

E-government Divide – Case Study Serbia

Stefan Radojičić

*Faculty of Organisational Sciences
University of Belgrade
Belgrade, Serbia
mcsradojicic@gmail.com*

Nebojša Dragović

*Ministry of Interior
Republic of Serbia
Belgrade, Serbia
nebojsa.dragovic74@icloud.com*

Dejana Kresović

*Securities Commission
Republic of Serbia
Belgrade, Serbia
dejana.kresovic@sec.gov.rs*

Aleksandar Krstić

*Ministry of Interior
Republic of Serbia
Belgrade, Serbia
krsticaleksandar@ymail.com*

Željko Bolbotinović

*Tekijanka d.o.o.
Kladovo, Serbia
zeljko@tekijanka.com*

Dragan Vukmirović

*Faculty of Organisational Sciences
University of Belgrade
Belgrade, Serbia
dragan.vukmirovic@fon.bg.ac.rs*

Abstract—The paper investigates the phenomenon of the e-government divide, which is assumed to present one of the main obstacles for the further development of digital services, and public administration in general. The results of quantitative and qualitative research indicated that it is necessary to redefine the methodological framework for measuring and monitoring both the digital divide in general and the e-government divide. Emphasis was placed on digital skills, which were found to represent one of the main factors of e-government inclusion. A methodological approach based on the definition of gap levels, with corresponding indicator is proposed. This solution is analyzed through a case study: e-government divide in the Republic of Serbia. The indicators defined in this way are given and their base values calculated for 2022.

Keywords - e-government divide, digital skills, indicators

I. INTRODUCTION

There are at least four factors determining the success of implementation of e-government: political, technological, organizational and social factors [1]. The focus of this paper is researching the social factors that are associated with the skills of the public on new technologies in order to reduce the e-government gap and increase digital inclusion, in general. Digital inclusion is the process of bringing the knowledge and use of information communication technology (ICT) closer to those who do not already have it, thus, bridging the digital divide [2].

The digital divide has long been established in the literature as complex phenomenon with social, political, economic, technological, and educational dimensions [3]. The digital divide (gap or digital inequality) has been defined in three different ways [4]:

- inequality of opportunities in technological access and connectivity to devices and networks, the internet on first place;
- illiteracy in computer skills to use technology among those who have access; and

- lack of the necessary digital competences for doing things and creating with ICT in complex situations such as education, business and e-commerce.

According to some scholars, digital literacy and digital skills are not synonyms. They state that digital literacy is a broader concept that implies digital skills and the ability to understand, evaluate and reuse information [5]. However, after secondary research, it can be concluded that this difference is increasingly erased, in benefit of digital skills [6].

The e-government divide is a gap between those who use and don't use e-government services, regardless of whether they have or do not have access to these services. It is indisputable that e-government requires citizens to be digitally literate, with a certain level of digital skills.

The subject of research in this paper is the analysis of the methodological concept and practical implications of the e-government divide, through a case study (CS) of the Republic of Serbia (RS) in order to reduce this divide. It starts from policy analysis, to specific definitions of indicators for monitoring set goals. The paper presents the results of research that indicate the main factors of the e-government divide in Serbia and the shortcomings in the existing indicators for their monitoring, which must be in focus of policymakers. Also, the conclusions give a set of recommendations for their improvement.

II. METHODOLOGY

Research and analysis of the available literature and other documentary sources in which the synthesis of the results is the basic methodological procedure applied in this paper.

The main research are:

- Usage of ICT in the RS, 2022, Households/Individuals as quantitative secondary research [7], and

- Online focus groups, as qualitative research.

The results of survey on ICT usage were conducted as CATI survey on a representative sample of 2.800 households/individuals on the territory of the Republic of Serbia (excluding Kosovo). The reference period was January 2022 (the three months preceding the telephone interview) and selected question were referred to the entire previous year (2021). The response rate was 90.6% (2.537 individuals). The basic methodological notes are shown in Figure 1. Statistical Office of the Republic of Serbia (SORS) conduct this survey based on EUROSTAT methodology, every year, from 2005.

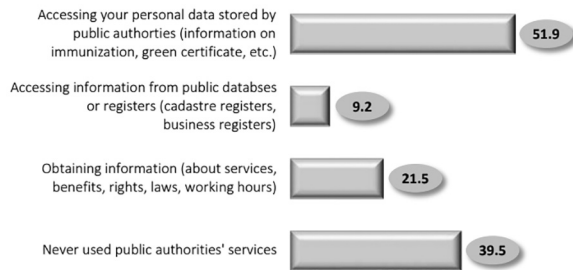


Fig. 1. Methodological frame of survey on ICT usage in RS [7]

The basic definitions are:

- Online population: The percentage of population aged between 16 and 74 who have used the Internet in the last three months, and
- Offline population: Percent of population aged between 16 and 74 who have not used the Internet in the last three months.

To further clarify the results obtained from quantitative research, two online focus groups were conducted. The following variables were controlled based on the disaggregation variables in the quantitative research:

- Age,
- Sex,
- Educational level, and
- Employment situation.

Twenty respondents were divided into two groups of 10 participants each:

- e-government non-users, representing the online population who have never used digital public authorities' services (experimental group), and
- e-government users (control group).

The research was conducted separately for both groups, with the same moderator, lasting 90 minutes, on April 14, 2023, under the Microsoft Teams meeting platform.

III. RESULTS

E-government services can be categorized as either informational or transactional [Nadal]. The level of necessary skills and literacy of users also depends on the cat-

egory of use.

- **Informational services** are characteristic of advertising space models (billboard stage) in which the institution's website is perceived only as a static mechanism for displaying information. Practically no form of communication is established, as citizens are passive observers
- With **transactional services**, interaction is established, as one-way and two-way communication between the government and the users. Transactional services require much more digital skills and presents one of the main challenges in using e-government and increasing of e-the government divide.

The e-government divide is directly connected with the digital divide in general, which represents a gap in the possibility and ability to use public authorities' services, on different levels, measured by various indicators.

The e-government divide has been defined at different levels:

- **Access gap**, which is a consequence of inequality in opportunities of technological access and internet connectivity. This divide stratifies the general population into the online and offline population.
- **E-government gap**, which is a divide within the online population between those who use and those who do not use e-government services. This divide stratifies the online population into e-government users and non-users

Inequality among e-government users also exists:

- **E-government skills gap**, which is a consequence of computer illiteracy and lack of ICT skills among those who have access. This divide stratifies e-government users into the "basic" and "above basic skills" categories.
- **E-government digital competence gap**, which is a consequence of the lack of necessary digital competences to achieve beneficial outcomes in various complex processes such as education, business (including e-commerce and e-government). This divide stratifies e-government users into those who only use informational services and those who use transactional services as well.

Based on the research results, a third category is added to this classification:

- **E-government subjective divide gap**, as a consequence of subjective reasons for not using public digital authorities' services. The assumption that this category includes e-government users with "basic skills" is confirmed in conclusions from online focus groups (Case study: RS).

In order to reduce the e-government divide, which also implies reduction each of the aforementioned gaps, it is necessary to define a strategic and methodological framework with indicators for monitoring.

At the EU level, in 2014, the Digital Skills Indicator (DSI) was defined as a composite indicator based on selected activities related to internet or software use those individuals aged 16-74 perform in five specific areas (Information and data literacy, Communication and collaboration, Digital content creation, Safety, and Problem solv-

ing) [8]. It is assumed that individuals who have performed certain activities possess the corresponding skills.

Based on the variety of activities performed, two levels of skills ("basic" and "above basic") are computed for each of the five areas. Finally, an overall digital skills indicator is calculated based on the component indicators for each area, serving as a proxy for the digital skills of individuals. The overall indicator includes categories such as "no skills", "limited", "narrow", "low", "basic", "above basic", or "at least basic skills" [9].

DSI implementations:

- DSI is used as an indicator for monitoring the Digital Decade, a strategic document that sets concrete targets for 2030 in four key areas: skills, infrastructures, digital transformation of businesses, and public services. Therefore, skills and public authorities' services are interconnected in the digital transformation package, accompanied by infrastructures [9].
- DSI is used as an indicator for monitoring the Digital Compass, an action plan that includes the target of ensuring that at least 80% of citizens (identified as the share of individuals aged 16-74) have at least basic digital skills by 2030 [10].
- DSI is used for constructing the DESI Index (the Digital Economy and Society Index), which monitors the annual progress of EU Member States in the digital domain. This report includes country profiles that help Member States identify areas for priority action, along with thematic chapters providing EU-level analysis in four main policy areas [11]. [11].
- DSI also monitors the implementation of the European Skills Agenda, which aims to achieve a target of 70% of adults aged 16-74 having at least basic digital skills by 2025 [8].
- Finally, DSI supports the implementation of the Sustainable Development Goals [12].

DSI has been revamped in its second edition, DSI 2.0, introduced in 2022. The Digital Skills Indicator 2.0 (DSI 2.0) categorizes digital skill levels as Basic, Intermediate, Advanced, and Digital Expert [6].

Based on the above, it can be concluded that the EU has a well-established methodological framework for monitoring digital skills. DSI 2.0 is accompanied by a revamped methodological framework based on the European Commission's Digital Competence Framework (DigComp) and its second edition [13].

IV. CASE STUDY: E-GOVERNMENT DIVIDE IN RS

A. National strategic framework

The national strategic framework for digital skills in RS is the Strategy for development of digital skills in the Republic of Serbia (Strategy) for the period from 2020 to

2024 [14]. The Strategy is based on the Digital Agenda for RS, which includes the Strategy for the Development of the Information Society in RS until 2020 and the Strategy for the Development of Electronic Communications in RS from 2010 to 2020. Since the Strategy aligns with the European framework DigComp 2.0, it does not contain the same indicators as DSI. Therefore, DSI cannot be directly applied to monitor the e-government divide in RS, as its target audience is primarily ICT professionals and other digital experts. Furthermore, there are no DSI results available for RS.

The general goal of the Strategy is to improve the digital knowledge and skills of all citizens, including members of sensitive social groups [15]. Among the four specific goals of the Strategy, specific goal 2, "Improvement of basic and advanced digital skills for all citizens," is primarily focused on enhancing digital literacy. An indicator has been defined at the level of this specific goal: the share of citizens aged 16-74 who have never used a computer (total).

The Strategy does not include a single indicator specifically for monitoring the e-government divide, despite stating in the text of the Strategy that "Divisions based on gender, age, and other personal characteristics in ICT have led to less inclusion in this field for women, persons with disabilities, the elderly, and other marginalized groups" [14].

At the general objective level, the indicator is the share of computer users aged 16-74 (total). Although disaggregated data exist in the reports of the Statistical Office of the Republic of Serbia (RSO) that pertain to the basic demographic factors of the e-government divide, they are not specifically mentioned in the targets, even though the Strategy text states that "the collected data should be disaggregated by age, gender, disability, and other characteristics that define the target population" [15]. The source for verification is the Annual reports of the RSO "Use of Information and Communication Technologies in the Republic of Serbia."

Other strategic documents and plans also do not address the issue of the e-government divide. For instance, the general goal of the e-Government Development Programme of the Republic of Serbia 2020-2022 focused on "the development of an efficient and user-oriented administration in a digital environment," with one of the specific goals being to increase the accessibility of e-government to citizens and businesses through the enhancement of user services and the availability of data in public administration [16]. Consequently, the emphasis is placed on the further development of services, registers, and records, as well as the improvement of functionality and design of the e-Government Portal, rather than on their utilization by all citizens.

In line with the above, no specific indicator is provided for monitoring the e-government divide.

B. E-government divide indicators

Based on the analysis of scientific literature and professional studies, the simplest indicators for measurement, derived from the results of quantitative research [7], have been defined with their respective values (Figure 2).

- **Access gap:** stratification of the general population into online and offline population. The percentage of the offline population in RS, aged between 16 and 74, who have not used the Internet in the last three months: 16.5%.
- **E-government gap:** stratification of the online population into e-government users and non-users. The percentage of e-government non-users in RS: 39.5%.
 - **E-government skills gap:** among e-government non-users, this gap is attributed to lack of skills, which includes not knowing how to use the website or finding it too complicated, as well as relying on another person to perform tasks on their behalf. The percentage for this skills gap is calculated as 5.2% (lack of skills) + 9.5% (another person did it on my behalf), resulting in a total of 14.7%.
 - **E-government digital competence divide:** the percentage of e-government non-users who have requested official documents or certificates, requested benefits or entitlements, or made other requests or complaints is 10.7%.
- **E-government subjective divide:** this divide is determined by factors such as not needing to request any documents or submit any requests, as well as concerns about security or personal data, and unwillingness to pay online due to credit card fraud. The percentages for this subjective divide are calculated as 63.0% (no need to request any documents or submit requests) + 2.4% (concerns about security or personal data), resulting in a total of 65.4%.

Population: individuals aged between 16 and 74			
100%		E-government population 60.5%	
Access divide	Online population 83.5%	E-government divide 39.5%	
		• E-government skills divide	
Offline population 16.5%		No informational users - Lack of skills -	14.7%
		• E-government digital competence divide	
		Digital competent population	10.7%
		• E-government subjective divide	
		No transactional users - No needs -	65.4%

Fig. 2. Methodological frame of survey on ICT usage in RS

The results presented in Figure 2 are provided at the highest level of aggregation without variables for disaggregation, such as age, sex, educational level, and employment situation. However, complete results of disaggregation can be found in the report [7]. For instance, the

structure of e-government non-users disaggregated by age and sex is presented in Table 1.

Table 1. E-government non-users, disaggregated [7]

Age					Sex	
16-24	25-34	45-54	55-64	65-74	Men	Women
41.9	30.7	43.6	40.2	53.0	37.6	41.4

In this table, a noticeable difference in age among e-government non-users can be observed, and this difference is statistically significant. While it was expected that the younger population would use e-government services more, the extent of the digital divide between men and women is unexpectedly large.

It is important to note that the choice of indicators for measuring the e-government divide can significantly influence the overall understanding of the situation. For instance, if the indicators are based on the definitions provided in Figure 3, the values for the e-government skills gap and digital competence divide may differ significantly from the values shown in Figure 2.

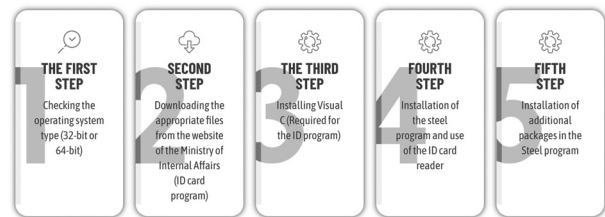


Fig. 3. Use of e-government services among the online population in the last twelve months in RS [7]

Already on the basis of this simple example an important conclusion can be drawn: it is important to precisely create/choose a methodology, which implies an unambiguous definition of indicators and monitoring their dynamics over time.

In order to clarify research doubts related to the E-government divide in Serbia in more detail, online focus groups are conducted.

C. Clarification of the e-government subjective divide

A similar situation as in developed countries, where the impact of the access divide is diminishing and digital skills and competencies are becoming crucial factors in these disparities, is also expected in RS. Despite many citizens having internet access, it does not automatically translate into a high adoption of e-government services. Research indicates that certain e-government initiatives fail to attract a significant portion of the population [2].

After conducting online focus groups research, two key findings emerged regarding the e-government subjective divide:

- Insufficient knowledge of available services

- Complexity in use.

Both user and non-user groups expressed a lack of awareness about the available services, although it was expected to be more prevalent among non-users. This is often cited as the main reason for not utilizing public authorities' services, which is a common response from both groups. However, when the moderator reminded the focus group participants about specific services, their interest would be piqued, and the basic obstacle hindering their usage—the complexity of use—would be mentioned.

To determine whether the difficulty lies in complex usage or a lack of basic ICT skills, an experiment was conducted. The installation process of the ČELIK application (electronic ID card reader), which is used for obtaining certificates for electronic signing (an example of transactional services), was demonstrated.

The moderator showcased the installation procedure, which consists of five steps (Figure 4). Despite the website claiming that the installation is simple, the participants did not find it to be so. One prerequisite for the installation is to have a smart card reader.

📅 Survey period	<ul style="list-style-type: none"> • The survey was carried out from 15 February to 28 February 2022
📞 Type of survey	<ul style="list-style-type: none"> • Telephone interview
👤 Sample size	<ul style="list-style-type: none"> • 2 800 households • 2 800 individuals
👥 Target population	<ul style="list-style-type: none"> • For households: target population is made of all households with at least one member aged between 16 and 17 • For individuals: target population is made of all individuals aged between 16 and 74
👤 Type of sample	<ul style="list-style-type: none"> • Two-stage, stratified sample
📍 Geographic scope	<ul style="list-style-type: none"> • Territory of the Republic of Serbia (without AP Kosovo and Metohia)

Fig. 4. Steps in the Installation of steel program [17]

It is emphasized as an important requirement during the installation process:

The most important thing when installing the new version of the ID reader software is that you now need to install:

1. **two VISUAL C packages**, not just one as before
2. **application Steel**, version 1.3.4.0
3. **two additions to the program** that did not exist before
 - one is for reading ID cards issued before August 18, 2014. (RSIDCardMW), and others – for reading identity cards issued after 18.08.2014. (TrustEdge)

Finally, on the web portal of the Ministry of Interior of the Republic of Serbia, it is stated [18]:

"In the event that Čelik+ cannot be installed, certain system libraries are probably missing, so it is necessary to install Microsoft Visual C++ 2008 SP1 Redistributable Package (x86) (zip format, 4MB)"

Although the complete instructions for installation are

written in the Serbian language, participants from both groups expressed personal frustration with the installation process. Even four participants from the control group, who were already using the Čelik application, confirmed that they encountered difficulties during installation. Only one participant managed to install the application on their own, while the other three required assistance. One user was unable to install the app and gave up using it, while another had to switch to a different device because the app didn't work on the first one. These observations are noteworthy considering that the control group participants were experienced computer users and belonged to the "above basic skills" category of e-government users.

The following conclusions can be drawn:

1. Digital literacy and digital skills can be considered as indicators for the e-government divide in general, but e-government services need to be more accessible and user-friendly.
2. In order to address the e-government subjective divide gap, which arises from subjective reasons for not using public digital authorities' services, a similar approach as that used for the online population with basic skills can be employed.

It's important to note that these results are based on qualitative research conducted with focus groups and may not be representative, but they provide insights and potential conclusions.

V. CONCLUSION AND RECOMMENDATIONS

A. Conclusion

The paper's title suggests that the author considers the digital divide as a significant barrier to the further development of e-government in RS. Therefore, policymakers need to prioritize addressing this issue by implementing appropriate state policies [3].

Through an analysis of the literature and other secondary sources, including empirical studies, it is evident that the field of e-government in RS is well-covered in both professional and scientific papers. Additionally, it is organized through the government's strategic documents such as strategies and plans.

However, the same cannot be said for the phenomenon of the digital divide, especially in terms of the indicators required for its monitoring as an integral part of action plans. The findings of the presented research support the need to redefine the methodology for defining, identifying, reducing the digital gap, and improving the existing indicators for monitoring the e-government divide in RS.

As a contribution to this area, the research proposes a redefinition of the e-government divide by stratifying the online population into e-government users and non-users based on their digital literacy and skill level, including the

e-government subjective divide gap category. The proposed methodological changes are illustrated through the case study of RS.

B. Recommendations

To address the basic challenges in the use of public authorities' services and reduce the e-government divide in Serbia, several activities are necessary:

- Improvement of the methodology and identification of appropriate indicators for effectively reducing the e-government divide.
- Promoting awareness and knowledge of available e-government services among citizens to overcome the barrier of insufficient knowledge.
- Simplifying the process and enhancing the usability of e-government services to alleviate complications faced by users.
- Providing training and support programs to enhance digital skills and competencies among citizens, enabling them to effectively utilize e-government services.

Future research efforts should focus on exploring the category of e-government subjective divide gap, which stems from subjective reasons for not using public digital authorities' services. The hypothesis for such research could be that this category primarily comprises an online population lacking "basic skills."

It is important to develop separate frameworks for digital skills and competencies tailored to the public sector, companies, and citizens to address their specific needs and requirements.

By implementing these measures and conducting further research, it is possible to make significant progress in reducing the e-government divide and enhancing the accessibility and utilization of public digital services in Serbia.

REFERENCES

- [1] V. Weerakkody, Z. Irani, K. Kapoor, U. Sivarajah and Y.K. Dwivedi, "Open data and its usability: an empirical view from the Citizen's perspective", *Information Systems Frontiers*, 19(2), 2017 285–300. <https://doi.org/10.1007/s10796-016-9679-1>
- [2] T. M. Nadal and M. A. Esteban-Navarro, Digital Competences for Improving Digital Inclusion in E-Government Services: A Mixed-Methods Systematic Review Protocol, *International Journal of Qualitative Methods*, Volume21:1–9 2022. <https://journals.sagepub.com/doi/full/10.1177/160940692111070935>
- [3] Z. Kovacic, and D. Vukmirovic, "ICT adoption and the digital divide in Serbia: Factors and policy implications", *Informing Science + Information Technology Education*, Joint Conference, Varna, Bulgaria, 2006, DOI: 10.28945/3247
- [4] M.A. Esteban-Navarro, M.A. García-Madurga, T. Morte-Nadal and A.I. Nogales-Bocio, "The rural digital divide in the face of the covid-19 pandemic in Europe-recommendations from a scoping review", *Informatics*, 7(4), 1–18. 2020, <https://doi.org/10.3390/informatics7040054>
- [5] A. Bradić-Martinović and J. Banović, "Assessment of Digital Skills in Serbia with Focus on Gender Gap", *Journal of Women's Entrepreneurship and Education* No 1-2 (2018), <https://doi.org/10.28934/jwee18.12.pp54-67>
- [6] R. Vuorikari, N. Jerzak, Z. Karpinski, A. Pokropek and J. Tudek, "Measuring Digital Skills across the EU: Digital Skills Indicator 2.0", Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-55856-9, doi:10.2760/897803, JRC130341.
- [7] SORS, "Usage of information and communication technologies in the Republic of Serbia". Statistical Office of the Republic of Serbia, 2022.
- [8] DSI, "Digital Skills Indicator – derived from Eurostat survey on ICT usage by Individuals" Methodological note – 2015, https://eufordigital.eu/wp-content/uploads/2019/10/Digital-Skills-Indicator-survey-on-ICT-usage-by-Individuals_Methodological.pdf
- [9] Eurostat "Individuals' level of digital skills (from 2021 onwards)", ESMS Indicator Profile (ESMS-IP), Compiling agency: Eurostat, the Statistical Office of the European Union.
- [10] EU 2030 Digital Compass: the European Way for the Digital Decade, Resolutions and Declarations, European Commission, 2021, <https://dig.watch/resource/the-digital-compass>
- [11] DESI Digital infrastructures, European Commission, 2023, <https://digital-strategy.ec.europa.eu/en/policies/desi>
- [12] T. Yenni, L. Cui, and Z. Sheng. "Digital resilience: How rural communities leapfrogged into sustainable development." *Information Systems Journal* 31, no. 2 (2021): 323-345.
- [13] G. Valentinova Misheva, "Digital Skills Indicator 2.0: Measuring Digital Skills across the EU", Digital skills & Jobs platforms, European Commission, 2022, <https://digital-skills-jobs.europa.eu/en/inspiration/resources/digital-skills-indicator-20-measuring-digital-skills-across-eu>,
- [14] D. Kresović, R. Popovac, S. Radojčić, N. Stanojević, D. Vukmirović and A. Krstić "Digitally literate population as the basis of e-government development - the example of the Republic of Serbia", 28. YU INFO 2023 Conference. Unpublished
- [15] Strategy (2020). Strategy for the development of digital skills in the Republic of Serbia for the period from 2020 to 2024. "Official Gazette of RS", no. 21 of March 6, 2020
- [16] The e-Government Development Programme of the Republic of Serbia 2020–2022 (hereinafter: the Programme) <https://www.srbija.gov.rs/dokument/45678/strategije-programi-planovi-.php>
- [17] Kako instalirati čitač lične karte? Celik MUP - jednostavna instalacija. Čelik verzija 1.3.8.2 Citaci.kartica.rs, JAN 2023, <https://citaci.kartica.rs/instalacija-celik-programa-za-citac-licne-karte/>
- [18] Ministry of Interior of the Republic of Serbia, Electronic ID card reader, Official web site of the Ministry of the Interior. <http://www.mup.gov.rs/wps/portal/sr/gradjani/dokumenta/>