Digital tools in enhancing public services delivery

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Rezumat: *Scopul acestei lucrări este de a analiza utilizarea instrumentelor digitale în vederea îmbunătățirii serviciilor publice în contextul transformării digitale. Folosind instrumente precum: formulare precompletate, date deschise, servicii publice digitale și soluții de e-guvernare, instituțiile publice își propun să simplifice procesele, să îmbunătățească accesibilitatea și să sporească implicarea cetățenilor. Această cercetare investighează modul în care diverse entități din sectorul public, luând în considerare factori precum domeniul de activitate, numărul angajaților și nivelul veniturilor, integrează instrumentele digitale în desfășurarea activităților. Respondenții care lucrează în instituții publice au participat la un chestionar electronic, iar rezultatele obținute au indicat că aceste instrumente digitale sunt utilizate pe scară largă. Această cercetare subliniază importanța utilizării instrumentelor digitale în îmbunătățirea serviciilor publice. Rezultate obținute pot fi utile pentru furnizarea unor informații care pot sprijini procesul decizional și respectiv să aducă schimbări pozitive în organizațiile din sectorul public.*

Cuvinte cheie: digitalizare, instrumente digitale, instituții publice, formulare precompletate.

Abstract: *The purpose of this paper is to analyze the use of digital tools in improving public services within the framework of digital transformation. By leveraging technologies such as pre-filled forms, open data, digital public services, and e-governance solutions, governments aim to streamline processes, improve accessibility, and enhance citizen engagement. The study investigates how various public sector entities, considering factors such as their field of activity, the size of the workforce, and income levels, integrate digital tools into service delivery. Respondents working in public institutions participated in an electronic questionnaire and the results obtained indicated that these digital tools are widely utilized. This research underscores the importance of using digital tools in improving public services. These results can be useful in providing actionable findings that can inform decision making and drive positive change in public sector organizations.*

Keywords: digitalization, digital tools, public institutions, pre-filled forms.

JEL Classification: H0, H83, O3, Q55.

1. Introduction

The rapid evolution of digital technologies has spurred significant changes in various sectors, including public administration. Chapter 1 of this work delves into the foundational concepts of digitization, digitalization, and digital transformation, with a specific focus on their implications for enhancing public services and fostering innovation within the public sector. Digital transformation strategies have immense potential to improve efficiency, transparency, and service delivery in the public sector. Digitalization not only streamlines institutional activities, but also opens opportunities for innovative service delivery. Integration of digital tools in public services, including pre-filled forms, open data initiatives, and e-government solutions, further amplifies the benefits by improving accessibility, transparency, and responsiveness to citizen needs.

The 21st-century governance model is increasingly digitalized, with digital technology integrated into public services. The European Commission has identified the necessity for digital transformation and has introduced the Digital Economy and Society Index (DESI) in 2014 to monitor and evaluate the progress of its member states in various digital domains. The DESI evaluates performance across five critical areas: connectivity, human capital, Internet use, digital technology integration, and digital public services. The DESI offers a 360° view of each country's digital landscape, providing invaluable insights into their strengths and weaknesses. It identifies areas in need of improvement and provides guidance for policy interventions. The European Commission's Digital Economy and Society Index (European Commission, 2022) serves as a key benchmark for assessing the progress made by Member States in going digital. Romania's position

in the DESI highlights both achievements and areas in need of improvement. Although the country has made progress in open data initiatives, there is still considerable room for improvement in public digital services, as reflected in comparatively lower scores.

The aim of the paper is to analyze the digital tools used in public institutions, namely open data, e-government solutions, pre-filled forms and digital public services according to the field of activity, number of employees and revenue level. All this to observe if there are differences considering these factors, which could lead to lower or higher usage.

2. Theoretical Background

2.1 Digitization, Digitalization and Digital Transformation

In the broadest field of digital transformation, further terms appear in the literature, including "digitization" and "digitalization". Although these three concepts have different meanings, they are often interchangeable, as research has confirmed (Bloomberg, 2018). Literature information describes these three terms by scope. Therefore, the first step of the transformation process is digitization, which is presented as a transition from analog to digital (Maltaverne, 2017) (for example, the conversion of the human voice into digital signals when we talk on the phone). The second term is digitalization and refers to the process of integrating digital technologies and the effects they bring as a result of applying the system. Unruh & Kiron (Unruh & Kiron, 2017) describe digitalization as a method of business and process innovation involving digital opportunities. Digital transformation is a set of processes and actions that seek to improve a unit through the combination of information, computing, communication, and connectivity technologies, which trigger significant changes in its characteristics (Gregory, 2021).

Public administrations around the world have made significant efforts towards digital transformation, motivated by the rapid evolution of technology as well as the cost, efficiency, and quality benefits. This transformation focuses mainly on the development and use of digital solutions to streamline internal and external processes and to provide quality services to citizens (Asgarkhani, 2005). However, public sector structures need to be reformed to take full advantage of digital solutions and services (Layne & Lee, 2001). Hence the emergence of the concept of digital governance or e-Governance, which involves supporting participatory democracy by opening up to citizens or private companies (Mărcuț, 2021). The purpose of e-government is not only to provide information and services to citizens, but also to create strategic internal and external links between central and local public administrations, businesses and citizens (Pedersen, 2018).

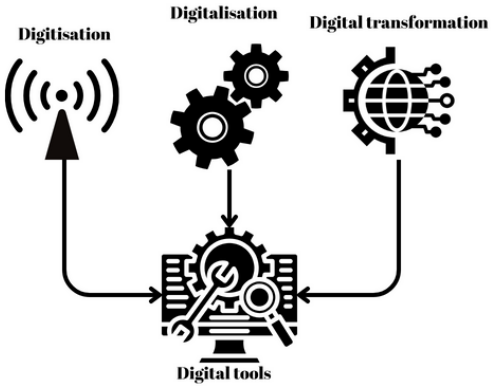

Figure 1. Digitization, Digitalization and Digital Transformation
Source: adapted by the author from Maltaverne (2017)

Digital transformation strategies in the public sector can improve efficiency, increase administrative transparency, and improve the delivery of government services, potentially changing the operation of the public sector (London Premier Centre, 2023). In public

administration, digitization produces many advantages, which should be found in the institutional strategic approach and promoted by its leaders. On the one hand, digitization makes institutional activities more efficient and contributes to efficient use of resources, cost reduction and the contribution of the institution to technological and socio-economic progress. On the other hand, digitization provides new opportunities by activating the capacities and institutions to provide innovative public services to citizens (Roja & Boc, 2021). All of these concepts create innovative digital tools to improve the delivery of public services (Figure 1).

2.2 Digital tools in public services

A first research gap concerns a detailed examination of how the size of an institution, as measured by the number of employees, influences the integration of digital tools. Another important research gap concerns the influence of income levels on the integration of digital tools. Currently, there is a lack of data about how the income level of institutions affects their ability and inclination to become digital. Income can be a key determinant of investment in technology as well as the priority given to digitization in the overall strategy of the institution. Thus, it is important to analyze the correlation between income levels and investments in digital technologies, as well as to analyze how institutions with different income levels prioritize digitization.

Any organization involves a complex system composed of at least four dimensions, namely: - people, technology, structure, and tasks. All four components are dependent, which means that any change to one will have consequences for the other three. In this context, technology is seen as a set of tools that help solve specific problems. For an organization to benefit from digital transformation, it is important to develop employees' digital skills to capitalize on digital tools (Kraft, Lindeque & Peter, 2022).

A concept approved to develop an optimal tax system is the pre-filled forms and processing of forms. The concept is quite simple. For example, if the tax authority already has information about a taxpayer from other sources, it can pre-populate the returns with these figures rather than ask the taxpayer to provide them again. This reduces errors and simplifies the verification process. Data sources can include employers, banks, social insurance companies, public or private health care institutions, statistical agencies, and other government authorities. For the pre-fill work, the connection to data from these third parties must be made with high-quality, real-time, and reliable software (Graur & Harea, 2022). According to the Digital Economy and Society Index (DESI) in 2022, Romania's 6-point score for pre-filled forms is well below the EU average of 63 (European Commission, 2022).

Open (government) data refers to information collected, produced, or paid by public institutions (also known as public sector information) and made available for free for reuse for other purposes. (European Union, n.d.). Through open data, the public or public institutions have access to data owned by another public institution and available online under an open license from a copyright perspective, thus legally allowing reuse of the information (Buga, 2018). These data fields range from traffic, weather, geography, tourism information, statistics, businesses, public sector budgets, and performance levels to all kinds of data on policies and inspections (food, safety, quality of education, etc.). Often a limited number of informal examples are used to provide examples of open data. These data are most often referred to as data that are relatively safe to be published by the government, and not to data that once published, could cause a public reaction (Janssen, Charalabidis & Zuiderwijk, 2012). The availability of open data has significantly increased. Public organizations are facing increasing pressure to release their raw data, which has led to the growth of open data. A strong motivation for open access to publicly held data is to increase the benefit of public sector investment. Furthermore, it can generate value through downstream use of the results, providing policymakers with the necessary data to help them tackle challenging problems (Arzberger et al., 2004), and involve the citizenry in analyzing large quantities of data sets (Surowiecki, 2004). Open data is frequently essential for the development

of public policy and the delivery of services, and can also be valuable to others, such as those seeking traffic information (Janssen, Charalabidis & Zuiderwijk, 2012).

The evolution of eGovernment systems has been rapid, with the move from paper to databases and from manual procedures to large IT systems. The development of eGovernment has been driven in all countries by legislative measures on public administration services offered online, which have also coincided with the rapid evolution of Internet use, with the overall aim of improving services and reducing costs for both users and service providers (Dragomir & Bărbat, 2012). The implementation of e-government can be hindered by political will and government regulations. Thus, in addition to new methods for recruiting officials and employees, the decision-making process must be redesigned. This transformation also needs to happen in the communities to motivate citizens to embrace the possibilities offered by the new information and communication resources, through courses provided in collaboration with the business sector, and by demonstrating the advantages that citizens can gain by being a digital citizen. The security of data is an essential part of this rebuilding process. The government is required to adopt policies to ensure the protection of information shared by citizens and companies in order to create an atmosphere of trust between all parties involved; the public, the people and the companies, and to ensure the government's openness and accountability to the society. New careers are emerging, and people are becoming more aware of their rights and the services they receive (Saltaji, 2019).

The technologies associated with e-Business have also caused similar changes in the public sector. Government institutions, at all levels, use Internet technologies to provide information and services to citizens, officials, and organizations interacting with them. E-Government solutions aim to use the Internet and network technologies for digital relations between the government and other institutions in the public sector, on the one hand, citizens, companies, and other government entities, on the other. In addition to the proximity of the mode of delivery of government services, e-government can perform public sector activities more effectively and also enable citizens to have better access to information (Dănăiță, Hurbean & Margea, 2008). The impact of eGovernment is felt internally, even if it is not visible to other parties, such as the public. These effects include faster decision-making, transparency, accountability, efficiency, and productivity. As a result, citizens are likely to be more content with the quality of government services, productivity of information is likely to improve, and information to be less costly, while access to information is likely to be simpler. Consequently, e-government creates a new way of cooperation between public institutions in many areas, particularly in the exchange of information. This can attract more local and foreign investors, because it is important for any government to provide an environment conducive to investment, and the government can use national funding effectively (Saltaji, 2019).

Citizens' need for reduced response time from public institutions has led to the need to transform public services into a digital format to facilitate both remote access and transparency. Therefore, by digitizing public services, we understand the transition from traditional operating methods to a completely digital system (Arnăut, 2022).

By digitizing public services, the public administration can improve the quality of its relations with citizens and their perception of administrative actions. Digitization provides access and availability to public services, increasing trust in new public administration. The greatest impact felt by both the employees of public institutions and the citizens is, on the one hand, the improvement in the efficiency and effectiveness of the activities carried out and, on the other, the efficiency of the requests made to public institutions (Roja & Boc, 2021). The digitization of public services and their delivery requires changes in public institutions and authorities, a new culture, and a new approach to the design of online services based on effective data management. We must also recognize that an important success factor is that the public must be a successful partner. For this to happen, the public must have easy access to these services, be aware that these online channels are an easy and fast option, have skills and abilities to use these online services and, above all, have an open attitude without resistance (Todoruţ & Tselentis, 2018).

2.3 Digital Economy and Society Index

Since 2014, the European Commission has monitored member states' progress in digital affairs through the Digital Economy and Society Index (DESI). Therefore, reports are submitted annually to track the development of the indices and identify the weakness of each member state. This index covers five important areas: connectivity (fast access to services), human capital (human resources required to work in a digital society), Internet use, digital technology integration (in business processes), and digital public services (European Commission, 2022). In this paper, we are interested in the indicator that addresses digital public services. This indicator includes open data tools, pre-filled forms, digital public services, and users of e-government solutions.

According to the latest DESI 2022 report (European Commission, 2022), Romania ranks 27th in terms of digital public services, with a score of 21 points, in contrast to the EU score of 67.3 points. From the point of view of users of e-government solutions, 17% of the country's population use public services in the digital environment, compared to the EU average of 65%. Regarding the use of pre-filled forms, Romania obtains a score of 19 points, the EU average being 64 points. Furthermore, in public services, our country receives a score of 44 points, unlike the EU with 75 points. Open data is used in public institutions (76%), considering that the EU has a percentage of 81%. However, through the Recovery and Resilience Plan, Component 7 (Digital Transformation), EUR 1,817 million are allocated for the digital transformation of the entire public system, which can bring Romania to the goal formulated by the European Commission of using 100% online public services (European Commission, 2022).

Figure 2 shows a significant discrepancy between the level of adoption of digital technologies in Romania and the EU average, with a clear gap in terms of e-government users and digital public services.

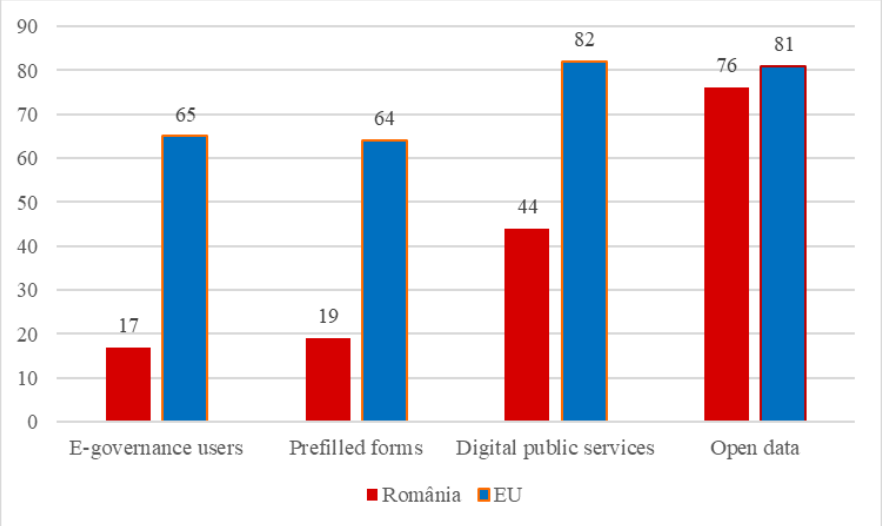

Figure 2. Romania and European Union in DESI index
Source: European Commission (2022)

While progress is being made in the area of open data, there is an urgent need for improvement in simplifying administrative processes and expanding access to online services. Therefore, Romania needs to pay more attention to the development of digital infrastructure and the implementation of effective strategies to bridge the gap and align with European standards in the digital economy and society.

3. Research methodology

This research was part of an institutional project called "Integration of digitalization opportunities in improving the management process of Romanian public institutions" within the

Bucharest University of Economic Studies and among the topics addressed, in this paper will be presented "The use of specific digitalization tools in public institutions in Romania".

The current study is based on a survey conducted by distributing an electronic questionnaire to people who work in public institutions and who have expressed their consent to participate in the research process. In terms of respondents, only those working in the fields of education, research, innovation and digitization and European projects and investments were selected. We collected 202 responses, of which 63% were from education, 19% from research, innovation and digitization, and 18% from European projects and investments. Following the collection of responses, to determine the degree of use of these digital tools, we analyzed using Excel. The questionnaire proposed for completion included: type of organization, position held, professional experience, level of education, gender, and field of activity, and then questions related to digitalization in public institutions. What we were particularly interested in for this research is the question: To what extent are the following digital public services used in your organization?

4. Analysis and Results

Digital public services have had a positive impact on Romania's public institutions, bringing numerous benefits such as increased efficiency, improved transparency, and simplification of processes. The following digital tools were analyzed for their use: e-government solutions, pre-filled forms, public services for citizens, and open data. These are presented in Figure 3 below.

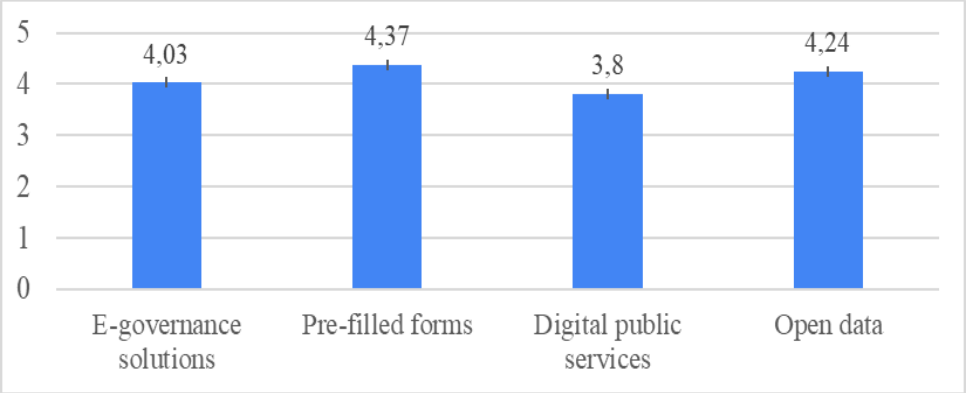

Figure 3. Analysis of digital tools
Source: author

The most widely used digital tools are pre-filled forms, e-government solutions, and open data. However, we notice that public services are used to an average extent. It is important that these tools are used to a large extent to facilitate the transition to digitization.

In Table 1 below, we have analyzed the use of digital public services according to the main field of activity, covering education, research innovation, investment, and European projects.

Table 1

Analysis of digital tools by field of activity

Digital tools	Education	Research, innovation and digitization	European investments and projects
E-governance solutions	4.04	3.74	4.32
Pre-filled forms	4.50	4.24	4.08
Digital public services	3.88	3.50	3.81
Open data	4.35	4.21	3.89

Source: author

In education both e-government solutions, prefilled forms, and open data are used to a very high extent, while digital public services for citizens are used to a medium extent. In research, innovation and digitization, prefilled forms and open data are used to a very high extent, while digital public services for citizens and e-government solutions are used to a medium extent. For European investments and projects, eGovernment solutions and pre-filled forms are used to a high extent. Digital public services and open data are used to a medium extent. An interesting aspect observed is that in all three areas of interest, digital public services are used to a medium extent, which shows the similarity between them. Of the three areas, the most advanced in terms of the integration of digital tools is education, which indicates a good adaptability to this digitization process. By comparing the results with the DESI index (European Commission, 2022), Romania does not provide sufficient digital public services for citizens and that there is a need to incorporate these public services into the digital space. However, as far as open data in public institutions are concerned, we have a high degree of use, as in the DESI report.

These differences may also result from specific needs and requirements. If we refer to the field of education, they are directed towards administering and facilitating academic processes, managing human and material resources, and ensuring effective communication between all stakeholders in the educational process. Research, innovation and digitization often involve collaboration between multiple institutions, management of complex projects and access to data and resources for research activities. Thus, e-government solutions in this area need to facilitate project management, collaboration between teams and access to data and resources relevant to research. European projects and investments involve cross-border cooperation and management of funding and reporting of results to European institutions. E-Government solutions for European projects need to provide tools for efficient management of communications and data between participants, monitoring and reporting progress and ensuring compliance with European requirements.

The infrastructure and resources available play a critical role in determining the extent to which open data is used in different domains. These include issues of accessibility to technology, data storage and processing capacity, and the expertise needed to work with this data.

In some areas, institutions may have access to advanced technology, including tools and platforms for data collection, storage, and analysis. This can facilitate the use of open data and encourage its adoption. On the other hand, lack of access to appropriate technology may slow down the adoption of open data. Organizations or institutions without adequate digital infrastructure may have difficulties in collecting and using open data effectively. Areas working with large volumes of data, such as scientific research, may require more advanced data storage and processing infrastructure to manage these large volumes of data. In areas where data storage and processing infrastructure is limited, the use of open data may be more restricted due to limited technical capabilities to manipulate and analyze this data. The use of open data may require specific technical knowledge and skills to manipulate and analyze this data effectively. Areas that have staff with relevant technical expertise and skills may be more willing to adopt and use open data to a greater extent. On the other hand, in areas where there is a lack of expertise or qualified human resources to work with open data, their use may be limited. Investment in training and technical skills development can be crucial to boost the adoption of open data in these areas.

In Table 2 below, we have analyzed the use of digital public services by level of income, starting from 500,000 euros to over 50 million euros.

Table 2

Analysis of digital tools by income levels

Income Levels	500,000-1,000,000€	1,000,001 - 5,000,000 €	5,000,001 - 10,000,000 €	10,000,000 - 49,999,999 €	Over 50 million €
E-governance solutions	3.50	4.06	4.32	3.96	4.04
Pre-filled forms	4.00	4.12	4.13	4.50	4.54
Digital public services	2.50	3.50	3.94	3.86	3.96
Open data	4.00	4.12	3.81	4.39	4.36

Source: author

Based on the table above, for E-governance solutions, they are used to a very high extent, except for organizations with revenues between 500,000-1,000,000 euros, where we have a lower degree of use. For pre-filled forms, we notice a very high degree of use in the case of public institutions that earn more than €10,000,000. In the case of digital public services, organizations that earn between €500,000-1,000,000 there is a very low degree of use, which may come from fragmentation. In other words, in Romania, digital public services are fragmented both territorially and between the different levels of decision making - local, regional and national. Some institutions providing digital public services are supported by solutions such as virtual civil servants or electronic document delivery processes. In contrast, other institutions at the same level, but in different regions, face difficulties in adopting these innovations due to a lack of available resources (Mărcuț, 2021). The open data tool is used to a large extent in all organizations. With the exception of digital public services, where revenue has an influence on their use, the three tools are still used regardless of the revenue earned by the institution.

In Table 3 below, we have analyzed the use of digital public services according to the number of employees in public institutions.

Table 3

Analysis of digital tools by number of employees

Number of employees	Small organizations (10-249 employees)	Mid-sized organizations (250-499 employees)	Large organizations (over 500 employees)
E-governance solutions	4.14	4.17	3.95
Pre-filled forms	4.17	4.15	4.51
Digital public services	3.59	3.85	3.83
Open data	3.86	4.00	4.44

Source: author

According to the table above, we have a high degree of use of E-governance solutions, regardless of the size of the organization. As far as pre-filled forms are concerned, in small and medium sized organizations they are used to a large extent, as opposed to large organizations where they are used to a very large extent. For public services, they are used to a medium extent, but we can notice a significant difference between large and medium organizations as opposed to small ones. For open data, in large organizations they are used to a very high extent, but in small and medium organizations they are used to a high extent. We can see that the four digital tools are used more in medium and large organizations than in small organizations. It is important to note that although we are talking about smaller organizations, they are keeping pace with larger ones and that these tools are not lacking.

5. Conclusions

The use of digital tools in public institutions has a positive impact, from efficiency of activities to transparency or adaptability in a dynamic environment. The use of all these tools brings us closer to achieving the European Commission's objective of digital transformation of public institutions. The results on the degree of use of these tools have shown that public institutions in Romania are largely using modern digital technologies in their activities. It is remarkable that among all the digital processes, services, and tools, there is no element that is not used at all, regardless of the field of activity.

The practical implications that can be drawn from the paper provide actionable recommendations for policy makers, public administrators, and other stakeholders to accelerate their digital transformation efforts in public administration. By taking advantage of these insights, governments will be able to harness the transformative potential of digital technologies to improve public services, improve citizen engagement, and drive innovation in governance. A huge increase in digital public services has been generated, which has also required an adaptation of equipment and information technologies, thus having the capacity to better meet users' needs. Technologies

will evolve very rapidly; online services will be increasingly and more sophisticated. In this context, Romania needs to catch up with the other EU countries. Europe, to increase the pace of digitization, to progress rapidly and sustainably to move out of the low performing countries (Todoruţ & Tselentis, 2018). Digitization makes information and government processes more accessible to citizens. Online platforms can provide up-to-date information on government decisions and policies, and citizens can access public services in an easy and transparent way. This increased transparency improves trust in government and promotes greater accountability of public institutions.

In terms of research limitations, there is a lack of previous research examining these digital tools in the context of public institutions. Thus, the only data we could refer to for comparison was the DESI index. However, for future research directions, we can integrate more domains. Also, the sizing of organizations to be on the levels of public system structures (municipalities, county councils, authorities, ministries, etc.), to monitor the progress towards a digital society.

After the analysis of all digital tools, we noticed that no matter what field of activity, digital tools are used to the same extent, with small variations. Basically, even if we are talking about an institution whose main field of activity is education, it benefits from the same technological support as an institution whose main field of reference is research, innovation, and digitization. Consequently, digital transformation and the use of specific digitization tools encompass public institutions in Romania, regardless of their field of activity. Digitization is a crucial step towards modernizing and streamlining public administration in Romania. By continuing and accelerating digital transformation efforts, public institutions can provide improved services, increase citizens' trust, and contribute to the development of a more connected and innovative society.

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