusions of the DESI analysis that the digital governments of these countries are the most user-centric, transparent, technologically equipped and open to users from other European countries.

It is important to point out that digital maturity may vary depending on the level of public administration. With a few exceptions, central government service providers are more digitally mature than their local and regional counterparts. In Europe, 84 % of all government services are available online, compared with 71 % of regional services, while only 60 % of local services can be provided digitally. There are, of course, some exceptions to the rule that central administrations outperform regional or local administrations. Interestingly, those countries where the central administration is digitalising public services at the same pace or slower than the regional or local administration include Denmark, Iceland, the Netherlands, Slovakia and Poland (eGovernment Benchmark 2022 — Synchronising Digital Governments, 2022).

1.2. PROGRESS IN THE DIGITALISATION OF PUBLIC SERVICES IN POLAND AT THE LOCAL GOVERNMENT UNIT'S LEVEL

The increasing digitalisation of public administration in Poland is visible at the government and local government unit levels, although the dominant share in this respect is visible in the area of e-state. This is evident in specific solutions that were implemented with particular intensity during the COVID-19 pandemic. Vial (2019) provided a multifaceted presentation of the digitalisation process and the different types and effects of the implemented technologies. Based on an analysis of studies on the use of digital technologies in companies, he described the opportunities, potential, and risks of implementing digital solutions. According to Vial, implementation of the digital transformation process has led to changes in the following areas: structural (organisational structure, organisational culture, leadership, employees and their roles and skills) and value creation (value proposition, value shaping networks, channels, capabilities and the "ambidextrousness" of organisations). Among the barriers to digitalisation, he mentioned organisational resistance, inertia, and threats to security and privacy. On the other hand, digitalisation has a positive impact on operational efficiency, organisational results and social change. One issue that has not been addressed in this context is the use of digital technologies in public administration, particularly in local government units. Research on the impact of digitalisation on the quality of public administration work and the position and role of administration staff, improvements in processes or services performed by the public administration and the benefits and threats for users have recently been conducted in different parts of the world by, among others, Mina-Raiu, Melenciuc (2022), Ofoma (2021), Andersson et al. (2022), and Umbach and Tkalec (2022).

The implementation of digitalised, fully electronic public services in Poland is currently possible thanks to the "Trusted Profile" digital identity system, originally launched for a small group of recipients in 2011. Constantly being upgraded, it has become widely available with over 12 million users since the end of July 2021 (i.e., 12 milionów …, 2021). Thanks to the "Trusted Profile" option, citizens using the Gov.pl platform can submit electronic notifications, e.g., regarding their marital status or the birth of a child, without the need to visit a local government unit office (Digital Economy and Society Index

(DESI), Poland, Country Report, 2021). Simultaneously with the trusted profile option, banks and other entities with users identified at the national level have also introduced their own identification systems.

Secure communication between citizens and the public administration is also possible thanks to the mObywatel mobile application, introduced in October 2017, which guarantees rapid access to mDokumenty. This application currently allows the user to confirm, among other things, their identity, entitlements or car insurance (e.g., mLegitymacja for school students, mLegitymacja for university students, mPojazd, etc.) as well as access to e-prescriptions and e-referrals. This application is being expanded to include more and more new functionalities, e.g., access to mLegitymacja for old age and disability pension holders. At the end of April 2022, over 7.5 million Poles used this application (mObywatel ..., 2022).

When it comes to the digitalisation of local government offices, one application that has been developed as a useful tool for users is eGmina. It allows the residents of a municipality to search for news, interesting places, and zones available after logging in. Users log in via their trusted profile. The account of a logged-in user is shared with the account on the eNależności platform. A logged-in user has access to data from the domain systems presented on the eNależności website and has the option of making payments via the payment system (eGmina, 2023).

In addition, as the few Polish studies in this field have shown, national local government offices use various digital tools to manage both internal and external processes in contact with users, such as electronic document flow, electronic archive, automatic correspondence with customers, handling applications and online complaints, document coding, self-service points of contact with customers (eBOM), an electronic queuing system, automatic hotline, voice bot/chatbot, time recording based on network log-in, electronic recording/ordering/liquidation of fixed assets, electronic handling of HR matters, electronic ordering of IT services, meetings and online courses. They also make use of tools supporting the digital functioning of offices, such as cloud solutions, internal virtual networks, CRM systems, electronic worktime recorders, Big Data, machine learning, artificial intelligence, and social media (Kafel et al., 2021b; Miazga et al., 2022). It should also be noted that the degree to which digital tools are used in local government offices varies (Kafel et al., 2021b), as can be observed in Polish cit-

ies. For example, the following digital tools were used in large cities with greater frequency than in smaller cities: high-speed Internet, cloud services, ERP and BI systems, while staff are provided with equipment for remote work or for training ICT. On the other hand, the key barriers hindering the digital transformation of such offices may still include, most importantly, insufficient financial resources, staff resistance to change, the limited competences of public administration officials and the current law. Despite the obstacles, municipal offices are introducing more and more e-services for citizens, even though many of these are scattered over various sites and rarely allow the user to deal with an entire matter online (Miazga et al., 2022).

This article addresses the literature gap in the debate on the importance of digitalisation in the public sector and is aimed at contributing to research on the digitalisation of local government in Poland.

2. RESEARCH METHODS

An analysis of selected models developed for both enterprises and public organisations provided the basis for an original model for gauging the digital maturity of public administration institutions, both at state and local government levels. The proposed model distinguishes between six dimensions: digitalisation-oriented management (vision, mission and management strategy of public sector organisations), openness to the needs of stakeholders (partners), digital staff competences, process digitalisation, digital technologies (information and communication technologies, IT systems, cloud data, process automation, and network speed) and e-innovation. Representatives of the surveyed organisations were asked questions about each of the dimensions distinguished in the model. The study adopted the 7-point Likert scale (where 1 meant "definitely not" and 7 — "definitely yes"). The answers enabled the authors to assess the level of maturity of the surveyed entities according to the above scale, as presented in Table 3. The overall score for a single organisation is calculated as the sum of the average scores for individual dimensions divided by six (which is the number of dimensions included in the study).

To determine the level of digital maturity of a public sector organisation, an additional condition was also considered, namely, if the score in at least one dimension (out of six) fell below the minimum

Tab. 3. Scale of digital maturity of public sector organisation

RANGE	DEGREE OF THE ORGANISATION'S DIGITAL MATURITY
7.00–5.67	Full digital maturity (FDM)
5.66–5.00	Very high degree of digital maturity (VHDM)
4.99–4.34	High degree of digital maturity (HDM)
4.33–3.67	Moderate degree of digital maturity (MDM)
3.66–3.00	Low degree of digital maturity (LDM)
2.99–2.34	Very low degree of digital maturity (VLDM)
2.33–1.00	Insufficient degree of digital maturity (IDM)

Source: Kafel et al. (2021a).

score for the level immediately below it (according to the adopted scale), the level of maturity should be lowered by one level. In addition, the authors proposed the rule that to move to a higher level of digital maturity, improvements had to first be made in certain activities, especially in those areas that received such a low score. These activities may be considered a priority from the perspective of the digitalisation of a public sector entity.

A score between 7.00 and 5.67 on the digital maturity scale meant that an organisation had reached full digital maturity. This condition was defined by the authors of the study as a model organisation with full digital maturity and, thus, was a model worth following. For an organisation to make the transition towards this model, its managers had to take actions within each of the six analysed dimensions.

The full research sample consisted of 142 public organisations operating in Małopolska. These included local government units (at both county and municipality levels), labour offices, the National Revenue Administration, social insurance institutions, social welfare centres, sanitary and epidemiological stations, and police and municipal guards. The surveyed entities operate at the regional and local levels, including the voivodeship, county and municipality levels. In total, 21 270 people were employed in the organisations included in the sample. To verify the digital maturity of local government units, 54 units operating at the municipality and county level in the Małopolska were covered in the research (42 Municipality Offices, 12 County Offices; return rate was 26.4 %). They employed 4 417 staff (an average of almost 82 people per unit). The data was collected in 2020–2021 with an online measurement tool. Our respondents represented a top management level (town/city mayors or organisation managers) and a high management level (deputy organisation managers or department managers), one person per unit.

3. RESEARCH RESULTS

A comparison of different parameters of digital maturity in a county and municipality (Table 4 and Fig. 1) leads to the general conclusion that a higher degree of maturity has been achieved in the county.

According to the scale adopted by the authors, the level of digital maturity of counties is moderately higher (score: 3.82), while in the case of municipalities, digital maturity remains low (score: 3.47). These differences are particularly significant when it comes to the concentration of management tasks based on digitalisation (4.17 in counties and 3.60 in communes) and the digital competences of employees (4.23 in counties and 3.75 in communes). The fewest differences were noted in the digitalisation of processes (3.38 in counties and 3.19 in municipalities) and digital technologies (4.40 in counties and 4.21 in municipalities). The reason for the narrow gap between the two levels of local government may be the use of earlier presented IT solutions, which are available to LGUs to handle administrative tasks outsourced to them, as well as standardised processes thanks to standardised tools, but also legal regulations.

Overall, the level of digitalisation should be assessed as moderate in counties and low in municipalities (most dimensions of digitalisation are at such levels). The two areas where digitalisation is lowest in both counties and municipalities are e-innovation (low level in counties and very low in municipalities) and digitalisation of processes (low both in counties and municipalities). In turn, the areas characterised by the highest levels of digitalisation are digital technologies (high in counties and moderate in municipalities) and the digital competences of staff (moderate in both groups). The latest observation indicates that the development of applied technologies is accompanied by increased competences, which should be assessed in a positive light.

As part of the study, the authors analysed the correlation between the dimensions of digital maturity and the effectiveness of local government units operating at the county and municipality levels. For this purpose, the authors used an efficiency indicator comprising three elements connected with the execution time of internal processes and matters related to individual customer service, as well as the number of errors and mistakes made (Cronbach's alpha for this indicator is 0.88). The correlation coefficients are presented in Table 5.

Tab. 4. Level of digital maturity in local government units in Małopolska

DIMENSIONS OF DIGITAL MATURITY AND RELEVANT ITEMS	COUNTIES	MUNICIPALITIES
Digitalisation-focused management	4.17 moderate	3.60 low
processes being modified to facilitate their digitalisation	3.67	3.33
significant sums from the budget are being regularly allocated to support the digitalisation of institutions	4.08	3.48
digitalisation strategy treated as a key element of an organisation's development strategy	4.83	4.19
a digitalisation strategy is being systematically implemented, and efforts are being made to ensure more effective use of public funds (e.g., reducing service costs per one applicant)	4.08	3.40
Openness to the needs of stakeholders	3.58 low	3.20 low
efforts being made to achieve a state in which customers can process most interactions via the Internet	3.75	3.48
use of modern IT infrastructure, e.g., automated self-service devices for customers, so-called touchpoints	3.42	3.07
stakeholders (including customers) are involved in the process of improving/designing how e-services are provided by a public sector organisation	3.33	2.93
the effects of digitalisation (efficiency, costs) are constantly monitored using indicators measuring, e.g., the time taken to perform a procedure, customer satisfaction, etc.	3.58	2.14
the external help/opinions of experts in digitalisation are sought	3.42	3.52
services provided by a local government unit are being made more accessible, and its client base (e.g., people with reduced mobility, people receiving benefits, recipients of "tourist vouchers" and similar benefits) is being expanded	4.00	4.05
Digital competences of staff	4.23 moderate	3.75 moderate
popularising among staff the use of information technology in information and communication processes	5.83	4.52
digital competences are treated as an important criterion for evaluating staff	4.50	4.19
staff digital competences are being systematically developed	4.00	3.88
a positive attitude towards the digitalisation of processes is being fostered among staff in public sector organisations	4.33	4.05
a system is in place for recruiting and retaining staff with a high level of digital competence ("digital talents")	2.50	2.12
Digitalisation of processes	3.38 low	3.19 low
primary data and processes connected with customer service are digitalised	4.25	3.33
most data and internal (auxiliary) processes (e.g., human resources, fixed asset records, data archiving) are digitalised	4.25	4.10
customer service processes are automated so that most can be performed with minimal staff involvement	2.42	2.40
internal processes (auxiliary processes, e.g., HR processes, fixed assets register, data archiving) are automated so that most can be performed with minimal staff involvement	2.83	2.74
efforts are being made to systematically reduce the costs of implementing processes/procedures using digitalisation and process automation	3.17	3.38
Digital technology	4.40 high	4.21 moderate
remote work is the standard mode for performing certain groups of tasks	4.00	3.67
IT systems used in local government units are fully integrated	3.67	4.00
all staff have unlimited access to IT support	5.58	5.24
use of dedicated software (adapted to the needs of the office)	3.83	4.21
systematic steps have been taken to ensure the protection and security of digital solutions	5.58	5.21
data stored in the "cloud" (or on proprietary virtual drives) is used to improve the efficiency of remote work	3.75	2.93
E-innovation	3.26 low	2.93 very low
data analytics software (e.g., artificial intelligence, so-called Big Data Management, Business Intelligence Tools) is used so as to better adapt to partners' expectations (offering individualisation)	1.75	1.33
innovative solutions based on the latest digital technology (use of "breakthrough" innovations, e.g., smart services)	3.08	2.17
processes using internal and external resources (e.g., start-ups, hackathons) are being systematically digitalised	2.58	2.36
e-innovations are sought at all levels of public sector organisations in accordance with the approach "we do not have to be ashamed of our ideas"	3.83	2.81
digitalisation and automation are helping (where possible) to increase the level of non-cash payments for benefits	4.08	5.31
efforts are constantly being made to increase the use of digital technologies	4.25	3.62

Tab. 5. Correlation coefficients

DIMENSIONS OF DIGITAL MATURITY	EFFICIENCY	
	COUNTIES	MUNICIPALITIES
Digitalisation-focused management (α = 0.853)	0.953*	0.737*
Openness to the needs of stakeholders (α = 0.761)	0.889*	0.600*
Digital competences of staff (α = 0.731)	0.436^{ns}	0.674*
Digitalisation of processes (α = 0.737)	0.867*	0.508*
Digital technologies (α = 0.695)	0.942*	0.521*
E-innovation (α = 0.826)	0.865*	0.722*
Number of entities	12	42

ns — no statistical significance ($p > 0.05$); * $p < 0.05$; α — Cronbach's alpha coefficient

The results of the correlation analysis presented in Table 5 indicate a strong correlation between the dimensions of digital maturity and the effectiveness of local government units (in terms of infallibility and the time of the performance/execution of tasks), while in counties, the correlation coefficients are very high (with the exception of the digital competences of staff). Correlation coefficients are also high in municipalities (for all dimensions of digital maturity) but clearly lower than in counties. This suggests that the relationship between the dimensions of digital maturity and effectiveness is stronger in counties than in municipalities and that municipalities are only making limited use of the potential for digitalisation (much less so than counties). This, in turn, may provide the basis for recommendations on how to better utilise digitalisation to improve efficiency in municipalities, especially when it comes to digital technologies and the digitalisation of processes (in the latter case, the differences between counties and communes are greatest).

4. DISCUSSION OF THE RESULTS

An analysis of the correlation between the dimensions of digital maturity and effectiveness confirms the observations made by Hofmann et al. (2012), namely that implementing e-government solutions requires the acceptance of a wide range of stakeholders, including citizens, entrepreneurs and administration employees. One of the dimensions of digitalisation in the proprietary model is openness to the needs of stakeholders. However, the results of the present analysis show that in this area, the level of maturity in the examined LGUs is relatively low, especially at the municipality level.

The problem addressed in this study is part of the current discourse on the importance of digitalisation in the public sector. In particular, it makes a valuable contribution to research on digitalisation in local government in Poland, which is part of the implementation of Digital Era Governance goals. Urs and Spoaller (2022) regarded ongoing digitalisation as a form of progress and development, which is transforming public administration into an entity that guarantees users high-quality services and a higher quality of life. This viewpoint confirms the conclusions previously formulated by Pelse et al. (2021), who point out that the factors driving digitalisation in public institutions are technological progress and society's desire for novelty and high-quality modern services.

Moreover, this process is fostered by education. Digitalisation in public institutions cannot exist without technological progress, and the opportunity to exploit it; a willingness to change is also necessary. This willingness is often fuelled by the pressure of public opinion, and the dividing line between the physical and digital worlds will become increasingly blurred (Pieterson et al., 2017). At the same time, digital transformation involves not only the implementation of technology elements but also certain social, political and organisational factors (Gardenghi et al., 2019). This is fully in line with the position of Dunleavy et al. (2006), who considered the effects of digital transformation broadly, focusing not only on technological but also organisational, cultural and social change.

While the concept of New Public Management still plays a central role in Poland, its importance is decreasing in many countries, and a scenario whereby in the coming years DEG and EDGE are applied on a wider basis in public management practice seems very likely (Dunleavy et al., 2005).

However, there is a noticeable risk that the reintegration of administrative structures resulting from digitalisation could lead to staff reductions, which would still not solve the problem of different departments of an organisation ("silos") hindering effective information management in citizen-local government official relations. Another consequence of the new conditions is that decision-makers need to resolve numerous dilemmas arising from digitalisation processes and governance that is more citizen-centred, transparent and participatory, which at the same time is more vulnerable to security, misinformation, and inequality (Milakovich, 2021). The authors fully agree with the thesis that the large-scale implementation of DEG must be followed by the internal and external opening up of national and local governments, which in turn will lead to much less complicated structures of public administration, characterised by the simplification and automation of everyday bureaucratic work and the more flexible provision of services (Dunleavy et al., 2005). The activities of public administration must now be closely linked to the increasing autonomy of citizens and their capacity for social problem-solving (Białożyt, 2017). Greater effort is needed to keep pace with citizens immersed in the digital world who use social media and online discussion platforms not only as their primary source of information but also as a more reliable source than that offered by the public administration in its current bureaucratic form.

The lack of sufficient competences when it comes to the digitalisation of public services will result in a situation where the public administration will be unable to communicate effectively with citizens, which may undermine the trust of the latter (Dunleavy & Margetts, 2015; Milakovich, 2021). Implementing the goals of Digital Era Governance in public administration practice can, according to the authors of the article, prevent or at least mitigate such dangers.

Conclusions

The study joins a debate on whether and how quickly the concepts of DEG and EDGE can be implemented in local public administration in Poland. Under Polish conditions, managers have adopted a selective approach and still refer to the notion of NPM, as evidenced by the relatively low level of digital maturity of the surveyed local government units. The development of DEG and EDGE has been limited by Neo-Weberian State and New Public Governance supporters, which still enjoy a dominant position in Polish public administration practice.

The added value of the article lies in the fact that it determines the degree of digitalisation in public administration entities at the local government level. These studies contribute to a small set of experiences aimed at identifying local governments' digitalisation level. The original research model, verified in practice based on local administration, has a pioneering character and is a significant addition to the tools used to measure the level of maturity of public sector organisations. The research showed that digitalisation was less advanced in municipalities than in counties. In addition, it was found that e-innovation and digitalisation are the least developed areas in this context. The recommendation, therefore, is to further develop digitalisation in local government units (LGUs).

The research has several limitations, primarily resulting from its sample (it was performed only among selected LGUs in the Małopolska region that expressed a willingness to participate). The authors intend to use their experiences with applying the model in selected public institutions (LGUs), prepare the next version of this model and test it on a larger research sample.

The differences observed in the correlation coefficients between the dimensions of digital maturity and effectiveness between counties and municipalities suggest a legitimate need for further research using more advanced analytical methods (and, thus, the need to research larger samples). Such studies must be replicated regularly to keep pace with a rapidly changing field. Similar studies are recommended to be replicated in other contexts (different types of public organisations, different levels of public administrations, and different regions) to validate and improve the proposed digital maturity model. Further research should consider the evolution of DEG towards EDGE; this will make it possible to understand the mechanism behind increasing digital maturity in public administration.

Acknowledgement

Europe Framework Programme (HORIZON-MSCA-2021-SE-01-1), Project No. 101086381.

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