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The Impact of Digitalization on the Transparency of Public Authorities

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Abstract

Transparency of public power is one of the main aspects of civil society. The actions of public administration bodies must be transparent, open, and ensure citizens' legitimate rights and interests. Large-scale digitalization of society also affects public authorities, opening up new opportunities for improving the transparency of public administration and creating risks at various levels of public administration. The study is devoted to the issue of transparency of public authorities under the influence of digitalization. The normative legal acts of Ukraine, the Strategy of digital development, scientific achievements of domestic and foreign scientists are analyzed. The main elements of transparency of public authorities are identified: transparency, openness, and publicity. The level of digitalization penetration into the bodies of legislative, executive and judicial branches of power is characterized. The main functions that digitalization can perform in relation to public authorities are identified. The main achievements of Ukraine in terms of the public power digitalization, which has increased its transparency level, are described. They include a network of web portals of legislative, executive and judicial authorities, which provide public information in the form of messages, files, open data sets, photo and video information. Another important achievement is the service of providing services online and the introduction in Ukraine of full-fledged digital documents, which are analogs of physical. The main indicators of digitalization and characteristics of public authorities are identified: Digital Development Level, IMD World Digital Competitiveness Ranking, ICT goods exports, ICT goods imports, ICT service exports, Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. A canonical analysis of digitalization impact on the transparency of public authorities quantitatively shows that public authorities are closely linked to digitalization and influenced by it.

Keywords: Transparency of Public Authorities, Digitalization, Canonical Analysis, Digital Economy, E-Government.

JEL Classification: H83.

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Introduction

The Constitution of Ukraine defines it as a sovereign, independent, democratic, social and legal state whose only source of power is the people. The people of Ukraine can reign directly through a referendum and public authorities, and local governments. Accordingly, the people must control the activity of public authorities. The state exists for the people and thanks to the people, thanks to civil society. Transparency as a property of public administration provides an opportunity to openly implement public policy through transparent tools and clear procedures. The higher the level of openness, transparency, and publicity of public authorities, the less opportunity for unscrupulous public officials to implement corruption schemes and make ineffective or criminal decisions. With the development of transparency of public authorities, the welfare of society increases.

In turn, society's scientific and technological progress does not stand still. The development of digital technologies opens vast opportunities for ensuring the transparency of public authorities. Using the latest tools, it is possible to implement e-government directly by the region's residents, simplify the receipt of public services, monitor the use of the budget, and the voting results of MPs at any level of government.

Literature Review

The concept of transparency of public authorities is widely considered in the scientific community. Several scholars believe the transparency of state and local government is a means of describing the information side of public authorities, which records the degree of information completeness about the subject and object of public administration (Yarema, 2018) and the adoption of relevant legislation on access to information (Bessa-Vilela et al., 2017). The author of another paper (Vione, 2020) focuses on understanding transparency as the political leaders' openness and the possibility of extending the various stages of administrative action to the public. Transparency of public finances was considered in (Molotok, 2020; Shkolnyk and Savchenko, 2018; Birskyte, 2018; Ott et al., 2018), etc.

It is particularly important to study transparency in terms of digitization. Transparency of public authorities from the point of view of data openness was considered in (Cahlikova and Mabillard, 2019). The authors in the research (de Silva Craverio and Albano, 2017) investigated the role of intermediaries through which the process of providing open data is implemented. E-government has been considered in (Ahmad et al., 2021; Agostino et al., 2021; Bernhard et al., 2018). Digitalization's overall impact on public administration's transparency has been observed in (Tereshchuk, 2020; Berezhna, 2019; Karpenko and Osmak, 2018; Komarova and Kovalchuk, 2021). However, digitalization and the level of transparency of public authorities have specific nature in each country. Digitalization is more affected by the level of economic, scientific, and technological development; and openness – by the institutional development of civil society.

Methodology and Research Methods

The research methodology includes an analysis of research conducted by domestic and foreign authors in the field of the impact of digitalization on the transparency of public authorities, laws of Ukraine and other regulations issued by public institutions of Ukraine, and information resources of public authorities of Ukraine. Statistical analysis, comparison methods, systematization, analysis and synthesis, decomposition and generalization were used. The phenomena of digitalization and public power are multifaceted and characterized by many indicators. To quantify the relationship between digitalization and transparency of public authorities, a canonical analysis was performed to determine the correlation between groups of variables. The general form of the dependence in the canonical analysis is as follows (Formula 1):

$$a_1 * x_1 + a_2 * x_2 + \ldots + a_n * x_n = b_1 * y_1 + b_2 * y_2 + \ldots + b_m * y_m \quad (1)$$

where $x_1 .. x_n$ – variables, defining digitalization (left side);

$y_1 . . y_m$ – variables, defining public administration (right side);

$a_1 .. a_n$ – coefficients of the canonical variable for the left side;

$b_1 .. b_m$ – coefficients of the canonical variable for the right side.

Results

The impact of digitalization on the transparency of public authorities should be considered through the decomposition of the essence of transparency. Because the concept of transparency itself is quite broad. The author singles out the main elements of transparency of public authorities: transparency, openness, and publicity (Nalyvaiko and Chepik-Tregubenko, 2015). Let us take a closer look at each constituent in greater detail.

Transparency. Transparency refers to the ability of public authorities to be accessible to citizens. Every action of public authorities must be clear to a wide range of people. Digitalization, in this case, increases the transparency of governance by raising public awareness and implementing an educational function. Available in online activity infographics, video explanations, online broadcasts of meetings or educational chatbots, including those based on artificial intelligence, which can explain to the user the essence of the action or provide relevant regulatory documentation.

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Openness. This component means the ability of any person to obtain information about the activities of public authorities or local governments. The method of "request-response" was used to implement openness in pre-digital time. In this case, it was necessary to contact the authorities directly to obtain the required information. Accordingly, this method created many inconveniences: time to send inquiries by mail and receive answers, physical visits to the institution to make a request and repeat to receive a response.

Digitization has made access to information much easier:

1. The ability to implement the method of "request-response" via e-mail.
2. Creating resources with open data. For example, the Open Data Portal allows you to connect online via the API and upload available data in any convenient format.
3. Digitization and cataloging of archival documentation. As the digitalization process in Ukraine has started relatively recently and is in the process of development, data collection, processing and placement is in a forward-looking mode: from the starting point and into the future. However, to implement openness, it is important to digitize all data in retrospect − the government archives. Artificial intelligence is used to digitize archival data in terms of text recognition from scanned images. The experience of the reCAPTCHA project divided images into fragments and then provided these fragments to users on various websites to weed out bots on the resource. Accordingly, in this version, millions of people helped to digitize the literature (Gilbertson, 2007).
4. Online broadcasts of meetings.

However, different levels of digital inclusion of citizens need to be considered to ensure openness. There is a category of citizens, especially the elderly, who do not have gadgets or access to the Internet. Accordingly, the authorities should implement programs to increase the population's digital literacy level.

Publicity. Publicity means the constant connection of public authorities with the public and the media. Publicity fulfills the information component of the parliamentary control over the implementation of laws, and the control measures of the parliamentary committees are covered. Accordingly, digitalization allows the masses to follow this process. From the point of view of the structure of public power at the state level, legislative, executive and judicial powers are distinguished. At the municipal level, there are executive bodies of local self-government and representative bodies of local self-government. The difference in the impact of digitalization according to the level of government can be traced only to different scales: state and municipal authorities should be transparent to all citizens, but the respective community or municipality will limit the level of involvement of municipal authorities.

According to the branching by type of state power, the level of influence of digitalization on transparency differs significantly. Since there are fundamental differences between the essence of these types of public administration, the strengths and weaknesses of digital force manifest themselves in different ways. Digitization has the best effect on the transparency of the legislature. Because the public, with the help of online technology, can follow every stage of the legislative process. Draft laws are posted on the Government's public discussion portal, where the public can comment, suggest additions, or leave an assessment of the bill. On the portals of the committees of the Verkhovna Rada of Ukraine, there is an opportunity to get acquainted with transcripts, minutes, work schedules and other information. Sessions of the Verkhovna Rada of Ukraine take place online, with the subsequent publication of decisions and details on how each deputy voted for one or another. This toolkit of digitalization allows to influence the legislative process and draw appropriate conclusions about parliamentarians as representatives of the people. The possibility of public appeal to the Verkhovna Rada of Ukraine through the system of electronic petitions should be singled out. A citizen authenticated in the system can create a request to the Verkhovna Rada of Ukraine. If 25,000 citizens support his request, this appeal will be included in the agenda of the parliamentary session and considered.

The realization of direct democracy is possible through digitalization, but its implementation requires overcoming many challenges. Voting in an online election or referendum runs the risk of being rigged. It is also impossible to determine whether this was free will or coercion. In the case of authentication of a person through a specialized portal, for example, using an electronic key issued by an authorized certification center, the public cannot follow the honesty of this choice. Whereas, in the case of traditional voting, there are public observers at the polling station who can declare this if a violation is detected. Therefore, it is necessary to eliminate such risks, for example, by using the online broadcasting of a person who votes remotely.

Accordingly, implementing such decisions, in turn, will lead to technical complications and a more expensive election process. There is also the problem of the digital inclusion of citizens. The judiciary also has some progress in implementing innovative digital approaches that have increased its transparency. The digitalization of the judiciary branch is manifested in the public access of information about the participants in the competitive selection for the judge position. The Automated Court Document Management System should be singled out. It ensures objective and impartial distribution of court cases between judges, determination of jurors and lay judges, organization of creation and storage of electronic documents, publication of specific information on the Judicial Power of Ukraine web portal and automatic sending, electronic communication of originals of electronic court documents. The results of court proceedings are placed in the Unified State Register of Court Decisions. Access to the registry is open, but confidential information is closed. Court hearings are broadcast online on the Judicial Power of Ukraine web portal, except in cases specified by law when closed hearings are held. The executive is obliged to provide public information in response to citizens' requests and publish it on the state open data web portal and its websites. The single-state open data portal contains:

1. Data sets by groups: economics, transport, justice, finance, ecology, youth and sports, taxes, education and culture, construction, land, justice, etc.

2. Managers generate public open data: ministries, civil services, agencies, inspections, national commissions, and other authorities. Each service has its web portal, which contains both lists of data to be published and the actual data sets. According to the Resolution of the Cabinet of Ministers of Ukraine "On approval of the Regulation on data sets to be disclosed in the form of open data" from 21.10.2015, there are more than 80 public information managers who place almost a thousand data sets, including 226 of them in the form registers. These registers include:

- Register of declarations of family ties and integrity.
- Register of participants of the Deposit Guarantee Fund of individuals.
- Unified register of enterprises in respect of which bankruptcy proceedings have been initiated.
- State Register of Certified Forensic Experts.
- Register of subjects of obligatory technical control of vehicles.
- Register of concluded contracts with heads of economic entities of the public sector of the economy.
- Register of software producers and distributors.
- State Register of Medicines.
- Register of wholesale prices for medicines.
- Licensed register of the Ministry of Health for medical practice.
- Register of educational documents (impersonal data).
- Unified register of recipients of humanitarian aid.
- National Register of Electronic Information Resources.
- Register of valid, blocked and revoked public key certificates.
- Register of administrative services.
- Unified state register of persons who have committed corruption or corruption-related offenses.
- Register of business entities.
- Other registers.

The availability of these registers plays an important socio-economic role. The interested citizen can receive information of economic, social, permissive nature online.

3. Public open data in terms of communities.

4. API for software access by third-party applications online.

For example, the transparency of the Ministry of Health of Ukraine during the COVID-19 pandemic played a significant role. Information dashboards with up-to-date daily information on the number of sick people, the number of those who recovered, the occupancy of hospitals and the availability of beds, and the provision of hospitals with medical staff were available in the public domain. The state acted not only by restricting visits to public places and, in general, to gather people in one place but also pursued an information policy to disclose all information for maximum public awareness. The executive branch and the legislature are characterized by the placement of draft regulations and online broadcasting of public meetings. A system of electronic petitions to the President of Ukraine and executive bodies of local self-government has also been implemented. Having studied the impact of digitalization on the branches of public power, it is necessary to consider in more detail

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the functional division of public administration in terms of digitalization. Digitalization has led to a revolution in government services. The development of the principles of transparency of public administration and its optimization has led to the possibility of providing a wide range of administrative services online. The evolutionary process of legislation development in services and access to information has contributed to this. Citizens of Ukraine have access to a wide range of administrative services that they can receive online. The information infrastructure in the form of web portals and mobile applications of service providers is developed.

The portal of the Public Services Guide contains a list of all administrative services. The following headings are available: protection of citizens during the war; the social protection; construction and real estate; citizenship and migration; Agriculture; transport; Life Safety; Intellectual Property; activity of business and public formations; professional activity; production and circulation of certain types of products; informatization, space, and electronic trust services; finances and taxes, fuel and energy complex and water supply; education, sports and tourism, culture and religion. The web page of each service contains detailed instructions on how and what you need to receive the service − a link to the online page of the service order, sending a request for the service by e-mail or through a personal account, or whether this service requires a physical presence. Information is provided on the term and cost of providing the service, the grounds for refusing to provide the service and the bodies where the services can be appealed (relevant service or type of court, such as the District Administrative Court). The attached information includes the regulatory framework governing the provision of the service and possible related services. Accordingly, the service recipient (citizen or foreigner) has complete information on where and how you can get the service. It is worth noting that this project was implemented with the support of the American people through the United States Agency for International Development (USAID), with financial support from the UK Government (UK aid) under the USAID/UK aid project "Transparency and Accountability in Public Administration and Services/TAPAS" and with the support of the SURGe project funded by the Government of Canada.

The above project is part of a set of projects aimed at the country's digitalization. According to the Law of Ukraine, "On the Unified State Demographic Register and documents confirming the citizenship of Ukraine, identity or special status", e-passport and e-passport for travel abroad are formed at the request of the person in whose name the passport of a citizen of Ukraine in the form of a card or passport of a citizen of Ukraine for travel abroad are used on the territory of Ukraine for identity and confirmation of citizenship, provision of administrative and other services. The only exceptions are 3 cases involving crossing the state border of Ukraine. The electronic passport of a citizen of Ukraine can be used to receive administrative services or, if necessary, to identify the person in the application "Diya" on a smartphone. You can verify the e-passport with another smartphone with the application "Diya" by scanning the qr-code, respectively; the application will check the entry of this document in the Register of Citizens and display a message that the person is verified.

"Diya" is a set of projects aimed at digitizing the activities of public authorities. Currently, 94 projects are being developed, which have their subprojects. Consider the latest of them, posted on the official web portal plan2.diia.gov.ua. Digital transformation of fisheries (e-fishing) includes the creation of an electronic system for collecting information and analysis of water resources, registers of available technologies, fishermen, catch quotas, etc., introduction of electronic services for issuing permits for special use of aquatic bioresources and licenses for commercial fishing bioresources, fisheries tickets, catch registration and reporting. Digital transformation of service provision in territorial centers of acquisition and social support for citizens (e-CCC and JV) − the creation of a single portal of e-CCC and JV to provide access to public services in electronic form, which will avoid queues in territorial centers of recruitment and social support, minimize corruption risks by creating and maintaining a transparent register of public (administrative) services in territorial centers of staffing and social support. Digital transformation of higher, professional higher and professional (vocational) education (e-University) − automation of the admission campaign, organization of recruitment and training (internship) of foreigners and stateless persons, ordering documents on education and European applications to them, the introduction of electronic licensing, modernization of the Unified State Electronic Database on Education, creation and modernization of the Unified Electronic System for Monitoring the Employment of Graduates. Digital transformation of state registration of legal entities, individuals − entrepreneurs and public entities (e-Business) − introduction of electronic and automatic services for business registration, public associations, submission of information on ultimate beneficial owners, modernization of the existing Unified State Register of Legal Entities, Individuals entrepreneurs and public formations, implementation of electronic interactions with information systems of public authorities. These are just some

of the projects. Projects on e-democracy, ecology, e-literacy, eeconomy (including virtual assets), and development of broadband Internet access infrastructure are being developed.

The next type of public authorities on the principle of functionality is public finance. Public finances include the state budget and the budgets of local governments. Accordingly, the sources of revenue and articles and the method of budget expenditures should be transparent. Within the Strategy for Digital Development, Digital Transformations and Digitization of the Public Financial Management System for the period up to 2025, six strategic goals for the development of digitalization of public finances were identified: "Centralization of IT management through implementation of common IT standards finance","Implementation of electronic services", "Implementation of priority projects to ensure the implementation of the priority tasks of the Strategy", "Preventing the influence of the human factor on automatic information processing", "Preservation and strengthening of human resources", "Information security in the Unified information and telecommunication system public finance management". The implementation of these goals is expected to increase the level of transparency and openness of data, increase public confidence in the institutions of the public financial management system, improve the quality of public services and administrative services.

The results of the implementation of this strategy are the creation of an information resource State budget web portal for citizens of Ukraine, openbudget.gov.ua, where you can view the structure of revenues, budget expenditures of different levels in the form of dashboards and the Unified web portal for public funds (spending.gov.ua), which can be observed transactions of public funds made through the Treasury with a description of the purpose. However, the issue of transparency of decision-making in budgeting remains debatable. Currently, apart from public discussions of draft budgets of territorial communities, there are no mechanisms to increase the transparency of local budgets. Open public procurement is the main tool to ensure control over the spending of budget funds. Open public procurement is carried out on the principles of fair competition among procurement participants, maximum economy and efficiency, openness and transparency at all stages of procurement, equal treatment of procurement participants and their nondiscrimination, and prevention of corruption and abuse.

In Ukraine, public procurement is carried out using the Prozorro system. With the Prozorro information system, public procurement tenders are held, and citizens can control the process and, if necessary, file a complaint with the police or local government. Despite many advantages: the ability to familiarize oneself with a public procurement plan, to get acquainted with potential suppliers of goods or services, their history of working with the system and possible corruption links with officials, the public procurement system has some disadvantages. First, excessive bureaucratization: a large number of supporting documents that must be submitted reduces the deal's attractiveness among suppliers and allows officials to manipulate the procurement process − for example, to provide a condition that only the "right" supplier can fulfill.

Secondly, purchases are usually made at higher than market prices: market prices are mostly formed by chains of stores that operate on the principle of "we offer and the consumer comes to us". At the same time, the public body expects that sellers will come to him. Under this system, contracts are won by intermediaries who receive their margin, which increases the contract price. Thirdly, the possibility of manipulating the maximum allowable procurement amounts: the customer often lowers the procurement amount threshold to choose a simplified procurement system and implement corruption schemes. The way to improve the public procurement system can be either to transfer the procurement organization to a special body, but in this case, the main goal of digitalization will not be realized − the exclusion of the human factor. Another way, which has already begun to be implemented, is to create a transparent marketplace (for example, Prozorro Market). On this service, verified sellers and service providers can offer their products. Accordingly, in case of coincidence with the customer's request, an agreement will be concluded between them. However, currently, the number of offers on this service is low. It is necessary to make participation in this marketplace attractive for suppliers, including the possibility of technical automation of importing goods to the market.

A deeper understanding of digitalization's impact on public administration's transparency is possible through canonical analysis. 31 European countries were selected for the study. The input data are 11 indicators divided into two groups: indicators of the level of digitalization and characteristics of public authorities. The first group includes the following indicators. Digital Development Level from E-Governance Academy Foundation. The selected indicator summarizes the level of development of information and communication technologies (ICT Development Index) and the network readiness indicator (Network Readiness Index). IMD World Digital Competitiveness Ranking is built on 51 criteria and characterizes the level of competitiveness of the country's

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digital sector. ICT goods exports (% of total goods exports) describe the demand for information technology in the international market and the share of the ICT market in the country. ICT goods imports (% total goods imports), which characterizes the country's digitalization level. ICT service exports (% of service exports, BoP) reflect how much the country's digital services are in demand in the international market.

Indicators that characterize public authorities include six indicators of The Worldwide Governance Indicators (WGI): Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. These indicators characterize all aspects of public authorities in the country, freedom of elections, transparency, tolerance for corruption and the overall quality of governance. The initial data are placed in Appendix A. The statistical package Statistica 12 was used to implement the canonical analysis. According to Figure 1, the canonical correlation (R) between the two groups of variables is 0.978, indicating a strong relationship between them. Chi-Square 107,616 with a significance level of $p<0.05$ confirms the statistical significance of the correlation coefficient R.

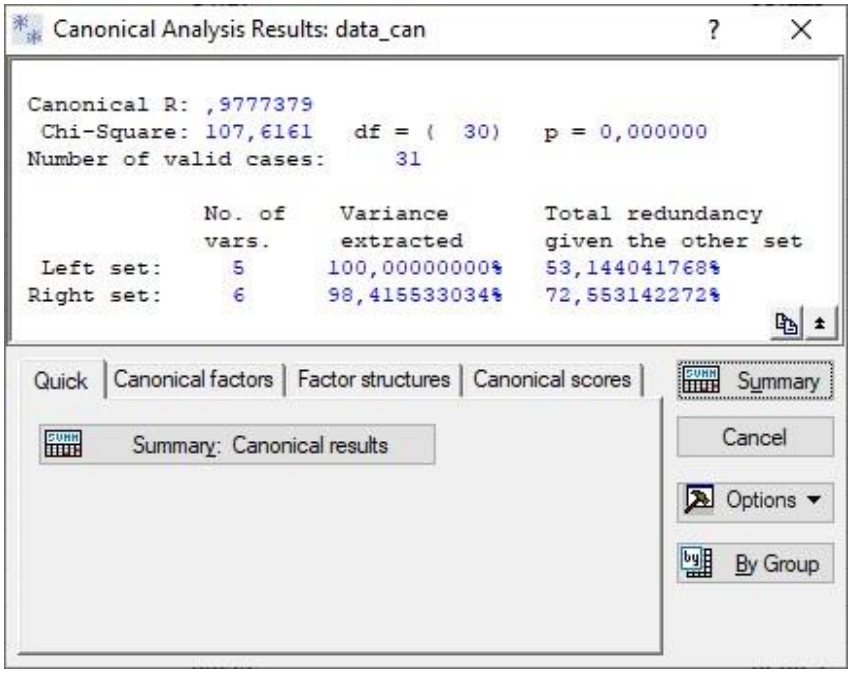
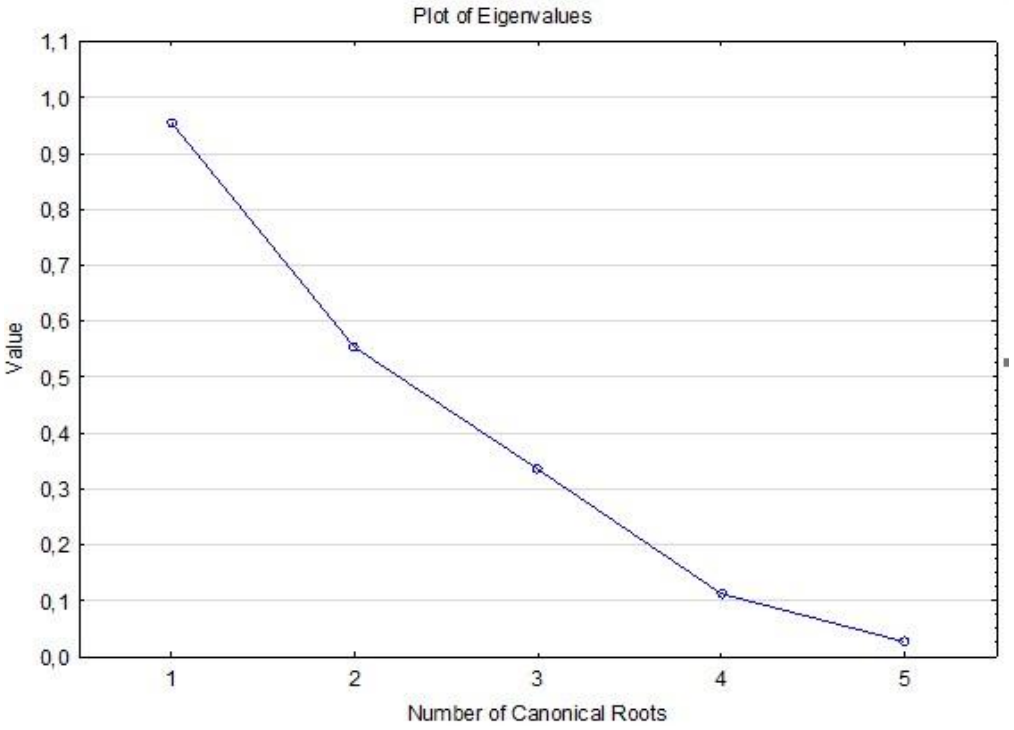


Figure 1. The Results of Canonical Analysis

Source: Compiled by the author

Considering the contributions of each set of variables to the variance (Figure 1), we see that the variation of digitalization indicators (Left Set) is taken into account by 100%, and the variation of public authorities (Right Set) by 98.42%. At the same time, Total redundancy reflects that 72.55% of the public administration variation is due to the Left Set variation. According to Figure 2, the result of the canonical analysis is five canonical roots. According to the value of p of the Chi-Square criterion, the statistically significant roots 0 and 1. However, the canonical root 0 explains 95.597% of the variance, and the canonical root 1 − only 55.351%. Therefore, only the canonical root 0 needs to be considered further.



Root Removed	Chi-Square Tests with Successive Roots Removed					
	Canonicl R	Canonicl R-sqr.	Chi-sqr.	df	p	Lambda Prime
0	0,977738	0,955971	107,6161	30	0,000000	0,011288
1	0,743980	0,553506	32,6662	20	0,036766	0,256381
2	0,579034	0,335281	13,3143	12	0,346665	0,574209
3	0,335638	0,112653	3,5129	6	0,742246	0,863837
4	0,162775	0,026496	0,6445	2	0,724530	0,973504

Figure 2. Graph and Table of Eigenvalues of Canonical Roots

Source: Compiled by the author

Figure 3 shows the correlations between groups of variables. The strongest link between Digital Development Level and Government Effectiveness, Digital Development Level and Rule of Law, IMD World Digital Competitive Ranking and Government Effectiveness.

Root Removed	Correlations, left set with right set					
	Voice and Accountability	Political Stability and Absence of Violence/Terrorism	Government Effectiveness	Regulatory Quality	Rule of Law	Control of Corruption
ICT goods exports	0,114	0,235	0,037	0,224	0,082	-0,031
ICT service exports	0,138	0,049	0,048	0,151	0,083	0,345
ICT goods imports	-0,010	0,150	0,034	0,124	0,030	-0,013
Digital Development Level	0,809	0,638	0,952	0,902	0,922	0,321
IMD World Digital Competitiveness Ranking	0,748	0,574	0,939	0,858	0,890	0,261

Figure 3. Correlation Between Groups

Source: Compiled by the author

According to factor structures (Figure 4), Digital Development Level and IMD World Digital Competitive Ranking have the highest correlation with the canonical root, with correlation coefficients of -0.973 and -0.945, respectively. And from the indicators of public administration Government Effectiveness, Regulatory Quality, and Rule of Law with coefficients -0.976, -0.974 and -0.963.

Root Variable	Factor Structure, left set				
	Root 1	Root 2	Root 3	Root 4	Root 5
ICT goods exports	-0,144	-0,487	0,806	0,304	0,018
ICT service exports	-0,128	-0,529	-0,185	0,419	-0,703
ICT goods imports	-0,097	-0,218	0,688	0,683	0,048
Digital Development Level	-0,973	0,122	-0,120	0,087	0,126
IMD World Digital Competitiveness Ranking	-0,945	0,266	-0,087	0,098	-0,141

Root Variable	Factor Structure, right set (data_can)				
	Root 1	Root 2	Root 3	Root 4	Root 5
Voice and Accountability	-0,870	-0,229	-0,119	-0,366	0,197
Political Stability and Absence of Violence/Terrorism	-0,688	-0,176	0,170	-0,075	0,675
Government Effectiveness	-0,976	0,182	-0,075	-0,002	0,090
Regulatory Quality	-0,974	-0,156	0,092	-0,134	0,033
Rule of Law	-0,963	0,025	-0,068	-0,136	0,135
Control of Corruption	-0,315	-0,403	-0,599	0,570	-0,026

Figure 4. Factor Structures

Source: Compiled by the author

By plotting the canonical variables derived from the canonical root, we see a direct relationship between Left Set and Right Set, i.e., between digitalization and the quality of public administration (Figure 5).

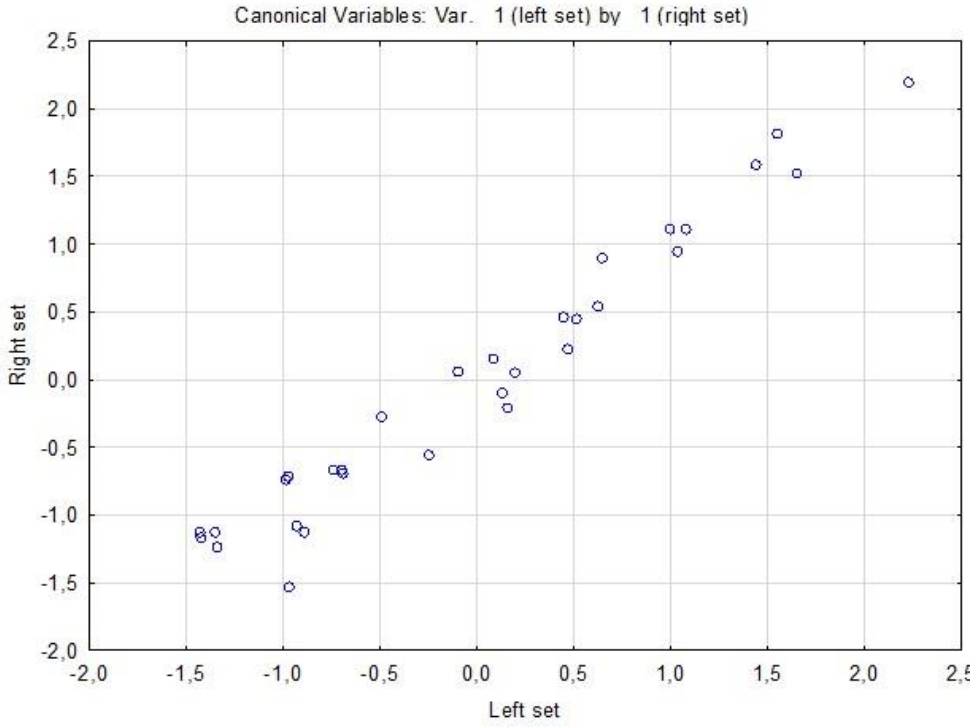


Figure 5. Scatter Plot of Canonical Variables

Source: Compiled by the author

Examining the canonical scores for the first canonical root (Root 1), we see that the contribution to the canonical variable is greatest at the Digiral Development Level (-0.682), so this indicator has the greatest impact on the quality of public administration. And in terms of the quality of public power, the indicators Regulatory Quality (-0.699) and Government Effectiveness (-0.544) have the greatest impact (Figure 6).

Variable	Canonical Weights, left set (data_can)				
	Root 1	Root 2	Root 3	Root 4	Root 5
ICT goods exports	-0,457	-0,913	1,190	-1,523	-0,451
ICT service exports	-0,046	-0,747	-0,596	0,389	-0,464
ICT goods imports	0,363	0,801	-0,185	1,919	0,525
Digital Development Level	-0,682	-1,933	-1,630	0,757	2,460
IMD World Digital Competitiveness Ranking	-0,317	2,149	1,597	-0,797	-2,457

Variable	Canonical Weights, right set (data_can)				
	Root 1	Root 2	Root 3	Root 4	Root 5
Voice and Accountability	0,122	-0,505	-1,859	-1,593	0,465
Political Stability and Absence of Violence/Terrorism	0,050	-0,198	0,574	0,598	1,415
Government Effectiveness	-0,544	1,704	-0,796	1,292	0,579
Regulatory Quality	-0,699	-1,853	2,618	1,131	-1,686
Rule of Law	0,093	0,927	-0,376	-1,666	-0,317
Control of Corruption	-0,060	-0,559	-0,593	0,686	0,014

Figure 6. Canonical Contributions of Variables to the Canonical Root

Source: Compiled by the author

Accordingly, general formula 1 takes the form:

$$-0{,}457 * \text{ICT goods exports} - 0{,}046 * \text{ICT service exports} + 0{,}363 * \text{ICT goods imports} - 0{,}682 * \text{Digital Development Level} - 0{,}317 * \text{IMD World Digital Competitiveness Ranking} = 0{,}122 * \text{Voice and Accountability} + 0{,}05 * \text{Political Stability and Absence of Violence(Terrorism)} - 0{,}544 * \text{Government Effectiveness} - 0{,}699 * \text{Regulatory Quality} + 0{,}093 * \text{Rule of Law} - 0{,}06 * \text{Control of Corruption}$$

Accordingly, digitalization has an impact on the quality and efficiency of public administration.

Risk cannot be neglected by assessing the positive impact of digitalization on public authorities' transparency. The main risks in introducing digitalization to ensure public authorities' transparency are digital security, maintaining a balance between liberalization and oversight, and lack of system flexibility. When implementing digital services and placing information in the public environment, it is worth paying attention to cybersecurity and the need for reliable data protection. Attackers can access a person's electronic documents by hacking servers and social engineering methods: pretexting, phishing, telephone phishing, “road apple” etc. In this case, public authorities should not shift the blame on the citizen but build a security system for their services so that criminals do not have access to information.

Maintaining a balance between liberalization and oversight is a hotly debated issue. Increasing bureaucratization and supervision will slow down and increase the cost of the entire public administration but, at the same time, will not leave opportunities for corruption. On the other hand − by simplifying all procedures and algorithms to a minimum, information flows will be accelerated, and information will become more accessible. Still, it will increase the possibility of the implementation of corruption schemes. The main tool for ensuring this balance is a risk-oriented cost approach: with decreasing transaction costs, liberalization increases. This approach is far from ideal. It is necessary to introduce automation of decisionmaking processes in public administration, which will simultaneously reduce opportunities for corruption and increase the time of the operation. In this case, digitalization will show itself to the best extent. The existence of transparent, accessible to all procedures and rules that ensure the transparency of public authorities can not always be adapted to the need to ensure the interests of the population during force majeure.

In the last three years, Ukraine has been hit by two global emergencies that were hard to believe in in the 21st century. Initially, the COVID-19 pandemic forced the authorities to use the tools of the state of emergency to ensure the functioning of the health care system and the preservation of the life and health of the population. Accordingly, the budget process needed to break procedures and deadlines to find additional funding for the

health care system. The second challenge to the transparency of public power was Russia's full-scale war against Ukraine. The boundaries of confidential information and state secrets were reviewed.

The state was mobilized to repel the enemy, which negatively affected the transparency of public power. However, these challenges impeded the development of digitalization of public authorities. The inability of a person to be physically present in a local government or other government agency has led to an increase in digital and online opportunities for citizens. It is important to develop this experience in the future.

Concusion

The development of public power in all developed countries of the world, including Ukraine, is influenced by digital technologies, which significantly increase the accessibility of citizens to information and create specific operational tools to control it. However, along with the significant benefits that digitalization brings to the transparency of public authorities, there are also substantial risks. Thus, the fight against cyber fraud, balanced control over the already implemented digital operations, and preserving citizens' data are further vectors of successful digitalization of public authorities. Therefore, the further development of civil society in Ukraine and the transparency of public authorities depends not only on the speed of implementation of digital technologies in all spheres of life, balanced public administration of this process, and the digital literacy of the population.

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Appendix A

Country	ICT goods exports	ICT service exports	ICT goods imports	Digital Development Level	IMD World Digital Competitivenes s Ranking	Voice and Accountability	Political Stability and Absence of Violence/Terror ism	Government Effectiveness	Regulatory Quality	Rule of Law	Control of Corruption
Austria	3,13	11,02	5,23	77,29	84,47	1,34	0,92	1,53	1,46	1,90	1,56
Belgium	2,17	11,41	4,11	75,34	82,49	1,31	0,47	1,15	1,29	1,37	1,49
Bulgaria	3,21	16,15	5,24	62,39	63,66	0,36	0,58	0,26	0,53	-0,01	-0,14
Croatia	2,33	5,74	4,89	65,34	59,99	0,46	0,69	0,46	0,59	0,40	0,08
Czech Republic	16,17	15,11	17,39	69,86	71,81	0,84	0,94	0,96	1,25	1,05	0,57
Denmark	3,65	7,26	7,39	84,17	95,23	1,55	1,00	1,91	1,57	1,88	2,16
Estonia	7,59	12,95	7,47	76,51	78,67	1,18	0,63	1,17	1,59	1,28	1,56
Finland	2,58	33,80	7,06	79,64	93,73	1,56	0,85	2,01	1,85	2,06	2,15
France	3,79	6,75	6,18	78,59	82,52	1,12	0,30	1,37	1,44	1,41	1,28
Germany	4,90	9,45	8,37	81,43	86,22	1,36	0,57	1,53	1,72	1,62	1,90
Greece	3,11	2,73	4,48	64,47	59,63	0,81	0,18	0,35	0,53	0,18	0,04
Hungary	12,82	9,38	13,75	65,72	65,47	0,34	0,77	0,50	0,60	0,53	0,06
Iceland	0,17	7,19	6,07	78,74	79,94	1,30	1,64	1,52	1,37	1,77	1,71
Ireland	8,80	53,05	9,71	76,23	85,86	1,31	0,97	1,29	1,60	1,38	1,49
Italy	1,97	7,33	5,00	68,33	67,90	0,91	0,40	0,48	0,96	0,30	0,26
Latvia	8,94	15,19	8,58	67,38	72,44	0,86	0,44	1,10	1,19	1,01	0,74
Lithuania	3,44	5,74	5,08	68,61	77,58	1,00	0,78	1,04	1,16	1,02	-1,14
Netherlands	10,27	9,24	13,54	83,48	94,26	1,49	0,85	1,80	1,86	1,78	-0,81
Norway	1,13	6,34	6,62	81,59	93,67	1,66	1,17	1,86	1,80	1,99	-1,10
Poland	6,55	12,26	8,35	66,61	73,71	0,67	0,56	0,53	1,01	0,43	-0,58
Portugal	3,40	5,93	6,14	68,25	73,01	1,20	1,07	1,17	0,97	1,14	-0,99
Romania	3,20	20,66	7,09	60,67	62,76	0,52	0,56	-0,16	0,46	0,40	0,64
Russian Federation	0,53	8,87	9,36	64,22	70,41	-1,12	-0,56	0,15	-0,43	-0,72	0,78
Slovak Republic	13,28	14,12	13,18	66,53	62,62	0,86	0,67	0,59	1,01	0,53	0,04
Slovenia	1,79	7,28	3,38	70,55	75,17	0,98	0,81	1,08	1,01	1,12	-0,39
Spain	1,63	9,56	5,08	73,92	78,74	1,04	0,31	1,00	1,05	1,03	0,92
Sweden	6,15	20,54	8,99	82,84	96,07	1,56	1,04	1,71	1,80	1,83	0,39
Switzerland	1,10	8,47	3,85	83,80	94,65	1,50	1,32	1,95	1,66	1,91	0,52
Turkey	1,15	2,33	4,06	58,84	59,79	-0,83	-1,37	0,05	-0,01	-0,28	-0,38
Ukraine	0,83	24,80	6,59	55,95	55,26	0,02	-1,42	-0,30	-0,26	-0,70	-0,09
United Kingdom	4,00	7,61	7,57	81,55	88,69	1,26	0,54	1,48	1,63	1,61	-1,51

Source: World bank, E-Governance Academy Foundation, IMD World Digital Competitivenes Ranking 2019