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Behind the Screens: Developers' Insights on Enhancing Public Services through Digitization

Andreea BARBU[1,2]

[1] National University of Science and Technology Politehnica Bucharest, Bucharest, Romania,
[2] Academy of Romanian Scientists, Ilfov 3, 050044 Bucharest, Romania
barbu.andreeab@yahoo.com, ORCID: https://orcid.org/0000-0003-3119-8753

Georgiana MOICEANU[1]

[1] National University of Science and Technology Politehnica Bucharest, Bucharest, Romania,
moiceanugeorgiana@gmail.com, ORCID: https://orcid.org/0000-0002-9483-0894

Cristina SIMION[1]

[1] National University of Science and Technology Politehnica Bucharest, Bucharest, Romania,
cristinas_upb@yahoo.com, ORCID: https://orcid.org/0009-0008-3461-3709

Ştefan CATANĂ[3]

[3] Faculty of Business and Administration, Department of Business Administration, University of Bucharest, Bucharest, Romania
stefan.catana@faa.unibuc.ro, ORCID: https://orcid.org/0000-0003-3013-3923

Jilan KESHTA[4]

[4] Arab Academy for Science, Technology, and Maritime Transport, College of International Transport and Logistics, Alexandria, Egypt
Jilan9a@adj.aast.edu, ORCID: https://orcid.org/0000-0001-7761-413X

Abstract: *In this study, software engineers' perspectives on the benefits and difficulties of digitizing public services are explored. The authors gathered information using qualitative research, which included a focus group. The study reveals advantages like faster access to data and process automation, as well as drawbacks like expensive infrastructure expenses and institutional opposition. While increasing data management, accessibility, and administrative effectiveness, digitalization also raises new integration, security, and communication challenges. The results provide knowledge for future research on technology adoption in public institutions and aid in understanding the successful growth of digital public services.*

Keywords: *digitalization, public services, e-Government Solutions, developers insights, technology integration*

INTRODUCTION

In the contemporary era, the accelerated development of information technology has given rise to a profound transformation in the way society interacts with public administration [1]. The digitization process of public services has become a central aspect of e-government, aiming to create an efficient and modern framework for the provision of services to citizens and businesses [2]. This initiative is based on the promise of simplifying administrative procedures, improving access to information, and streamlining government operations [3]. Therefore, this study aims to identify both the benefits and the key challenges of the digitization process of public services.

Recent papers in this field analyze the context of digitization but regarding the benefits and the key challenges of the digitization process of public services, most of the papers analyse the benefits reported by the governments of the different countries [4] [5], present different case studies [6] [7], analyse the perception of the citizens [8], corporate perceptions [9], implementation and challenges learned from different projects [10] [11], or case studies [12] and international comparisons [2]. However, there is a gap in the scientific literature when it comes to the presentation of the experience that makers of digital solutions have regarding public services. The

software developers are technology professionals who have a thorough understanding of the digital solutions used for the digitization of public services. Because of their professional backgrounds, they can offer a thorough view of how to apply and integrate technologies to enhance public services [13].

Therefore, the purpose of this study is to significantly advance the understanding of how employees of a software development company are affected by the digitization of public services. The emphasis is on the personal and professional experiences of these people who work for a business that develops software solutions to capture the comprehensive perspective of digital transformation. This business provides consulting as well as system management, mobile payment integration, and information systems audit. Consequently, the two specific goals of this study were:
- O1 - Identifying the main benefits and challenges of the digitization of public services;
- O2 - Determining the impact of digitization on the efficiency and quality of public services;

In this regard, the focus group technique will be used as part of the study's qualitative research methodology. Even though the aim of this study is to investigate how employees at a software development company view the digitization of public services, the findings can be utilized as a springboard for additional research into how widely accepted digital public services are.

EXPERIMENTAL

The main objective of this research is to analyze the perception of employees within a software development company regarding the digitalization of public services. This goal was pursued through qualitative research, with the "focus-group" method being employed. By using this method, representative data can be swiftly gathered from a small group of participants who have expertise in a particular topic [14], allowing for in-depth analysis of their points of view [15]. Two papers and approaches were reviewed to organize the focus group [16] [17].

One of the authors completed a 10-hour per month, one-year internship at a software development company with expertise in the digitalization of public services in order to conduct this analysis. Only 4 of the company's 5 workers had prior expertise with digitization initiatives for public services. Only the four employees who had prior experience with the digitalization of public services were thus invited to take part in the focus group. The moderator and the other employee who was in charge of recording the answers were the only attendees in addition to the other 4 people.

Several themes relevant to the digitization of public services were covered during the focus group meeting, but for this paper, two specific goals were established to help achieve the overall goal, and for each of them, a collection of questions was created (Table 1).

Table 1. Objectives and questions used in the focus group research

Objectives	Questions
O1 - Identifying the main benefits and challenges of the digitization of public services;	➢ What are the main advantages of the digitization of public services, from your perspective as software developers? ➢ What challenges have you encountered in developing software solutions for digital public services?
O2 - Determining the impact of digitization on the efficiency and quality of public services;	➢ How do you think digitalization has influenced the efficiency and quality of public services? Have you noticed improvements or are there areas that could be improved? ➢ How do you think possible obstacles or difficulties in providing quality digital public services can be overcome?

The company where the research participants are employed hosted the focus group right there in their corporate offices. In order to promote a free debate, all 6 participants in this study took part in an open discussion in the business meeting room while seated at a round table.

RESULTS

The first set of questions concerned how the digitalization of public services is perceived by users. Thus, the first analyzed question from this study concerned the main advantages of the digitization of public services, from the perspective of the participants as software developers (Table 2).

Table 2. The main advantages of the digitization of public services, from the perspective of the participants as software developers

Main advantages
• access to a centralized and updated database;   • help in developing applications and software solutions based on accurate and up-to-date information;   • process automation;   • developing software solutions that optimize workflows and reduce human errors;   • reducing the need to work with physical documents and manual processes;   • creating opportunities for the development of innovative software solutions.

The first focus group participant highlighted how the digitalization of public services allowed them access to a consolidated and updated database, a feature that also assisted them in developing apps and software solutions based on correct and up-to-date information. The second participant noted that they have been able to create software solutions that optimize workflows and lower human error rates thanks to the automation of procedures brought on by the digitization of public services. Additionally, by eliminating the need for manual procedures and physical documentation, they were able to create software solutions that were both more effective and quicker. All focus group members noted that the digitization of public services creates possibilities for the creation of cutting-edge software products that can enhance and simplify the user experience, including mobile applications, artificial intelligence, or blockchain.

After the presentation of the advantages, the discussion regarding the challenges launched by digitization followed. Thus, the second question was „What challenges have you encountered in developing software solutions for digital public services? (Table 3).

Table 3. Challenges encountered by the focus group participants regarding the development of software solutions for digital public services

Main challenges
• the slow and bureaucratic processes of some public institutions;   • integration with outdated technical systems of public institutions;   • the limited resources of public institutions;   • communication and collaboration with different departments and teams from public institutions;   • frequent changes in requirements and regulations within digital public services;   • resistance to change and adoption of digitization solutions;   • efforts to convince and demonstrate the benefits of the developed software solutions;   • ensuring data security and confidentiality within digital public services.

The focus group participants cited difficulties with both technical and sociocultural elements. For instance, the first participant brought up the slow, bureaucratic procedures employed by several public institutions, which caused delays in the adoption of developed software solutions and made it challenging to get quick feedback. Additionally, he said that it was difficult to integrate software solutions with out-of-date technological systems used by public organizations because these systems had different designs and standards. The second participant cited not just the procedures and red tape, but also the public institutions' constrained funding and other resources, which placed restrictions on the creation of software-based solutions. The other two participants noted that a significant barrier also lay in the actual communication and collaboration with various teams and departments from public institutions, as these activities need extra work to ensure the projects' alignment and coordination. Additionally, projects were impacted by regular adjustments to rules and specifications within digital public services, necessitating flexibility and agility in software development.

Because efforts were required to persuade and illustrate the advantages of the established software solutions, opposition to change and adoption of digitization solutions served as another challenge. The creation of software solutions for digital public services was then the subject of various conversations between the participants who sought to emphasize the existence of additional substantial problems. For instance, developing scalable and flexible software solutions that could handle large volumes of data and requests for digital public services required user interface and user experience to take an intuitive and simple-to-use approach for different categories of users. Last but not least, employees noted that maintaining the security and confidentiality of data

inside digital public services represented a continuous problem and that they had to put in place more, more specific information protection measures.

In order to then analyze the impact of the created solutions on the efficiency and quality of public services, the moderator presented the following set of questions: „How do you think digitalization has influenced the efficiency and quality of public services? Have you noticed improvements or are there areas that could be improved?" (Table 4).

Table 4. Aspects related to how the participants in the focus group believe that digitization has influenced the efficiency and quality of public services

The impact of digitization on the efficiency and quality of public services
• better data and resource management;
• improvements in the accessibility of public services through digital platforms;
• the possibility to access and use the services remotely, at any time;
• elimination of manual processes;
• reducing the time required to complete administrative procedures;
• facilitating collaboration and information exchange between different public institutions;
• reduction of human errors;
• eliminating the ambiguities associated with certain manual processes.

Regarding the advantages, all four participants agreed that the usage of cutting-edge software solutions in government operations improved data and resource management, boosting the effectiveness and caliber of services provided to citizens. Through the use of digital platforms, they observed advances in the accessibility of public services, enabling residents to access and use services from anywhere, at any time. By eliminating manual processes and cutting down on the time needed to complete administrative operations, digitization has considerably increased the efficiency of public services. Additionally, technology has made it easier for many governmental agencies to collaborate and share information, which has increased the coherence and synchronization of service delivery. Moreover, the quality of public services has improved through digitization, by reducing human errors and removing the ambiguities associated with certain manual processes.

The focus group participants highlighted the fact that there are still many aspects in Romania that can be developed and implemented, as there are still difficulties in ensuring adequate integration and interoperability between the various systems and digital platforms used in public services. They stated that it is crucial to ensure the security and safety of personal data within digital public services, with further precautions needed to ward off potential weaknesses and cyberattacks. One of the participants made the point that, in order to design and implement digital public services that truly meet people' wants and requirements, there needs to be improved user communication and consultation. This is particularly important given that some digital public services might have a difficult learning curve for consumers, necessitating improvements to user experience and usability. The delivery of updates and pertinent information may also be delayed for some digital public services, which could have an impact on user experience and confidence in these services.

The sixth question of this research was: How do you think possible obstacles or difficulties can be overcome in offering quality digital public services? (Table 5).

Table 5. Aspects related to how the participants in the focus group believe that possible obstacles or difficulties in offering quality digital public services can be overcome

Ways to overcome the difficulties in providing quality digital public services
• creating solid partnerships between software development companies and public institutions;
• the development of common standards and norms for the interoperability and integration of digital public systems and services;
• investments in human resources and the development of digital skills of staff in public institutions;
• collecting and analyzing feedback from employees of public institutions;
• collecting and analyzing feedback from citizens;
• adopting an agile and iterative approach in the development and implementation of public services;
• investments in areas such as cyber security and personal data protection;
• investments in research and technological development.

In response to this inquiry, the focus group participants highlighted the dearth of collaborations between public institutions and private businesses. Two of the participants made the point that in order to ensure effective collaboration in the creation and implementation of digital public services, strong collaborations between software development companies and public institutions are required. Additionally, they emphasized how the creation of universal guidelines and standards for the compatibility and integration of digital public services and systems might promote effective communication and information sharing between the various organizations. The third person in the conversation brought up the issue of human resources in government organizations. He said that investing in human resources and helping staff members develop their digital abilities could be crucial steps toward improving their capacity to effectively use and manage digital public services. In order to be able to identify the demands of the users as clearly as possible and how they may be addressed, it is also important to gather and analyze feedback from both people and staff of public institutions. A continuous improvement process based on feedback and identified needs can also be facilitated by using an agile and iterative approach to the creation and deployment of digital public services. The fourth participant in the discussion agreed with the ideas presented up to that point but also emphasized the need for investments in areas like cyber security and personal data protection in order to reduce risks and worries associated with using public digital services while also gaining the trust of the general public. Thus, he mentioned that a continuation of investments in technological research and development by the state is necessary to enable software developers to innovate and offer more advanced and efficient solutions for digital public services.

DISCUSSION

Software developers that participated in the focus group emphasized the creation of creative software solutions, process automation, and access to centralized and updated datasets as important benefits of digitizing public services. These benefits have a major positive impact on increasing data accuracy and efficiency in the provision of public services. An investigation of the potential effects of these benefits on the day-to-day operations of enterprises, government organizations, and citizens may follow from this talk. For example, having access to current information helps speed up decision-making, and administrative processes can be streamlined through automation [4] [5].

An important trend is the way that digitization improves the effectiveness and caliber of governmental services [10]. Results like increased accessibility, faster processing, fewer errors, better data and resource management, and shorter processing times can spark conversations about how these advancements affect public service delivery. Government services are now more responsive and easier for citizens to access, and companies may find it simpler to deal with governmental organizations [4].

The focus group participants suggested several strategies to get around roadblocks, such as forging solid alliances between software developers and government agencies, creating interoperability standards, enhancing government workers' digital literacy, and gathering user input [10] [11]. The focus of this conversation can be on how cooperation between the public and private sectors promotes efficiency and innovation in digital public services. It can also talk about how important customer input is to maintain these services' quality and fostering public trust.

CONCLUSIONS

The findings of this study shed light on several important factors for the effective creation and introduction of digital public services in Romania. Both the employees of software development companies and the end users face benefits and drawbacks from the digitization of governmental services. The participants emphasized advantages such as access to centralized databases and process automation. Challenges including high infrastructure spending and reluctance to reform within governmental institutions have been observed at the same time.

The findings demonstrated that the digitalization of public services brought about significant improvements in data management, accessibility of services, and reduction of time for administrative procedures, leading to greater efficiency. However, to improve quality, challenges related to integration, security and effective communication must be overcome.

However, the study's findings only serve as a starting point for further investigation into the level of acceptance of digital public services. In this regard, the completion of a bibliometric study and the analysis of specialist literature—whose findings will complement those of this research—are pursued as future directions.

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Corresponding author:
Andreea BARBU, Lecturer, Ph.D
Full address: Bucharest, Romania
Email: barbu.andreeab@yahoo.com