

DIGITAL INCLUSION IN PUBLIC SERVICES: CHALLENGES, BARRIERS AND STRATEGIES FOR EQUITABLE DIGITAL ADMINISTRATION

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Abstract. *This paper analyses the phenomenon of digital inclusion in public services, starting from the observation that the accelerated digitalisation of public administrations risks deepening pre-existing social inequalities. Drawing on the framework of the digital divide with its three levels — access, skills and outcomes — it examines the technical, social and institutional barriers that hinder the equitable adoption of digital government services. The situations of the elderly, low-income individuals, rural populations and those with low levels of education are analysed. The research includes the European and Romanian contexts, highlighting Romania's persistent lag. The paper applies this framework in an original case study of the “Parking Oradea” platform of the Oradea City Hall, launched in February–March 2026 as a national first in the full digitalisation of residential parking, identifying structural tensions between transparency objectives and the principle of inclusion. The paper proposes a set of intervention strategies: tailored digital literacy programmes, public-private partnerships, user-centred design and hybrid service delivery models.*

Keywords: *digital inclusion, digital public services, e-government, digital divide, digital literacy, Parking Oradea.*

1. INTRODUCTION

The digital transformation of public administration is today one of the most far-reaching reconfigurations of the state-citizen relationship. The large-scale shift of public services to the online environment — from filing tax returns, to accessing medical services, obtaining identity documents or interacting with local authorities — promises a more efficient, transparent and responsive public sector. Nevertheless, this transition generates a major structural risk: leaving behind important segments of the population who lack the access, skills or trust needed to benefit from the new digital channels.

The concept of digital inclusion emerged precisely as a response to this dilemma. Pérez-Escolar and Canet (2022) explicitly prefer the term “digital inclusion” over “digital divide”, arguing that the former formulation “more accurately captures the phenomenon of ICT gaps” and moves beyond a dualistic interpretation by integrating the intersection of class, ethnicity, gender, religion and disability (Pérez-Escolar & Canet, 2022: 3). In the context of public services, the stakes of digital inclusion are amplified by an essential feature: public services are not optional in the same sense as commercial ones. When a public authority eliminates traditional channels, citizens can no longer opt for an alternative; the lack of access or digital skills translates directly into the loss of fundamental rights.

Recent European data show how heterogeneous the reality is: according to the 2024 State of the Digital Decade report, the EU average for the indicator “digital public services for citizens” is 79.4 points, with Malta (100), Estonia (95.8) and Luxembourg (94.7) at the

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top, and Croatia (67.1), Poland (64) and Romania (52.1) at the bottom (Morte-Nadal & Esteban-Navarro, 2025: 2). While 98.6% of internet users in Denmark have interacted online with the administration, in Romania the figure is only 24.6%.

The paper aims to synthesise current knowledge on digital inclusion in public services, identifying both the complexity of the phenomenon and the solutions proposed in the specialist literature. The specific objectives are: (1) to clarify the theoretical framework of digital inclusion and the digital divide in relation to public services; (2) to identify the main barriers — technical, social and institutional — that affect the adoption of digital services; (3) to analyse the situation of vulnerable groups (the elderly, persons with disabilities, rural and low-income populations); (4) to examine the European context, with an emphasis on the situation of Romania; (5) to carry out an applied case study of the “Parking Oradea” platform, as a concrete example of local digitalisation with a direct impact on citizens; (6) to synthesise public policy strategies for addressing the digital divide.

The paper contributes to the debate on digital equity by linking the theoretical literature on digital inclusion with an applied local case. Its structure moves from conceptual clarification and the identification of barriers, to the analysis of vulnerable groups and the European and Romanian context, before applying these insights to the “Parking Oradea” platform and formulating policy recommendations.

2. METHODOLOGY

This study uses a qualitative research design that combines a narrative review of the specialist literature with an applied single-case study. The purpose of the methodological design is not to measure statistically the use of digital public services, but to explain how different dimensions of digital exclusion are produced through the interaction of access, skills, institutional design and outcomes.

The literature review covers works published between 2006 and 2025 and prioritises studies on digital inclusion, the digital divide, e-government adoption, trust in public services, accessibility and vulnerable groups. The selection of sources was guided by three criteria: direct relevance to public services and e-government; contribution to the three-level model of the digital divide or to the identification of barriers; and usefulness for interpreting the Romanian and European context.

The analytical framework is built around four categories: (1) the three levels of the digital divide — material access, skills and outcomes; (2) the typology of barriers — technical, social and institutional; (3) the main vulnerable groups identified in the literature; and (4) public policy strategies for inclusion, including digital literacy programmes, hybrid service delivery and user-centred design. This framework is subsequently applied to the case study in order to evaluate whether digitalisation improves access or reproduces existing inequalities.

The case study is the “Parking Oradea” platform, selected because it represents a recent and highly relevant local example of compulsory digitalisation in a public service with direct consequences for citizens. The empirical material consists of official documents and communications issued by Oradea City Hall, direct observation of the web portal and mobile application, and content analysis of local press materials published during the launch and early implementation period in February–March 2026.

The analysis proceeds through triangulation: official claims about transparency, efficiency and administrative simplification are compared with the actual user journey and with the difficulties reported in the local press. This makes it possible to identify tensions between the objectives of digital transformation and the principles of inclusion.

Nevertheless, boundaries must be acknowledged. The study does not include survey data or interviews with users, and it does not measure the medium-term evolution of the platform after its initial implementation. Consequently, the case study should be read as an interpretive analysis of the platform's inclusive design and early implementation problems, rather than as a statistically representative assessment of all users' experiences.

3. LITERATURE REVIEW: DIGITAL INCLUSION AND THE DIGITAL DIVIDE

3.1. Defining the concept of digital inclusion

Pérez-Escolar and Canet (2022) synthesise the literature, showing that digital inclusion means “much more than universal access to the internet or the use of digital technology”, requiring “adequate support and the right digital skills”, as well as “the availability of hardware and software, of relevant content and services; and of training for the digital literacy skills needed” (p. 3). The same source identifies the “five Cs” of digital inclusion: connectivity, capability, content, confidence and continuity.

This extended definition underlines that digital inclusion cannot be reduced to a technical problem. It incorporates cognitive, critical, motivational, creative and cultural dimensions (Pérez-Escolar & Canet, 2022: 3) — a multidimensional construct that simultaneously involves infrastructure, the individual and the social environment. Mesa (2023: 2) stresses that a central component is “digital citizenship”, understood as “the set of rights, obligations and opportunities that take shape in the context of specific state organisations that develop digital infrastructure and services”. This perspective places digital inclusion within a normative framework of citizens' rights, giving it a democratic stake.

3.2. The concept of the digital divide and its three levels

The term “digital divide” was initially used to refer to inequalities in access to ICT, but it has evolved significantly. Mesa (2023: 3) describes how the concept has been extended to include differences in digital skills, ways of using the internet and differences in outcomes.

Morte-Nadal and Esteban-Navarro (2025: 2) systematise this framework on three levels: the first divide refers to “material access to infrastructure, such as internet connectivity and up-to-date technological devices”; the second concerns “the possession of the digital skills needed to use the internet”; the third involves “obtaining meaningful opportunities, outcomes and benefits through the use of ICT”. In the e-government context, “the digital divide can be influenced by all three levels of disparity”, including through “the inability to interact effectively with public administration owing to the inherent complexity of electronic services”.

Vassilakopoulou and Hustad (2023: 955–956), in a systematic review of the 2010–2020 period, show that “research has expanded towards digital inequalities that go beyond access”. In countries with advanced infrastructures the access divides are closing, but “the inequalities that affect people's capacity to use digital resources effectively persist”. Data from the International Telecommunication Union show that “in the least developed countries only 19% of individuals had online access in 2019, while in developed countries almost 87% access the internet”.

3.3. Theoretical models of e-government adoption

Two theoretical frameworks stand out in the literature: the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). TAM, developed by Davis in 1989, “identifies two key determinants of technology adoption: perceived usefulness and perceived ease of use” (Morte-Nadal & Esteban-Navarro, 2025: 7). UTAUT extends this framework with additional factors: social influence, facilitating conditions and behavioural intention.

Djatzmiko et al. (2025: 7) point out that TAM, in its traditional form, “does not fully capture structural barriers such as the lack of digital skills, infrastructure disparities and trust in technology”, recommending its integration with Digital Divide Theory for a more complete perspective.

The Belanger and Carter (2008: 168) model is particularly relevant for explaining the adoption of digital public services. The authors argue that “trust in the internet and trust in government are significant determinants of the intention to use e-government services”, suggesting a dual barrier: on the one hand, trust in technology as such (security and confidentiality risks); on the other hand, trust in the capacity of public institutions to deliver reliable online services. This dual nature of trust is essential for understanding adoption differences between countries with a similar level of technological development but different institutional histories — the case of post-communist countries, including Romania, being illustrative.

At the empirical level, Bokšová et al. (2021) confirm that the success of e-government depends not only on the existence of platforms, but also on the capacity and willingness of citizens to use them effectively. Their study, conducted on 1,613 respondents from the Czech Republic, compares the general public with active internet users and shows that people with more frequent internet use express higher support for the digitalisation of public services. In their sample, support for e-government is 86% among active internet users and 67% among the general public, indicating a gap of approximately 19 percentage points (Bokšová et al., 2021: 27, 33–35). This difference supports the idea that the adoption of digital services must be analysed together with the actual level of internet use, digital skills and the perception of personal usefulness.

4. BARRIERS TO DIGITAL INCLUSION IN PUBLIC SERVICES

The recent literature identifies three main categories of barriers that hinder the equitable adoption of digital public services: technical (related to infrastructure, devices, security), social (related to skills, trust, cultural perceptions) and institutional (related to the regulatory framework, service design and public policies). This typology, systematised by Djatzmiko et al. (2025: 10–14), offers a useful framework for analysis, but the authors stress that the barriers intersect and reinforce one another — a person with limited access to infrastructure will develop digital skills with greater difficulty, and the lack of skills erodes trust, which in turn reduces the likelihood of use. This circularity makes partial interventions ineffective and argues for integrated public policy approaches.

4.1. Technical barriers: access, infrastructure and security

Djatzmiko et al. (2025: 11) observe that “even in urban areas where internet connectivity is more widespread, high subscription costs and inadequate digital infrastructure disproportionately exclude low-income groups”, and that “rural and marginalised communities often suffer from a lack of broadband infrastructure”.

A crucial dimension is the accessibility of design. Many e-government platforms are not designed with the universal user in mind, “leading to exclusionary experiences for individuals with disabilities, low digital literacy or outdated devices” (Djatkiko et al., 2025: 11). “AI decision-making systems may fail to account for socio-economic disparities and accessibility needs”, introducing a new form of algorithmic exclusion. Fear of online fraud, phishing and identity theft “discourages individuals with limited digital literacy from adopting e-government services”.

Cybersecurity represents a dual barrier: on the one hand, the real vulnerabilities of public platforms expose citizens to concrete risks; on the other hand, the perception of these risks discourages adoption even where the systems are secure. Djatkiko et al. (2025: 18) recommend “robust cybersecurity frameworks” combined with “public education campaigns” in order to balance the two dimensions. Bilouseac (2025: 19) notes that, in Romania, “transparency regarding data protection has stagnated at 43.10 points” according to DESI 2024 — below half the EU score — suggesting that the security dimension is underdeveloped precisely in the country where the perception of risk is probably the greatest.

4.2. Social barriers: skills, trust and cultural perceptions

Mubarak and Suomi (2022: 3) stress that “even in developed countries, elderly people face challenges in learning ICT skills on their own and need training”. An essential component is trust. Mesa (2023: 5), on a representative sample of 3,002 Italian citizens, demonstrates the complex relationship: “just over half of the respondents (54.6%) expressed a positive level of trust towards the administration. Among those who have never used digital public services, trust falls to 46.4%, while among beneficiaries of PA platforms it is 57.1%”.

People with higher education show “a much higher level of trust, reaching 63.4%” (Mesa, 2023: 5). This correlation suggests a vicious circle: people with low education have less trust and use digital services less; and the lack of use reinforces their scepticism. “32.1% of the sample consider that the difficulties brought by digitalisation will outweigh the benefits”.

Cultural perceptions also play an important role. Djatkiko et al. (2025: 13) observe that “many individuals continue to prefer face-to-face interactions with public officials”. In the case of Italy, Mesa (2023: 9) refers to the concept of “Italian familism”: “the major resistance of citizens to the digitalisation of the PA is cultural and stems from the attachment to the traditional approach of « proximity » to public institutions”.

4.3. Institutional barriers: design, fragmentation and public policies

Djatkiko et al. (2025: 14-15) identify multiple institutional barriers: outdated regulatory frameworks, bureaucratic fragmentation, insufficient digital literacy programmes, deficient accessibility design and funding constraints. Many governments “prioritise digital infrastructure over policies that ensure equitable access”, and “national e-government strategies do not adequately address the needs of persons with disabilities or those with low digital literacy”.

Morte-Nadal and Esteban-Navarro (2025: 7-8), through 33 interviews with experts, find that “the [digital public] services are perceived as complex and inaccessible because of non-intuitive interfaces, the lack of user-centred design and technical jargon”. “Only a few European countries (Ireland, Portugal, Malta) recognise the importance of broader stakeholder involvement in the design of digital public services”.

Institutional fragmentation represents a specific barrier of complex administrative systems. Citizens are often forced to interact with several platforms, each with its own authentication system and its own interface, for services that, in the user's logic, ought to be integrated. Djatmiko et al. (2025: 14) recommend "interoperable e-government frameworks" to unify access. Another aspect is the absence of a systematic assessment of the social impact of digitalisation policies: in many cases, decisions to migrate services to exclusively digital channels are taken on the basis of administrative efficiency considerations, without a prior assessment of the populations that will be negatively affected. This problem recurs in the case study of the Parking Oradea platform, where the reduction of public-facing hours was decided concurrently with the launch of the digital platform.

5. VULNERABLE GROUPS AND DIGITAL INCLUSION

Pérez-Escolar and Canet (2022: 6), on the basis of a systematic review of 331 studies, identified a clear hierarchy: the elderly are in first place (32.56%), followed by persons with disabilities (20%), poor communities (18.14%), women (10.23%) and ethnic minorities.

5.1. The elderly and the grey digital divide

Mubarak and Suomi (2022: 3-4) established the concept of the "grey digital divide". "The most serious consequences of the grey digital divide are perhaps those related to healthcare", because "the elderly cannot benefit from mobile health services". The authors advance a structural perspective: "eHealth will dominate in the near future, but at the same time, the ageing of the population will increase" — a tension between demographic and technological trends.

Age is not one-dimensional: there are important differences between the "third age" (relatively active) and the "fourth age" (more vulnerable). "Instructors cannot use the same principles and techniques to deliver content to the elderly as to the young. The elderly need their own time to learn, often need excessive patience, repetition and empathy" (Mubarak & Suomi, 2022: 5).

European data confirm this: "the probability of internet use decreases by 8% for each additional year after the age of 65" (Kolotouchkina et al., 2024: 3359). Vassilakopoulou and Hustad (2023: 959) synthesise the key factors identified by the elderly themselves: "fear and anxiety in using technology, a negative attitude, the feeling of being too old to learn, a lack of knowledge, difficulties in understanding digital terminology". The authors stress the importance of "family support": "cognitive support from the family facilitates learning", and "emotional support based on patience, praise, encouragement and comfort can help the elderly avoid computer anxiety" (Vassilakopoulou & Hustad, 2023: 961).

5.2. Persons with disabilities

For persons with disabilities, the accessibility of design is crucial. Djatmiko et al. (2025: 12) stress that "many e-government websites and applications are not optimised for users with visual impairments, non-native speakers or those with limited digital literacy". Recommendations include making accessibility standards mandatory (WCAG, ISO 30071-1), and integrating screen readers and AI-based accessibility tools.

Critical studies in the field of disability have drawn attention to the tendency to "design digital systems that compel persons with disabilities to conform to a world that marginalises them", instead of changing the systems to adapt them to diversity (Pérez-

Escolar & Canet, 2022). Global data confirm the scale: “a gap of 11% in access to internet use in developing countries; low rates of smartphone ownership; a lack of compliance with web content accessibility guidelines at 63% of national government portals and 98% of top websites” (Kolotouchkina et al., 2024: 3359).

Bokingito et al. (2025: 19), evaluating 27 Philippine government websites, highlight a structural discrepancy: “web accessibility compliance obtained higher scores, with rates ranging between 62.32% and 97.1% and an average of 82.5%”, but web presence compliance was much lower, “with an average of 53.43%”. The conclusion: although the technical infrastructure for accessibility may be adequate, many government services are not yet available online at the transactional level, leaving citizens with disabilities without real access.

5.3. Rural and low-income populations

The rural-urban divide remains one of the most persistent. Djatmiko et al. (2025: 10) show that “rural and remote communities often face disproportionately higher costs for internet access”. The case of Romania is illustrative: Șandor (2006: 157) documents that, in rural areas, computer access was 6.5% (vs. 29.9% urban), and internet access was 1.1% (vs. 11.9% urban). The knowledge gap was similar: 11.2% of rural inhabitants knew how to use a computer, compared with 38.6% in urban areas (Șandor, 2006: 159).

Djatmiko et al. (2025: 13) observe that “low-income populations often prioritise necessities such as food, housing and healthcare over investments in technology”, and that “e-government adoption is significantly lower in households that struggle to afford smartphones”. This highlights a vicious circle of digital poverty.

Ng et al. (2022: 1073) illustrate the problem through the case of Singapore — ranked first in the Roland Berger Digital Inclusion Index 2020. “In a modern urban society with a reported internet access rate of 98%, it came as a surprise when it was discovered that, during the COVID-19 lockdown, certain public rental flats for low-income households had no internet points” (Ng et al., 2022: 1078). More dramatically: “the agencies we studied found that certain parents had such deficient digital knowledge that they did not even know how to plug in and turn on a computer” (Ng et al., 2022: 1079). The authors propose “universal digital access” with digital resources “provided automatically and affordably as public utilities” (Ng et al., 2022: 1081).

The results of Bokšová et al. (2021) confirm, in a Central European context, the same vulnerability of the elderly and of low-income people. In the general-public sample, 44% of respondents over 60 consider that the digitalisation of public services is not beneficial for them, and 83% declare themselves insufficiently informed about the available e-government tools. The below-average income category is even more reluctant: 51% of respondents in this category consider the digitalisation of public services not to be personally beneficial (Bokšová et al., 2021: 42–45). Therefore income, age and the frequency of internet use operate cumulatively as factors of digital vulnerability.

5.4. The education and gender divide

Education appears as one of the strongest predictors. Mesa (2023: 5-7), on the basis of logistic regression on the Italian sample, identifies education as “the most important variable”. Among respondents with tertiary education, the share of digital users ranges between 61.1% and 81.3%; among those with primary and lower-secondary education, between 43.5% and 69.2%. Education “gives individuals a greater possibility of acquiring cognitive tools to cope with the complexity generated by ICT”.

The gender divide is more nuanced. Șandor's data (2006: 157) show relatively small differences between men and women regarding access, but in specific communities (elderly, rural, immigrant women) exclusion is disproportionately severe. Gender inequalities interact with other forms of inequality, generating situations of cumulative vulnerability.

6. THE EUROPEAN AND ROMANIAN CONTEXT

6.1. The strategic framework of the European Union

The EU has made digital inclusion a strategic priority. The "2030 Digital Compass" proposes four axes: digital skills, infrastructures, the transformation of businesses and the digitalisation of public services. The EU has set "the ambitious objective for 2030 of ensuring that 80% of its citizens acquire at least basic digital skills" (Morte-Nadal & Esteban-Navarro, 2025: 2).

The DESI 2024 indicator offers an updated picture: 55.56% of people aged 16-74 in the EU possess at least basic digital skills. The Netherlands (82.7%), Finland (82%) and Ireland (72.9%) are the leaders, while Poland (44.3%), Bulgaria (35.5%) and Romania (27.7%) remain behind. The "European Declaration on Digital Rights and Principles" (Mesa, 2023: 2) "commits to promoting a model of digital transformation that puts people at the centre".

Yera et al. (2020: 6), analysing 767,691 Eurostat questionnaires from 26 EU countries, show that "between 2014 and 2019, the largest digital divide among the 28 EU countries grew by 2%, from 32% to 34%" (Yera et al., 2020: 2), and that "in 2019 the average use of e-Government in the 28 EU countries reached only 55%" (Yera et al., 2020: 3). The e-Government Use Index (EGUI+) places Romania in last position with 0.07, compared with Denmark (4.50) (Yera et al., 2020: 16).

6.2. The case of Italy: education as a key factor

Italy offers a valuable illustration. Mesa (2023: 1) describes that "the Italian public administration (PA) has always had problems with slowness and inefficiency. In 2021, the Italian government made a massive investment in the digitalisation of the PA as part of an extraordinary recovery plan, with over 200 billion euros". The research on 3,002 respondents reveals that "over three quarters of respondents have already used a public service at least once through an online channel".

Nevertheless, "over a third fear that the digitalisation of public services will worsen the situation of citizens". "With the exception of the police (70%), the president of the republic (68%) and schools (56%), all the country's public institutions fall below the 50% trust threshold". The central conclusion: "the educational and cultural dimension is a crucial aspect as a lever for counteracting the digital divide".

6.3. Romania: the challenges of an incomplete transformation

Romania is consistently in the lower part of the rankings. Romania records e-government service use of only 24.6% — the lowest in the EU after Bulgaria and Germany (Morte-Nadal & Esteban-Navarro, 2025: 2). Only 27.7% of Romanians possess basic digital skills.

Șandor (2006: 162) advances an explanation that remains valid: e-government services are not merely a technological problem, but an administrative-cultural one. "The administrative culture is still bureaucratic, every interaction with citizens or businesses requiring many paper documents. Without a drastic simplification of procedures, the electronic delivery of public services will remain science fiction". In the same logic, the

author observes that “interaction with public administration is still seen as a personal one. [...] Romanians continue to prefer direct, personal, face-to-face contact with public officials” (Şandor, 2006: 162).

Yera et al. (2020: 13) identify, with 2009-2015 data, a Romanian particularity: “Romania was the only country where the two extreme levels of e-Government use [...] were characterised by two rules involving a single factor, manual occupation: manual workers did not use e-Government tools, while those who were not manual workers used them”. “Romania has a very imbalanced data set, with 94% of the questionnaires being of the null e-Government use type” (Yera et al., 2020: 9).

Bilouseac (2025: 14-19) carries out a critical analysis of the DESI indicators: “the score obtained in the category of digital public services (21/100) remains more than three times lower than the EU average, placing the country in last position”. Romania comes close to the European average in access to electronic health records (75.10 vs. 82.70) and mobile optimisation (85.48 vs. 96.13), but the gap remains dramatic in actual users (26.91% vs. 74.71%) and pre-filled forms (24.38 vs. 70.98). Demand for digital services grew from 15.89% to 26.91% (2020-2024), but transparency regarding data protection stagnated at 43.10 points.

Cibian et al. (2022: 5–6), in the most detailed mapping of digital exclusion in Romania, highlight a paradoxical reality: Romania has connectivity above the EU average (10th of 27 in DESI 2021), yet “more than 10 million Romanians do not have basic digital skills”, and “this number has increased by 3 percent over the last two years”. The most exposed groups are “people living alone (55.5% of single-person households have no internet access), the elderly (approximately one in three pensioners have never used the internet), those with low levels of education (29% have never used the internet) and those living in rural areas” (Cibian et al., 2022: 5). The authors advance the concept of “functional digital illiteracy”: “although certain basic digital skills exist, they do not allow a sufficient understanding of digital processes” (Cibian et al., 2022: 56).

A recent analysis of the digitalisation of Romanian public administration confirms the same discrepancy between strategic objectives and actual implementation. Burlacu et al. (2025) show that Romania has a strategic framework aligned with the Digital Compass 2030 and significant European funding, including through the NRRP, but progress is affected by the lack of clear coordination, an insufficiently adapted legislative framework and the low level of adoption of digital services by the population and SMEs (Burlacu et al., 2025: 289–290). In the SWOT analysis, the dominant weaknesses are the low level of digital skills in public administration, deficient inter-institutional coordination, fragmented digital infrastructure and the lack of interoperability (Burlacu et al., 2025: 292–293).

At the local level, Stoica and Ilas (2009: 173-177), in the first evaluation of 165 Romanian municipal websites, showed that Timișoara (39.66/100), Bucharest (39.36) and Arad (38.73) were the leaders, but “the national average was only 16.39”. The least developed dimensions were security (average 0.62/20) and digital democracy (average 1.14/20). The structures observed then — an underdeveloped participatory dimension, formal security, an emphasis on information dissemination — remain visible in the DESI 2024 data presented by Bilouseac (2025: 16).

The local context can also be read through Şoproni’s (2025) analysis of Oradea. The study presents the city as an example of how local leadership, participatory governance and community-driven branding can reinforce socio-economic inclusion. Şoproni argues that good governance is linked to responsibility, transparency, inclusivity and responsiveness, and that Oradea’s development model draws legitimacy from stakeholder engagement and

civic pride (Şoproni, 2025: 110-111). This perspective is useful for the present paper because it makes the Parking Oradea case analytically more demanding: the platform should not be assessed only as a technical tool, but also against the city's broader claim to inclusive, participatory and citizen-oriented governance.

7. CASE STUDY: DIGITAL INCLUSION IN THE “PARKING ORADEA” SERVICE OF THE ORADEA CITY HALL

The elaborated conceptual framework — the three-level digital divide (Morte-Nadal & Esteban-Navarro, 2025: 2; Vassilakopoulou & Hustad, 2023: 955), the taxonomy of barriers (Djatkiko et al., 2025: 10-14), the hierarchy of vulnerable groups (Pérez-Escobar & Canet, 2022: 6) — is applied to a relevant local case: the full digitalisation of the residential parking service of the Municipality of Oradea, launched in testing on 11 February 2026 and officially operationalised in March–April 2026.

7.1. Justification of the case and methodology

The choice of the case is justified by three arguments. First, it is a national premiere — the first system in Romania to allow the online allocation and auctioning of residential parking spaces, fully digitalised (Agerpres, 26 February 2026). Second, the scale is significant: 27,652 residential parking spaces inventoried, 20,500 allocated, ~4,500 available, with parking revenues exceeding 33 million lei in 2025. Third, the particularity of the case is that the service was transformed from a traditional relationship, mediated by owners' associations, into one mediated exclusively digitally — a feature that places the case in the “digital-only” category criticised by Djatkiko et al. (2025) and Mesa (2023).

The research question: to what extent do the architecture, design and implementation of the “Parking Oradea” platform reflect or contradict the principles of digital inclusion identified in the literature, and what adjustments are necessary for alignment with European standards?

The methodology triangulates three sources: (a) documentary analysis of the platform and official communications (oradea.ro, the dedicated sub-pages, press releases, regulations, video tutorial); (b) direct observation of the portal.parcari.oradea.ro portal and the Parking Oradea mobile application; (c) content analysis of the local press, which critically documented the implementation in February–March 2026: the investigations published by eBihoreanul, Bihon, Jurnalul Oradean and Observatorul Bihorean, plus the press conferences reported by Agerpres. Acknowledged limitations: in the absence of sociological field research, the evidence on the experience of citizens is mediated through press reports; the analysis does not cover a period long enough for a medium-term evaluation.

7.2. Description of the digital parking ecosystem

The system has three components with differentiated logics. The “Parking Oradea” mobile application (Android/iOS) is intended for on-street and off-street (multi-storey) parking; it allows the purchase of tickets by SMS or card, subscriptions, the payment of fines, and the real-time viewing of available spaces. The portal.parcari.oradea.ro web portal is dedicated exclusively to residential parking — account creation, document upload, allocation, electronic auctions. The interactive map provides geographical location and tariffs.

The crucial distinction concerns the compulsory nature of the digital channel. For on-street and multi-storey parking a dual-channel model operates: tickets can be bought by

SMS, by card at parking meters or via the application — compatible with the hybrid model recommended by Kaihlanen et al. (2022: 1) and Mesa (2023). For residential parking the model is entirely digital-only: enrolment, document validation, allocation and payment of the annual subscription of 160 lei are carried out exclusively online, without a parallel traditional procedure.

The user's actual procedure involves: creating the account, uploading scanned documents, validating the address from a predefined list, simultaneously validating two codes (e-mail and SMS) within an uninterrupted session, and associating an existing contract or registering for allocation. In the event of direct allocation or allocation by auction, the beneficiary has 48 hours to pay, and failure to do so entails a ban on participating in allocation for 12 months. At the level of institutional integration, the database is interconnected with the Romanian Auto Registry, Road Insurance, the DGASPC (for disability certificates) and the Cadastre Office — a technical level that is remarkable compared with the average of the DESI indicators (Bilouseac, 2025: 16).

7.3. Application of the three-level digital divide framework

At the first level — material access — Oradea is, compared with the national average, relatively favourably positioned; the North-West region is in the upper part of the regional rankings regarding household internet access (Cibian et al., 2022: 15). Nevertheless, the first level is not neutralised: 55.5% of single-person households nationally have no internet at home (Cibian et al., 2022: 5, 16). Applied to Oradea, this datum translates into a significant number of citizens — in particular elderly people living alone in inherited flats in central neighbourhoods where the concentration of parking spaces is highest.

The design aggravates the problem by requiring two validation channels simultaneously. The procedure requires the validation, in the same session, of an e-mail code and an SMS code, without the possibility of restarting. For a citizen without an active e-mail address (a frequent situation among the elderly), the first technical barrier is insurmountable without external help. The case reported by the press: residents who abandon the session before validating both codes remain blocked with an “unfinalised account”, a situation from which they can no longer recover except by requesting deletion from the Parking Service — a procedure which, paradoxically, itself presupposes digital capacities.

At the second level — digital skills — the most visible part of the divide is concentrated. The procedure involves: scanning/photographing documents in compatible formats (JPG, PNG, HEIC), uploading them while respecting size limits, identifying the address in a list that, in many cases, does not contain the correct option, and entering the telephone number without the initial digit “0”. This complexity validates the observation of Kaihlanen et al. (2022: 3): “the ability to use the internet does not necessarily imply a capacity to use digital services”. Direct proof comes from the press: reporters who tested the platform concluded that “enrolment in the digital system will be a challenge for people who are not familiar with the digital system”, while another article notes that “using the platform sometimes proves to be a « stumbling block » even for people who have good knowledge” (BIHON, 12 March 2026).

This observation places the case directly in the area that Cibian et al. (2022: 56) call “functional digital illiteracy”. The concrete manifestation: the massive crowding of the Parking Service — approximately 280 people in a single day (4 March 2026) — and the emergency opening of Counter no. 9 in the Counters Hall (“Pyramid”) starting on 9 March 2026, a measure that de facto contradicts the narrative of a fully digital service.

At the third level — actual benefits — a significant asymmetry appears. For those who manage to navigate the platform: transparency, the elimination of intermediation through owners' associations, automatic notifications, payment without travelling. For the others: the loss of an already-held space or the impossibility of accessing new ones. The 12-month penalty for non-payment within 48 hours represents the clearest example of disproportionate exclusion: an elderly citizen who, receiving the notification by e-mail (a channel he does not check daily), fails to pay online within 48 hours is administratively excluded for a year. The penalty contradicts the principle of proportionality and of digital citizenship (Mesa, 2023: 2).

The emergence of a private intermediation market — firms that offer, for 50 lei, the creation of the account (eBihoreanul, 21 March 2026) — represents a concrete economic indicator of the divide. In the logic of digital exclusion described by Cibian et al. (2022: 56), this is a vulnerability of the “functional digital illiteracy” type: the citizen may have minimal access to technology, but needs intermediation in order actually to complete a digitalised public service. The fact that the firm in question “is not doing very well, because instead of paying this money, the residents prefer to queue in the Pyramid” is, paradoxically, an encouraging datum: elderly citizens choose free public support over paid private intermediation — confirming Mesa's recommendation (2023: 10) regarding “digital facilitation centres”.

7.4. The exposed vulnerable groups

The elderly represent, in accordance with the literature, the most exposed group. Three arguments: (a) they are the category most strongly anchored in the neighbourhoods where the concentration of parking spaces is highest; (b) they are the least technically prepared for a process that requires an active e-mail, SMS, document scanning, web navigation; (c) the “grey digital divide” intensifies with age. Official recognition came in a problematic form: the director of the Real Estate Patrimony Directorate stated that “residents who find enrolment difficult will have to ask for the support of a person familiar with working online, or come to ask for guidance at the City Hall” — externalising responsibility to the citizen. This position directly contradicts the recommendation of Djatmiko et al. (2025: 22) that “governments should move beyond the mere deployment of infrastructure and prioritise human-centred digital policies”.

For the low-income segment, the burden is multiple: the necessary devices, internet and telephone subscriptions, plus the private intermediation option of 50 lei (equivalent to one third of the annual fee of 160 lei). The Romanian particularity identified by Yera et al. (2020: 13) — the occupational factor as a stronger predictor than in other EU countries — suggests that the population of manual workers, even after retirement, remains disproportionately excluded.

For citizens with low levels of education, the platform's terminology — “account validation”, “contract import”, “unfinalised status”, “cache” — represents a substantial cognitive barrier. Error messages are formulated in jargon, without suggesting concrete actions. This problem reflects the conclusion of Morte-Nadal and Esteban-Navarro (2025: 8) regarding “the language used by public administration” as the second most important factor for inclusion ($M = 4.26$).

Persons with disabilities present a revealing paradox. The regulation explicitly provides for an exemption from payment for severe or pronounced disability — a measure that goes beyond many other municipalities. However, the exemption is conditional on enrolment on the same platform. In other words: persons with disabilities are not exempted

from the digital barrier, but only from the financial one. There is, in the official communications, no mention of compliance with web accessibility standards (WCAG, EU Directive 2016/2102 transposed through GEO 112/2018).

7.5. The typology of barriers and structural tensions

At the technical level, the design of the platform concentrates the most serious problems: validation in two simultaneous stages within a single session; the quality of the underlying database — missing addresses, inconsistent block numbers, contracts that do not associate (“An import contract was found in the database but it is currently not associated”, BIHON, 12 March 2026); the reduced intelligibility of error messages; the absence of an accessibility audit. These problems reflect a prioritisation of security over usability and an incomplete migration process.

At the social level, the most visible barrier is the lack of confidence in one’s own capacity — confirmed by the 280–300 people who turned up on peak days at the premises of the Parking Service (eBihoreanul, 5 March 2026). In addition, there is the cultural preference identified by Şandor (2006: 162) for personal, “face-to-face” contact. The fact that residents prefer queues of several hours to paying 50 lei for intermediation reflects an institutional resource — trust in public authority — that the municipality does not capitalise on in its design.

At the institutional level, the most criticisable decision was the reduction of the public-facing hours of the Parking Service from three days a week to a single day, exactly during the transition period. This runs counter to the recommendations of Kaihlanen et al. (2022: 1) and Mesa (2023) on maintaining traditional channels. The City Hall partly corrected this by opening, on 9 March 2026, Counter no. 9 — a reactive correction that confirms the central thesis of the literature: the digital transition requires additional investment, not reductions, in traditional support structures. A second institutional barrier is the 12-month penalty for non-payment within 48 hours — which disproportionately matches the penalty to the error. A third is the absence of a formalised digital inclusion strategy: there are no plans with measurable objectives, partnerships with civil society or collaborations with public libraries.

The case highlights three structural tensions. The transparency/accessibility tension: the official argument — eliminating suspicions of favouritism — is legitimate, but procedural transparency was obtained at a substantial accessibility cost. The efficiency/equity tension: digitalisation reduces administrative costs, but the gain is not distributed equitably. The universality/personalisation tension: the platform adopts a “one-size-fits-all” logic, contradicting the principles of user-centred design. A more mature approach would offer differentiated pathways — a fast option for experienced users and an assisted option (with explained steps, a “high contrast” mode, audio options, contextual tutorials) for vulnerable categories.

7.6. Recommendations specific to the Oradea context

On the basis of the analysis and with reference to the framework of Morte-Nadal and Esteban-Navarro (2025: 10-11), I propose eighteen recommendations organised across five dimensions.

On the access dimension: (R1) maintaining a parallel traditional allocation procedure for citizens who declare on their own responsibility the difficulty of using the platform; (R2) extending the public-facing hours of the Parking Service to at least three days a week, including afternoon hours; (R3) establishing assisted access points in public libraries

(the “Gheorghe Șincai” County Library, the neighbourhood branches), inspired by the model of the “digital facilitation centres” described by Mesa (2023: 10).

On the skills dimension: (R4) free “assisted enrolment” workshops in neighbourhoods, at the premises of owners’ associations, run by mixed teams (officials and volunteers from pensioners’ organisations); (R5) video tutorials adapted to different categories of users — with an emphasis on the scenario “I have no parking space and want one”, omitted in the current official material; (R6) partnerships with the University of Oradea for “digital buddy” programmes between students and the elderly.

On the interaction dimension: (R7) auditing and certifying the platform in accordance with WCAG 2.1 AA, with publication of an accessibility statement; (R8) reformulating error messages in plain language; (R9) an asynchronous validation procedure (codes valid for 72 hours) to eliminate the requirement of a single session; (R10) a 24/7 assistance chatbot; (R11) a “high contrast” mode option and font enlargement; (R12) automatic pre-filling of fields on the basis of querying the already-interconnected databases (RAR, Cadastre, DGASPC).

On the social-factors dimension: (R13) mitigating the 12-month penalty — a progressive penalty (warning, 3 months, 12 months); (R14) formal partnerships with pensioners’ and disability organisations in consulting on the design; (R15) an information campaign, with printed materials distributed in letterboxes.

On the outcomes dimension: (R16) the quarterly publication of monitoring indicators (the enrolment rate by age category, applications rejected for technical reasons, the average waiting time); (R17) an independent impact evaluation at 12 months, with interviews and focus groups; (R18) the integration of the effort into the municipality’s Local Development Strategy.

The case study brings two original observations to the literature. The first: the emergence of a private intermediation market (50 lei for an account) as a concrete economic indicator of the digital divide — a phenomenon that manifests itself even in the local public services of a high-performing municipality in an EU country. The second: the prevalence of citizens’ preference for the assisted public counter over private intermediaries — a valuable institutional resource that argues in favour of public investment in assisted support structures.

8. STRATEGIES AND POLICIES FOR DIGITAL INCLUSION

The recommendations are grouped into five main directions: digital literacy programmes, public-private partnerships, user-centred design, hybrid models and integration into the sustainable development goals.

8.1. Tailored digital literacy programmes

Djatzmiko et al. (2025: 17) argue that “nations with structured digital education frameworks have higher rates of e-government adoption”. The examples include the “Seniors Go Digital” programme in Singapore, which “offers free workshops and hands-on training for older adults, in order to boost their confidence in using online government services”. Mubarak and Suomi (2022: 3) insist that “the precise training of the elderly is the most important factor”, recommending “the creation of a mindset, in addition to the delivery of ICT skills”. Pérez-Escobar and Canet (2022: 9) synthesise the essential components: health literacy, social interaction skills, computational skills, and the encouragement of online engagement. For the Romanian context, effective programmes must take into account

minority languages and the cultural specificity of rural communities, where the mere translation of existing materials is not sufficient.

8.2. Public-private partnerships and the third sector

Djarmiko et al. (2025: 19) stress that “multi-stakeholder partnerships can significantly improve accessibility, affordability and reach”. The examples include the Google–Indonesian government partnership for rural small businesses, the Microsoft “AI for Accessibility” programme, and the EU–Microsoft partnership for sign-language interpretation AI. At the European level, Morte-Nadal and Esteban-Navarro (2025: 7) find that “the third sector is seen as fundamental, requiring more support and training for mediation agents”.

8.3. User-centred design and accessibility standards

Djarmiko et al. (2025: 18) recommend that “governments mandate accessibility standards based on universal design principles, ensuring that all e-government platforms comply with WCAG”, with “multilingual support, screen readers, adaptive user interfaces and AI-based accessibility tools”.

Morte-Nadal and Esteban-Navarro (2025: 8) examined 602 Spanish intermediary leaders, identifying a clear hierarchy: data confidentiality and security ($M = 4.34$), the language used by public administration ($M = 4.26$), the simplification of procedures ($M = 4.26$), internet access ($M = 4.24$), education ($M = 4.14$), digital skills ($M = 4$), and the support of officials ($M = 4.04$).

8.4. Hybrid service delivery models

The transition to digital must not eliminate traditional channels. Morte-Nadal and Esteban-Navarro (2025: 8) identify the hybrid model as an important recommendation: “face-to-face channels and personalised support are essential to complement digital services”. Mesa (2023: 10) describes a concrete initiative — the “digital facilitation centres” financed through the Italian NRRP: “physical access points, usually located in libraries, schools and community centres”.

The study by Kaihlanen et al. (2022: 4), on 74 participants from five vulnerable Finnish groups, offers rigorous empirical validation: “for most participants, access to digital health services was hindered by insufficient digital skills, local language skills, or both” (Kaihlanen et al., 2022: 1). More significantly: “the ability to use the internet does not necessarily imply a capacity to use digital services” (Kaihlanen et al., 2022: 3). The conclusion: “while digital services are growing, traditional face-to-face services will still need to be offered alongside the digital ones in order to ensure equal access” (Kaihlanen et al., 2022: 1).

Ng et al. (2022: 1081) propose a framework of “universal digital access” with three components: devices (one device per person), an internet connection (as a public utility), and digital skills (online government services in the native languages of non-English speakers).

8.5. Integration into the sustainable development goals

Djarmiko et al. (2025: 21) argue that digital inclusion policies must be integrated into the UN SDGs. The most relevant are: SDG 4 (Education), SDG 9 (Industry, innovation, infrastructure), SDG 10 (Reduced inequalities) and SDG 16 (Peace, justice, strong institutions). Pérez-Escobar and Canet (2022: 1) stress that “SDG 10 is particularly

connected with the objectives of our studies, because both are focused on reducing inequalities”.

8.6. Inclusive governance in smart cities

Kolotouchkina et al. (2024: 3359) observe critically that “despite the potential inclusive benefits of digital innovation, certain critical aspects of everyday life in the city are reproduced and reinforced, because many are left behind owing to a lack of access, skills, resources or capacities”. The authors add: “the rhetoric of smart digital change works much more to « sell » a city in the global economy than to effectively address urban inequalities” (Kolotouchkina et al., 2024: 3358). One of the structural problems is the passive role assigned to citizens: “residents are often regarded as data sources that feed urban platforms, consumers of digital services and/or investors in urban technologies” (Kolotouchkina et al., 2024: 3359).

9. DISCUSSION AND IMPLICATIONS FOR PUBLIC POLICY

The synthesis of the literature and the case study highlight three structural tensions. The first: the tension between administrative efficiency and social equity — digitalisation promises cost reduction, but without compensatory measures it risks excluding the groups most dependent on services. The second: between universality and personalisation — European policies tend to set uniform objectives, but reality — as the Italian and Romanian cases illustrate — is that social structures vary considerably. The third: the tension of responsibility — should digital inclusion be a task of the citizen or of the state? The answer is a combination: personalised training programmes plus a design simple enough for users with limited skills.

For Romania, the recommendations of Șandor (2006: 161–162) remain current: targeted investment in rural areas, “lifelong learning” programmes, a change in administrative culture. The Parking Oradea case adds a specific lesson for local administrations: digitalisation without deliberate compensatory measures can deepen the divide, transforming citizens with access into excluded citizens.

Burlacu et al. (2025) complete these recommendations with a current institutional perspective: the transition to e-government cannot be treated exclusively as a technological project, but as an organisational and social transformation. The authors recommend strengthening inter-institutional coordination, developing the digital skills of officials, the interoperability of public systems, optimising the user experience and periodically monitoring digital progress through clear indicators (Burlacu et al., 2025: 294–296). For local administrations, this perspective is relevant because it shows that digital platforms can fail socially even when infrastructure and funding exist, if they are not accompanied by administrative leadership, common standards and support for users.

Mubarak and Suomi (2022: 5) draw attention to a fundamental limitation: “there is no arguable reason to assume that a complete elimination of the digital divide will ever be possible. State-of-the-art technologies will continue to be expensive for the majority of people”. Digital inclusion is not a fixed destination, but a continuous process. Djatmiko et al. (2025: 11) draw attention to the new challenges related to AI: “algorithmic bias in AI-based public services can further disadvantage marginalised populations”.

10. CONCLUSIONS

Digital inclusion in public services represents one of the great challenges of contemporary governance. The transition to e-government offers significant opportunities,

but if it is not managed with attention to equity, it can deepen social inequalities and exclude precisely those who have the greatest need of efficient public services.

The literature analysed allows five main conclusions. First, the digital divide is multidimensional, with three levels (access, skills, outcomes). Second, the most exposed groups — the elderly, persons with disabilities, rural populations, those with low income and low levels of education — present vulnerabilities that intersect. Third, the barriers identified are simultaneously technical, social and institutional, which means that solutions must be integrated. Fourth, the European context highlights important convergences (DigComp, the Digital Decade objectives), but also persistent divergences — with Romania remaining one of the countries with the largest divides. Fifth, effective strategies combine tailored literacy programmes, public-private partnerships, user-centred design, hybrid models and integration into sustainable development.

The case study of the “Parking Oradea” platform offers an empirical illustration of the tensions that the literature anticipates at the theoretical level. The case confirms: the elderly are the most exposed group, “digital-only” models generate paradoxical queues at physical counters, and the elimination of traditional channels entails the opening of parallel emergency channels. The Oradea case adds two original observations: the emergence of a private intermediation market (50 lei) as an economic indicator of the divide, and the prevalence of citizens’ preference for the assisted public counter.

For the Romanian context, the specific agenda includes: massive investment in rural digital infrastructure; literacy programmes tailored to the elderly, the rural population and low-income groups; the simplification of administrative procedures; the preservation of traditional channels and the development of digital facilitation centres; and the transformation of administrative culture.

Future research could explore: the contextual dimensions of digital inclusion in Romania through qualitative studies; the systematic evaluation of NRRP initiatives; comparisons with similar cases from other Romanian municipalities; and qualitative studies with officials who work directly with vulnerable citizens. The paper highlights that digital inclusion is not merely a technological problem, but a profoundly political and ethical one — it concerns the fundamental right of every citizen to participate in public life on equal terms. Securing this right in the digital age requires a coherent commitment from the state, civil society and the private sector, as well as an awareness that technology must serve people, not the other way around.

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