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Measuring the Quality and Performance of E-Government Services

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ABSTRACT:
E-government plays a pivotal role in modernizing public administration by enhancing the efficiency, transparency, and overall quality of public services. In this context, evaluating the quality of e-government services is crucial for gauging user satisfaction and informing policies aimed at digital transformation. This study focuses on examining the key dimensions of e-government service quality, including accessibility, reliability, information security, interoperability, and citizen-centric design. The research methodology combines a review of specialized literature, an analysis of relevant regulatory frameworks, and a comparative assessment of selected e-government platforms. Findings reveal that service quality is strongly shaped by institutional capabilities, the digital literacy of users, and the extent of integration across public information systems. The study concludes by highlighting the importance of a comprehensive, user-focused approach to foster continuous improvement in e-services and to strengthen public trust in governmental institutions.

Keywords: e-government, service quality, public administration, digital transformation, accessibility

1. Introduction

The world is experiencing a profound transformation driven by advances in information and communication technology, fundamentally reshaping the interactions and operations of the economy, citizens, and public administration (Al-Kuwari, 2024; Burlacu et al., 2022; Burlacu et al., 2024). At the European level, it is widely acknowledged that integrating ICT into public services can play a crucial role in achieving the Lisbon Strategy goal of making Europe the most dynamic and competitive knowledge-based society. This includes enhancing citizens' quality of life, strengthening the single market, and alleviating administrative burdens on businesses (Al Dhaheri, 2021).

Consequently, initiatives are underway to maximize the long-term benefits of e-government services already deployed across Member States (Alshehri et al., 2012). The adoption of ICT in public administration holds substantial potential to boost the efficiency and effectiveness of the public sector, both in delivering citizen-centered services and in optimizing internal administrative processes (Al-Nidawi et al., 2018; Burlacu et al., 2023).

Moreover, the adoption of digital solutions allows administrations to become more transparent, reduce bureaucracy and ensure faster and more direct communication with citizens. In addition, these technologies facilitate the collection and analysis of data, providing the basis for informed decision-making and for the implementation of more

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efficient public policies that are more adapted to the needs of communities. Digital transformation is not just a simple modernization tool, but an essential strategy for sustainable development, increasing economic competitiveness and strengthening public trust in state institutions (Alshammari et al., 2025; Rădulescu et al., 2023; Rădulescu et al., 2025).

2. The situation of e-government in Romania

The key element of the e-government concept is to improve the relationship and streamline the exchange of information between the public sector, on the one hand, and citizens and the business environment, on the other.

In other words, e-government means providing public services in electronic format for citizens and the business environment, a more efficient and cheaper alternative, which allows the government to be closer to citizens and adapt its services according to their requirements.

To implement the e-government concept, a country must have adequate infrastructures of data systems, institutional and technological, a compatible legislative framework, properly trained human resources and, last but not least, strategic thinking and coordination (Fan & Yang, 2015; Burlacu et al., 2022; Burlacu et al., 2024).

Functioning as a multi-channel communication system between government, citizens, the business environment and service providers, e-government services allow administrative bodies to ensure increased access to information, centralize and integrate data and applications, streamline the decision-making process in public activity, increase revenues and reduce costs (Ighomereho et al., 2022; Nica et al., 2023).

E-government does not only mean transposing public services into an online format; it implies a fundamental change in the way these services are delivered and managed. For the successful implementation of e-government, it is necessary to define a coherent application architecture and a predefined set of generic services and tools for the development, implementation and subsequent management of applications (Fan & Yang, 2015).

This architecture must be constantly updated to ensure correspondence with user requirements and with new emerging technologies. In this context, from the set of electronic services provided at the level of central and local public administration, EU Member States have identified 20 services as basic – of which 12 are intended for citizens and 8 for the business environment. The establishment of "basic" services was carried out based on two criteria: the revenues generated by these services to the state budget and local budgets and, respectively, the frequency of interaction between the providing institution and citizens or the business environment (Ighomereho et al., 2022)

Table 1. Basic public services

Services for citizens	Services for the business environment
Payment of taxes and fees for citizens	Payment of social security contributions
Searching for jobs through job centers	Declarations and payment of taxes
Help through social services	Declarations and payment of VAT

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Personal papers	New company registrations
Car registrations	Providing data for statistics
Building permits	Customs declarations
Requests and complaints to the police	Environmental permits, including reporting
Access to public libraries	Public procurement
Requesting and obtaining certificates	-
Enrollment in universities	-
Notification of change of home address	-
Health related services	-

Source: author

Romania has made significant efforts in the last decade to create a framework conducive to the development of e-government. The National Electronic System (SEN) was launched in September 2003 and is available on the Internet through the portal www.e-guvernare.ro, as a single access point for public information and services.

This portal allows the free download of over 210 administrative forms, offering citizens and businesses online electronic services. SEN was awarded the "best digital content" award in the e-Government section, within the World Summit for the Information Society.

The rapid development of the infrastructure has made it possible for the Romanian Government to provide a series of interactive and transactional services, such as the Virtual Payment Counter, the Electronic System for Payment of Local Taxes and Duties, the Electronic Public Procurement System, the Electronic System for Attributing International Freight Transport Authorizations, the Electronic System for Collecting Statistical Data and others. In parallel, legislation on personal data protection, electronic signature, electronic commerce and cybercrime are some examples of laws adopted, compatible with European legislation (Papadomichelaki & Mentzas, 2012; Rădulescu et al., 2022).

According to a study conducted by the United Nations in 2023 (Papadomichelaki & Mentzas, 2012), Romania was among the countries with medium development of e-government, with a usage rate of 41%. This highlights the need for Romania to persistently promote and facilitate the adoption of e-government services among both citizens and businesses.

3. Excellence of digital public services

A public institution can make meaningful progress in implementing e-government services only if it comprehends users' attitudes and behaviours toward these services. Therefore, the concept of e-government service quality should be considered a fundamental aspect of this domain. Focusing on service quality is a key component of public administration reform, and assessing it is essential to determine whether these services achieve their intended objectives (Lee & Lin, 2005). Such evaluation allows for the identification of both strengths and weaknesses, providing a basis for improving service delivery. Moreover, a thorough assessment can inform the development of effective strategies to enhance and optimize e-government services (Lee & Lin, 2005;

Burlacu et al., 2023; Burlacu et al., 2024). The study of e-government service quality is still relatively new, with research in the field typically examining both user satisfaction and the quality of the online platforms themselves (Mensah, 2019).

User satisfaction is the central variable of the model, and the cause-effect nature of these methodologies allows analyzing the impact of a certain variable on overall satisfaction. The American Customer Satisfaction Index for E-government (ACSI – E-government) uses two methods to measure and analyse user satisfaction: questionnaires and econometric modelling. Quarterly, 80,000 Americans are interviewed about the electronic services used, and 90 government websites are evaluated. Thus, the ACSI index identifies the main factors that determine user satisfaction and quantifies the relationship between them and overall satisfaction, based on the answers provided in specific questionnaires (Mensah, 2019; Nica et al., 2023).

Another similar index is the Korean eg-CSI (Qekaj-Thaçi & Thaçi, 2023), but in this index the qualitative aspects analysed refer to information, processes and services. The Western Norway Research Institute uses a model with 25 quality indicators and criteria for evaluating the websites of public institutions in Norway (Sá, Rocha & Cota, 2014). An interesting feature of this method is that the evaluation is not carried out by users or administrators, but by experts in the field. The European Top of the Web approach (e-Government Unit, DG Information Society, European Commission, 2004) focuses on the benefits obtained by users (Sá et al., 2014; Bran et al., 2023).

User satisfaction and perceived quality are measured by combining aspects related to usability (whether the user encountered problems using the service), benefits obtained (time savings, flexibility, etc.) and overall evaluation (whether the customer's expectations were met or not).

Another approach, E-government in Thai, was used to evaluate e-government websites in Thailand (Sukasame, 2004). This method is based on the analysis of factors such as reliability, inter-page links and ease of use, which influence the way e-government services are delivered. Studies also conducted in Romania in the field of e-government (Sá, Rocha & Pérez Cota, 2016) have highlighted the quality of e-government services as an important factor in their adoption and in increasing user trust (Sá et al., 2016; Burlacu et al., 2023).

To evaluate e-government services, we used a fuzzy approach, based on the model presented in Figure 1. Data were collected through a 10-question questionnaire, structured in such a way as to evaluate the quality of e-government services from the perspective of four categories of criteria: usability, reliability, functionality and service efficiency (Scott, DeLone & Golden, 2016). Linguistic variables from "very low" to "very high", on a five-point scale, were used to determine user satisfaction with each of the 10 analysed criteria, in assessing the quality of e-government services offered by the Bucharest City Halls, both municipal and sectoral.

The questionnaire was distributed to 150 citizens or organizations, and the response rate was 47 questionnaires completed correctly. The results were evaluated by processing the responses obtained. At the beginning of the questionnaire, each respondent was asked to establish, on a scale of 1–100, the domain associated with the linguistic variables, its structure being presented in Table 2. The next step consisted in determining

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the fuzzy set for each linguistic variable. Triangular fuzzy sets were used, due to their frequent applicability in practice (Wijatmoko, 2020; Rădulescu et al., 2025).

Triangular fuzzy sets A(L, M, U) represent a special type of fuzzy sets with three parameters, each associated with a linguistic variable, expressing a degree of membership between 0 and 1. The membership function μA(x) for a triangular fuzzy set is defined according to Lee.

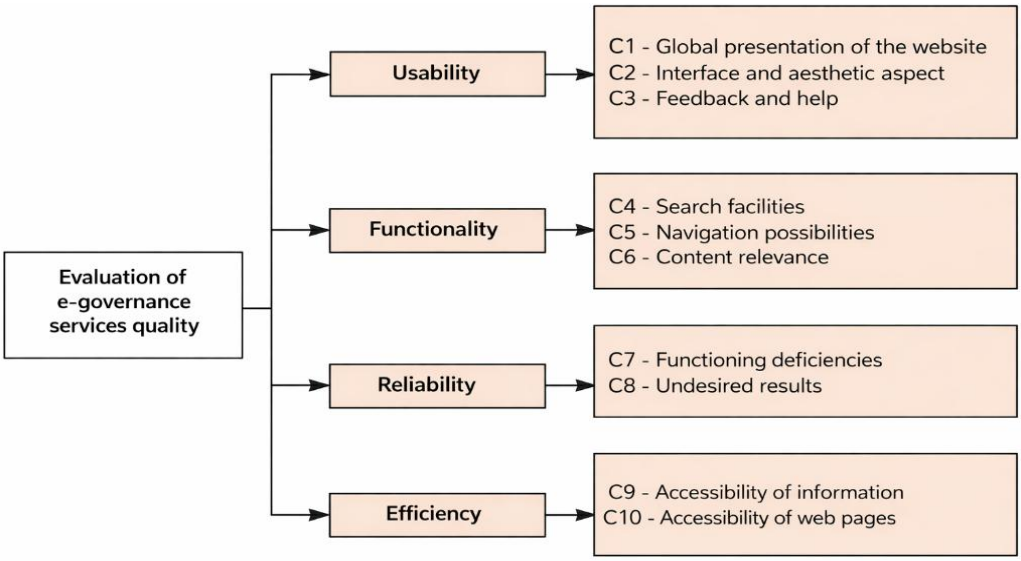

Figure 1. E-government service quality model
Source: author

where L and U represent the minimum and maximum values for the fuzzy set A, and M is the modal value, calculated as M = (L + U)/2. For example, for the linguistic variable "Very low" (FS), the values L, U and M are calculated according to Table 3. Based on the responses of the surveyed people, each linguistic term was characterized by a triangular fuzzy set, presented in Table 3.

Table 2. Triangular fuzzy sets (FT) associated with linguistic variables

Linguistic term	Symbol	FT
Very low	VL	(0,7.25, 25)
Low	L	(5,22.4, 40)
Medium	M	(25,44.5,65)
High	H	(45,70.15,90)
Very high	VH	(60,85.2,100)

Source: author

In the next step, the weights of the evaluation criteria were determined using the Analytic Hierarchy Process (AHP). Let c_{ij} denote the relative importance of criterion i compared with criterion j, for a set of n evaluation criteria. Pairwise comparisons between

criteria were performed using the fundamental Saaty scale presented in Table 4. These comparisons generate an $n \times n$pairwise comparison matrix $C = [c_{ij}]$, defined as:

$$C = \begin{bmatrix} c_{11} & c_{12} & \cdots & c_{1n} \\ c_{21} & c_{22} & \cdots & c_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ c_{n1} & c_{n2} & \cdots & c_{nn} \end{bmatrix}$$

where $c_{ii} = 1$, $c_{ji} = 1/c_{ij}$, and $c_{ij} > 0$.

The matrix is then normalized by dividing each element by the sum of its corresponding column:

$$\tilde{c}_{ij} = \frac{c_{ij}}{\sum_{i=1}^{n} c_{ij}}.$$

Finally, the weight of each criterion is obtained as the arithmetic mean of the normalized values in each row:

$$w_i = \frac{1}{n} \sum_{j=1}^{n} \tilde{c}_{ij},$$

where $w_i$represents the priority weight assigned to criterion i.

The presented algorithm is applied for each level of the criteria tree. Based on this algorithm, the calculated value of the importance of each criterion is shown in Figure 1.

To evaluate the performance, each website was analysed based on the responses obtained from the questionnaires. Each criterion was evaluated using five linguistic variables: "very low", "low", "average", "high" and "very high".

These linguistic variables were converted into triangular fuzzy numbers, according to Table 4, resulting in a fuzzy matrix of the performances E. The results of the evaluations are presented in Table 2.

In the next step, the fuzzy numbers resulting from the criteria evaluations were integrated with the importance coefficients calculated for each criterion. If W represents the vector of the importance of the criteria, then the fuzzy value of the sites can be calculated by the formula R = E * W.

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Table 3. Fuzzy numbers resulting from criteria evaluations

Criteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	R
Bucharest City Hall	(39.5, 60.3 82.4)	(53.5, 75.3, 95.2)	(17.5, 28.4, 60.3)	(58.6, 84.2, 95.3)	(73.1, 84.3, 95.2)	(64.8, 85.7, 94.7)	(49.2, 72.9, 83.9)	(50.4, 67.5, 83.9)	(35.9, 58.8, 74.5)	(59.9, 82.3, 97.3)	(29.5, 40.44, 51.4)
Sector 1 City Hall	(35.2, 59.6 81.2)	(58.2, 82.3, 97.1)	(23.5, 32.7, 55.2)	(59.8, 80.7, 93.8)	(52.1, 65.4, 72.4)	(62.1, 83.2, 87.5)	(43.3, 73.4, 87.5)	(34.1, 43.8, 59.6)	(31.6, 54.3, 65.1)	(51.7, 77.2, 95.2)	(28.4, 39.4, 47.8)
Sector 2 City Hall	(15.7, 32.2, 55.8)	(41.1, 63.3, 85.2)	(12.4, 18.4, 41.8)	(35.2, 59.5, 71.1)	(70.3, 77.6, 80.4)	(55.7, 74.5, 80.2)	(54.3, 75.3, 92.1)	(12,6, 22.8, 35.5)	(23.7, 49.5, 68.9)	(38.2, 64.8, 79.8)	(22.4, 31.6, 40.6)
(Sector 3 City Hall	(12.3, 35.1, 59.3)	(14.7, 30.2, 48.2)	(9.2, 12.5, 35.3)	(58.7, 84.4, 94.2)	(59.5, 83.2, 79.5)	(65.3, 84.5, 91.8)	(47.8, 71.5, 83.4)	(8.2, 15.4, 28.2)	(33.8, 61.2, 78.8)	(45.2, 70.1, 88.7)	(22.2, 31.8, 40.7)
Sector 4 City Hall	(10.9, 28.4, 53.2)	(43.8, 70.8, 92.8)	(17.3, 21.5, 48.1)	(45.2, 64.5, 74.4)	(74.1, 81.7, 85.2)	(53.6, 73.2, 86.9)	(41.2, 69.2, 87.3)	(5.8, 20.4 33.7)	(32.2, 59.8, 71.2)	(47.1, 72.5, 86.5)	(23.7, 32.8, 43.4)
Sector 5 City Hall	(9.4, 27.7, 51.8)	(12.4, 27.4, 48.2)	(9.8, 15.3, 39.3)	(23.5 40.1, 54.8)	(44.5, 54.8, 59.7)	(43.4, 59.8, 72.2)	(34.1, 62.1, 77.5)	(22.7, 37.7, 54,4)	(15.4, 27.2, 39.4)	(19.7, 40.7, 59.1)	(14.6, 22.6, 33.1)
Sector 6 City Hall	(35.2, 58.4, 84.1)	(59.1, 81.3, 98.2)	(25.9, 33.8, 59.7)	(57.1, 75.4, 84.2)	(55.3, 70.9, 78.8)	(52.9, 68.3, 75.5)	(52.5, 74.2, 90.1)	(43.3, 58.1, 76.3)	(35.2, 62.3, 74.2)	(49.7, 79.4, 93.4)	(27.6, 37.2, 46.8)

Source: author

Following the evaluation, a ranking of the analysed websites was made. The results obtained represent a start in supporting the difficult process of creating high-performance websites that meet the quality requirements of the "ordinary visitor" to the highest possible degree.

4. Conclusion

The quality of e-government services is fundamental to the effective implementation and widespread adoption of digital public services. This research emphasizes that simply offering online services is not enough; users' perception of service quality plays a crucial role in determining their satisfaction, trust, and level of engagement. Important factors affecting e-government service quality include usability, reliability, functionality, and efficiency, all of which collectively influence the overall user experience (Burlacu et al., 2023; Rădulescu et al., 2023).

Through the use of robust evaluation techniques—such as fuzzy logic models integrated with the Analytic Hierarchy Process (AHP) for assigning criterion weights—it becomes possible to systematically evaluate service performance and pinpoint both strengths and areas for improvement.

Empirical evidence from international indices, such as the American Customer Satisfaction Index for E-government (ACSI-E) and other national models, as well as specific studies conducted in Romania, demonstrates that high-quality services foster greater citizen trust, encourage frequent usage, and support more transparent and responsive governance. Moreover, integrating user feedback into service design and continuously monitoring service performance are essential to align e-government offerings with citizen and business expectations.

The findings of this study also underline that e-government quality extends beyond technical infrastructure. Legal frameworks, organizational capacity, strategic planning, and multichannel communication mechanisms play a crucial role in ensuring that services are accessible, reliable, and efficient.

The use of multi-criteria decision-making and fuzzy evaluation approaches enables administrators to capture subjective assessments of quality while quantifying them for objective decision-making (Rădulescu et al., 2025).

Furthermore, enhancing the quality of e-government services has broader societal and economic implications. It reduces administrative costs, optimizes resource allocation, strengthens public accountability, and facilitates the digital transformation of government institutions (Nica et al., 2023; Burlacu et al., 2024). As technological innovations continue to evolve, integrating artificial intelligence, big data analytics, and machine learning into e-government platforms presents opportunities for predictive, adaptive, and more personalized services.

In conclusion, the continuous improvement of e-government service quality is fundamental for achieving a citizen-centric, efficient, and transparent public administration. Policymakers, administrators, and researchers should adopt an integrated approach that combines technical excellence, regulatory compliance, strategic planning, and active user engagement to maximize the benefits of e-government initiatives. This approach not only enhances user satisfaction but also contributes to sustainable development, economic competitiveness, and the overall modernization of public governance systems (Burlacu et al., 2022; Burlacu et al., 2024; Rădulescu et al., 2025).

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