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Innovation Management and information Technology impact on Global Economy
in the Era of Pandemic

Editor

Khalid S. Soliman

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The Application of Digital Solutions in Public Administration: The Evidence from Poland

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Abstract

The aim of this study is to explore the digitalization of public administration. In particular, this study aims to identify digital technologies that are most commonly utilized in public organizations in Poland. Moreover, this study aims to unveil the differences in the application of digital solutions among different types of public organizations. This study employs a quantitative survey and case study method. The results of the survey show that digital solutions are used to a different degree and that different types of public organizations utilize digital solutions in different ways and to different extent. The results indicate that the most common tools implemented in public administration in Poland are electronic register box, electronic document circulation, electronic handling of human resources matters, online meetings, online courses, internal virtual network drives, electronic working time recorders, and social media in contacts with the stakeholders. Among examined types of public organizations, the Social Insurance Institution (SII) exhibits the highest level of digital solutions implementation which is higher than in any other type of public organization, as well as the average level observed in the entire sample. This advantage is visible in all examined areas of digitalization, namely internal processes, external processes, and supporting solutions. This study offers meaningful implications for public administration managers, including the example of good practices implemented in the SII.

Keywords: Digitalization, IT, Public Administration, E-Government.

Introduction

Digital technologies have a huge impact on the way we work and do business, but also on our daily lives. Artificial intelligence, quantum technologies, communication via social media, digital enterprises, e-commerce are revolutionizing our world, just like the previous three industrial revolutions. They contribute to the creation of an increasing amount of data, the use of which can generate completely new, previously unattainable levels of values (Shaping Europe's digital future, 2020). The use of digitization in the rationalization of structures and processes in enterprises is nowadays a key source of their added value. This often means the need to modify the so-called business model of the organization towards network logic, which now offers greater development opportunities than the logic of value chains (Szomburg et al., 2020). The concept of digital transformation is often perceived only through the prism of technology – robots, systems, and algorithms. Meanwhile, a digitally mature organization knows how to use digital solutions to achieve its goals and create added value. The requirement to modify the model of operations also applies to the public institutions which, thanks to the popularization of the Internet and the development of e-services for citizens and companies, operate in a network of interconnected entities. Therefore, the digital

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transformation of public institutions requires organizational change, and the application of new technology to provide high-quality e-services to citizens (Sledziewska and Wloch, 2020).

Poland represents a relatively high degree of utilization of digital technologies in public administration. According to the United Nations E-Government Survey, Poland is ranked among countries with very high level of E-Government Development Index (EGDI) (UN E-Government Survey, 2020). In the DESI ranking (Digital Economy and Society Index, 2020) in 2020, compared to the EU Member States, Poland ranks 23rd with a score of 45 points, while the average is 52.6 points. Based on pre-pandemic data, Poland's score has improved, as has the EU average. According to the Central Statistical Office report, the number of people using the services of public administration via the Internet has been growing rapidly in Poland in recent years. In 2020, they accounted for almost 42% of the population aged 16-74, including the percentage of people searching for information on public administration websites by 2.3%, and those sending completed forms by 2.1% compared to the previous year (Społeczeństwo informacyjne w Polsce..., 2020).

Poland has taken many initiatives within digitalization as a result of the crisis related to the COVID-19 pandemic. Several actions have been taken to support e-health solutions for patients and healthcare providers. There were, among others, the following activities: remote consultations, symptom verification tools, chatbots, infectious contact determination applications, and self-diagnosis applications. In the field of education, online activities have been undertaken to engage learners, e.g. educational games. In terms of support for teachers, the Remote Lessons portal and contact with a virtual assistant have been prepared. The digitalization of public administration was also accelerated within the "Anti-crisis Shield" – the government program to support Polish enterprises affected by the COVID-19 pandemic (Digital Economy and Society Index, 2020). The Home Quarantine application was implemented for faster communication with services and support those quarantined at home. Thanks to the application, you can confirm compliance with the quarantine and the place of your stay, and efficiently contact the services responsible for supervising people in quarantine (Cyfryzacja podczas pandemii..., 2020).

The aim of this study is to explore the digitalization of public administration. In particular, this study aims to identify digital technologies that are most commonly utilized in public organizations in Poland. Moreover, this study aims to unveil the differences in the application of digital solutions among different types of public organizations. This study employs a quantitative survey and case study method.

The remaining of the article is as follows. First, we review the literature on dimensions of digitalization in public administration. Second, we present our variables and sample. Third, we present the results of quantitative research. Fourth, we describe several solutions implemented in those public organizations which are the most advanced in complementing digital technologies.

Dimensions of digitalization in Public Administration

The previous government structures created by New Public Management are gradually changed by Digital Era Governance reforms (Mergel et al., 2019). Effective E-Government can provide more efficiency and savings for governments, businesses and citizens. Digital Government concept as researched and practiced over the past two decades continues to evolve and the definitions of E-Government and Digital Government are gradually becoming more detailed and multidimensional (Lindgren et al., 2019; Janowski, 2015). The experts of the International Telecommunication Union (ITU) highlighted the disparity of these terms. In their opinion Digital Government is the umbrella term that comprises all uses of information and telecommunication technologies in the public sector, while E-Government is one aspect of digital government, and it refers to the provision of governmental services by ICTs, particularly over the Internet (Electronic Government for Developing Countries, 2008). Adopting such an interpretation of both concepts allows to establish criteria for assessing the level of digitization of administration. One of the most famous tools for analysis of E-government development is E-Government Development Index (EGDI) (UN E-Government Survey, 2020). This tool helps to measure e-government effectiveness in the delivery of public services, and characterizes the degree of readiness and the capacity of different countries to use information and communication technologies (ICTs) in state and municipal management. It is a composite index based on the weighted average of three normalized indices. One-third is derived from the Telecommunications Infrastructure Index (TII), one-third from the Human Capital Index (HCI) and one-third from the Online Service Index (OSI) (UN E-Government Survey, 2020). EGDI is calculated since 2001 and today is one of the largest by participants (193 countries in 2018) (Borshchevskaia, 2018).

The paper deals with other tool for analysis of E-government development designed by the European Commission called The Digital Economy and Society Index (DESI). This tool is a composite index that summarizes relevant indicators on Europe's digital performance (The Digital Economy and Society Index, 2020). The DESI has a three-level structure which consists of: dimensions, sub-dimensions and indicators. It tracks the evolution of EU Member States, across five main dimensions: Connectivity (fixed broadband take-up, fixed broadband coverage, mobile broadband, broadband price index), Human Capital (internet user skills, advanced skills and development), Use of Internet (internet use, activities online, transactions), Integration of Digital Technology (business digitization, e-commerce) and exactly Digital Public Services (e-government). At the dimension intertwined and positive changes in the digital economy can only be achieved through coordinated improvements in all areas (Digital Economy and Society Index, 2020).

Digital Public Services dimension is of key importance, from the point of view of the research method adopted in this study. This dimension consists of the following indicators: e-Government users, pre-filled forms, online service completion, digital public services for businesses (including the cross-border dimension), open data, user centricity and key enablers. These indicators referred to several digital solutions that can be used in the process of implementing digitization in public administration. The first of the highlighted indicators, i.e. e-Government users considers out of all internet users who needed to submit forms to the public administration – the percentage who submitted the forms through online means. Second indicator, pre-filled forms, measures the extent to which data that is already known to the public administration is pre-filled in forms presented to the user. This means that users do not have to re-submit the same data to the public administration as they use interconnected registers. Online service completion, the third indicator, relates to the extent to which the individual steps needed for dealing with the public administration can be performed completely online. Next indicator, digital public services for businesses, measures the degree to which public services for businesses are interoperable and work cross-border. Next indicator measures the government's commitment to open data, and it seems to relate to the thesis that a frequent measure of the maturity of a government's digital services is how effectively it uses government data to proactively create public services (Larsson, 2021). Another indicator i.e. user centricity is particularly important from the point of view of customer service. This indicator includes three key elements of online service provision. The first one, i.e. online availability, illustrates how services are made available (the following options are highlighted here: the service is automated; the service is available online through a portal or directly; information on the service is available either through a portal or online; the service or any information about the service is not online available). The second one, i.e. usability measures the availability of support channels and feedback mechanisms, such as online chats. The third one, i.e. mobile friendliness captures the extent to which government services are available through mobile devices, providing a seamless and convenient mobile experience to the public and businesses. The seventh indicator, which is the key enabler indicator, is based on the latest technologies used in digital administration. It includes the following four elements of online service provision and availability: electronic identification (eID – a government-issued document for online identification and authentication), eDocuments (a document that has been authenticated by its issuer using any means recognized under applicable national law, specifically through the use of electronic signatures, i.e. not a regular PDF or Word document), authentic sources (named as pre-filled forms in DESI: base registries used by governments to automatically validate or retrieve data related to individuals or businesses) and digital post (assesses whether public authorities allow people to receive communications digitally only, such as through personal electronic mailboxes). The last of the proposed indicators i.e. cross-border mobility indicates the extent to which users of public services from another EU country can use the online services of the EU country being assessed (it includes four indicators, assessed in a cross-border scenario: online availability, usability, eID and eDocuments) (Digital Economy and Society Index, 2020).

Methodology

Variables

Based on the literature review (especially indicators distinguished in Digital Public Services dimension), we have selected several digital solutions that can be used in public administration. We have divided them into 3 groups, namely, indicators related to internal processes, indicators related to external processes, and also indicators covering a variety of digital technologies that can support different processes implemented by public administration institutions.

The first group includes solutions associated with external processes (EP), i.e., those connected with delivering services to customers. These solutions are electronic register box, electronic document circulation, electronic archive (containing scanned documents), automatic correspondence with customers (calls, reminders), online handling of applications and complaints, document coding (QR, barcodes), self-service customer contact points, electronic queuing system, automatic helpline, and voicebots / chatbots.

The second group comprises solutions that apply to internal processes (IP), for example, human resource management or asset management. In particular, in this group is working time records based on network login, electronic register / ordering / liquidation of fixed assets, electronic handling of most human resources (HR) matters (e.g., change of personal data, leaves, compensation, taxation), electronic ordering of IT services, online meetings, and online courses.

The third group includes digital technologies that can support different operations as well as the (supporting technologies – ST). Among them are “cloud” solutions, internal virtual network drives, algorithms improving processes, integrated management systems (ERP or MRP), customer relationship management (CRM) systems, electronic working time recorders, big-data, machine learning, artificial intelligence, and social media in contact with the stakeholders.

We have asked our respondents whether they use each of the above-mentioned solutions. Then we have summed up the positive answers. The more solutions they indicated (positive answers), the higher score they received. However, the responses were divided into three groups, namely, internal processes, internal processes, and supporting technologies, according to the classification presented previously. Thus, each organization was assessed in three categories.

Sample

Our sample consists of 142 public organizations operating in Lesser Poland. They include units of local government (municipality and community level), Labour Office (called sometimes “unemployment office”), National Revenue Administration, Social Insurance Institution (SII), Social Welfare Centers, Sanitary-Epidemiological Stations, Police, and Municipal Police. The examined entities operate at the regional and local level, in particular, voivodship (province, the EU NUTS 2 level), district (sub-units of NUT 3 level), and community (which is equality of local administrative units [LAU] according to the EU NUTS classification). In total, 21270 people are employed in organizations in our sample. The characteristic of the sample is presented in Table 1.

Table 1: Sample characteristic

Sub-sample	number of units	numbers of units at province and district level	numbers of units at community level	number of employees	average number of employees
Local government units	54	12	42	7117	131.80
Labour Office	15	15	0	1277	85.13
National Revenue Administration	34	29	5	8205	241.32
Social Insurance Institution	5	2	3	942	188.40
Social Welfare Centres	13	3	10	1280	98.46
Sanitary-Epidemiological Stations	7	7	0	187	26.71
Police	8	8	0	2162	270.25
Municipal Police	5	1	4	100	20.00
The entire sample	141	69	64	21270	150.85

Source: own study

Our data was collected with the online questionnaire in February-March 2021. We have received 142 answers which constitutes our final sample.

Results

This study assesses the degree of application of digital tools in different categories of public organizations. Table 2 presents the solutions related to external processes, Table 3 presents the solutions related to internal processes, and Table 4 presents the solutions that can support the activity of public organizations. Respondents have indicated whether they apply a tool (marked

as “1”) or not apply (“0”). These tables contain the average scores obtained by the organizations representing each type on the basis of responses received from surveyed organizations.

Table 2: The application of digital tools in external processes

Sub-sample	Electronic register box	Electronic document circulation	Electronic archive	Automatic correspondence with customers	Online handling of application and complaint	Document coding	Self-service customer contact points	Electronic queuing system	Automatic helpline	Voice-bot / chatbot
Local government units	0.80	0.72	0.24	0.24	0.30	0.22	0.02	0.15	0.11	0.02
Labour Office	0.80	0.60	0.27	0.33	0.33	0.13	0.33	0.33	0.20	0.00
National Revenue Administration	0.65	0.71	0.24	0.32	0.21	0.74	0.12	0.38	0.35	0.06
Social Insurance Institution	1.00	1.00	0.80	0.80	0.40	0.60	0.40	1.00	0.80	0.40
Social Welfare Centres	0.54	0.15	0.08	0.31	0.31	0.00	0.00	0.00	0.08	0.00
Sanitary-Epidemiological Stations	0.00	0.14	0.00	0.29	0.29	0.14	0.00	0.00	0.43	0.00
Police	0.88	1.00	0.63	0.00	0.38	0.38	0.13	0.00	0.00	0.00
Municipal Police	0.80	0.60	0.60	0.80	0.40	0.40	0.00	0.20	0.00	0.00
The entire sample	0.71	0.65	0.27	0.30	0.29	0.34	0.09	0.23	0.21	0.04

Source: own study

Table 3: The application of digital tools in internal processes

Sub-sample	Working time records based on network login	Electronic register / ordering / liquidation of fixed assets	Electronic handling of most HR matters	Electronic ordering of IT services	Online meetings	Online courses
Local government units	0.11	0.56	0.57	0.31	0.85	0.93
Labour Office	0.27	0.60	0.60	0.33	0.93	1.00
National Revenue Administration	0.53	0.38	1.00	0.94	1.00	1.00
Social Insurance Institution	0.80	0.80	1.00	1.00	1.00	1.00
Social Welfare Centres	0.15	0.38	0.54	0.31	0.69	1.00
Sanitary-Epidemiological Stations	0.00	0.14	0.57	0.29	1.00	1.00
Police	0.13	0.50	0.75	0.25	1.00	1.00
Municipal Police	0.40	0.40	0.80	0.20	0.60	0.60
The entire sample	0.26	0.48	0.71	0.48	0.89	0.96

Source: own study

Table 4: The application of digital technologies supporting operations

Sub-sample	Cloud solutions	Internal virtual network drives	Algorithms improving processes	Integrated management systems	CRM systems	Electronic working time recorders	Big-data	Machine learning	Artificial intelligence	Social media
Local government units	0.37	0.70	0.07	0.17	0.06	0.20	0.20	0.00	0.02	0.70
Labour Office	0.07	0.67	0.20	0.13	0.00	0.20	0.13	0.00	0.00	0.40
National Revenue Administration	0.26	0.32	0.38	0.21	0.21	1.00	0.59	0.00	0.06	0.15
Social Insurance Institution	0.40	0.80	0.80	0.60	0.60	0.80	0.80	0.20	0.60	0.80
Social Welfare Centres	0.08	0.46	0.15	0.08	0.00	0.00	0.15	0.00	0.00	0.31
Sanitary-Epidemiological Stations	0.43	0.43	0.14	0.00	0.00	0.00	0.14	0.00	0.00	0.86
Police	0.00	0.50	0.63	0.25	0.00	0.38	0.50	0.00	0.00	0.50
Municipal Police	0.20	0.40	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.20
The entire sample	0.26	0.55	0.23	0.17	0.09	0.41	0.31	0.01	0.04	0.48

Source: own study

The results presented in the above tables indicates that the most common digital solutions associated with external processes in our sample are electronic register box and electronic document circulation. In the area of internal processes, electronic handling of HR matters, online meetings, and online courses are most common solutions implemented in public organizations. Finally, internal virtual network drives, electronic working time recorders, and social media in contacts with the stakeholders are the most common supporting solution utilized in public administration.

Table 5 present a comparison of the degree of application of digital tools in three examined areas (namely, internal processes, external processes, and supporting technologies) in different groups of public administrations surveyed in the study.

Table 5: The application of digital tools

Sub-sample	External processes	Internal Processes	Supporting Technologies
Local government units	2.81	3.33	2.48
Labour Office	3.33	3.73	1.80
National Revenue Administration	3.76	4.85	3.18
Social Insurance Institution	7.20	5.60	6.40
Social Welfare Centres	1.46	3.08	1.23
Sanitary Epidemiological Stations	1.29	3.00	2.00
Police	3.38	3.63	2.75
Municipal Police	3.80	3.00	1.40
The entire sample	3.12	3.79	2.55

Source: own study

Figure 1 presents a comparison of the utilization degree of digital tools in three examined areas (namely, internal processes, external processes, and supporting technologies) in the Social Insurance Institution (SII) and the entire sample.

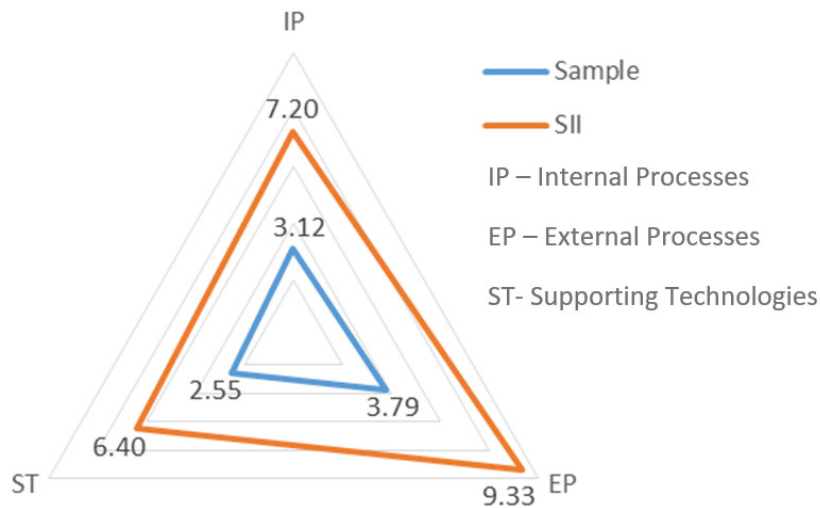


Fig. 1: The degree of using digital solutions in the entire sample and the Social Insurance Institution (SII)

Source: own study

Both Table 5 and Figure 1 indicate that the Social Insurance Institution (SII) is more advanced in terms of utilization of digital solutions than other investigated types of public organizations. Thus, we will analyze selected digital solutions implemented in the SII.

Selected digital solutions implemented in the Social Insurance Institution (SII)

The Social Insurance Institution (SII) (official website: <https://lang.zus.pl/en/>) is one of the most important public institutions in Poland in terms of the scope of its activity and the social importance of its tasks, it cooperates with about 26 million clients in Poland and several hundred institutions in home and abroad. SII combines the functions of a social security institution with that of a financial institution. The mission of SII is professional customer service, the use of modern technologies and employee potential, as well as effective management of public funds (Strategia Zakładu Ubezpieczeń Społecznych na lata 2021–2025, 2021). At the end of December 2018, SII employed 44,923 people. Most of them are located in 43 branches, 209 inspectorates and 71 field offices in Poland (Raport Roczny ZUS, 2018). SII is an important element of the e-administration structure developed in Poland, it is the first Polish e-office and a leader in the development of e-state. Over the last decade, SII has implemented several solutions that fit into the construction of the e-state. The most important of them include: Electronic Services Platform of SII, e-Contribution, Anti-Crisis Shield, Polish Tourist Voucher, e-ZLA (*Electronic Medical Exemption*) and the e-Acta project (*digitization of employee files*) and the National Application EESSI (*Electronic Exchange of Social Security Information*).

The launch of the Electronic Services Platform (ESP) in 2012 was the first step in using electronic solutions based on new, broad IT capabilities. This platform gives the possibility of submitting electronic applications, checking paid contributions or calculating the future retirement pension, as well as the ability to independently generate certificates. The ESP also allows the use of data collected in SII by other public administration institutions (Uscińska, 2020). In 2020, 30 changes to the software were implemented on the Electronic Services Platform of SII (an average of 2 per month). Many of them concerned new solutions resulting from the COVID-19 pandemic, including Anti-crisis Shields or the Polish Tourist Voucher.

The Anti-Crisis Shield is a package of legal regulations and financial solutions that support entrepreneurs and people working on the basis of civil law contracts. Public aid has been earmarked for those struggling with COVID-19 related restrictions and downtime. The support offered by the government is to protect employment, reduce the burden on enterprises and maintain

their financial liquidity. The implementation of this project required SII to change or develop new applications on the ESP SII and to develop instructional guidelines in the form of short information, instructional guides, videos and graphics.

The Polish Tourist Voucher is a form of support for Polish families and the tourism industry in connection with the difficult economic situation caused by the COVID-19 epidemic. The voucher can be used to pay for hotel services or tourist events in Poland until the end of March 2022. To handle travel vouchers, SII provided a system for handling voucher entitlements and entitlements for tourist entities used by the Polish Tourist Organization and a payment system with a voucher in which people using the voucher pay for hotel services or tourist events to tourist entities. At ESP SII, a new service has been made available for people who have been awarded a voucher and for tourist entities that redeem it. An application was also created for a receptionist to accept voucher payments. SII also provided a special hotline for people using the voucher and tourist entities, which operates day and night, all days of the week. In 2020, other improvements were also introduced on the ESP SII website, e.g. 76 applications and 22 insurance documents were made available in the e-Platnik application made available in HTML format, new applications have a simplified form, and some of them have been replaced with one common form (Działania ZUS w 2020 r., 2021).

The e-Contribution project was implemented on January 1, 2018, and consists in introducing individual contributory accounts for payers. Each contribution payer was given an individual account number to which he pays the relevant social security contribution every month.

Another project, e-ZLA (*Electronic Medical Exemption*), was implemented in December 2018 and is related to the transition from issuing certificates of temporary inability to work in paper form to issuing sick leaves in electronic form. SII provides external entities with the documentation necessary to develop software for transferring e-ZLA through office applications, i.e. software created by external entities to submit electronic medical certificates to SII. In addition, SII provides manufacturers of office applications with access to the simulation environment, which enables manufacturers to test integration with the SII interface. The SII certificate developed for doctors to issue e-ZLA is also used in other solutions implemented by public administration institutions within building e-state (e.g. in the e-prescription project).

The e-Acta project (*digitization of employee files*) consists in the transition from paper documentation to electronic form. The purpose of implementing e-Files is to shorten the period of storing employee documentation by the employer and to gather in one place all information concerning the course of the professional and insurance career of a citizen, based on which the right to various benefits is determined. The implementation of this project required changes to the IT system and the Electronic Services Platform of SII (Uscinska, 2020).

In the middle of 2019, Polish SII, as one of the first institutions in Europe, completed the construction of the National Application EESSI (*Electronic Exchange of Social Security Information*) and the national contact point with the EU social security information exchange system (Działania ZUS w 2020 r., 2021). SII was one of the first insurance institutions in Europe to implement an information exchange system within the prescribed period, adjusting its own IT systems to EESSI. It prepared and maintains the so-called national application, thanks to which the information exchange process can also be used by other Polish pension authorities (Strategia Zakładu Ubezpieczeń Społecznych na lata 2021–2025, 2021).

Conclusions

The aim of this study was to explore the digitalization of public administration. The results of the survey show that digital solutions are used to a different degree and that different types of public organizations utilize digital solutions in a different way and to a different degree. Among examined types of public organizations, the Social Insurance Institution (SII) exhibits the highest level of digital solutions implementation; which is higher than in any other type of public organization, as well as the average level observed in the entire sample. This advantage is visible in all examined areas of digitalization, namely internal processes, external processes, and supporting solutions. The analysis of selected digital tools indicates that they enable the SII to improve the quality and efficiency of services. In particular, these solutions include Electronic Services Platform of SII, e-Contribution, Anti-Crisis Shield, Polish Tourist Voucher, e-ZLA (*Electronic Medical Exemption*), the e-Acta project (*digitization of employee files*), and the National Application EESSI (*Electronic Exchange of Social Security Information*).

Our study offers implications for managers in public organizations. Our observations confirm the need for the implementation of digital solutions, moreover, the study presents some practical examples from leading (in terms of digitalization) institution.

The survey indicates the most common solutions for different types of public services; this may indicate the direction of improvements for those organizations that use digital solutions to a low degree. These solutions can serve as “best practices” that are worth replicating. However, when implementing the finding of this study, someone should consider its limitation. They are sourced in the sample size and characteristics, as well as the limited selection of digital tools which were examined within this study.

Our study confirms the necessity of research on digitalization in public administration. Such studies need to be replicated regularly to follow the dynamic development in the field. The differences in the pace and scope of the digital development indicate that the studies should include different types of public organizations, different levels of public administrations, as well as in different regions. The comparative studies have the potential to explain the mechanism forcing the development in the field of digitalization in public administration.

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