

EVALUATING PUBLIC DIGITAL SERVICES BEYOND SUPPLY-SIDE MATURITY: A USER-CENTERED FRAMEWORK AND EVIDENCE FROM ARMENIA

Tatul MKRTCHYAN

Doctor of Economics, Professor
ASUE Head of the Chair of Applied Economics,

Narek MELKUMYAN

PhD student of the Chair of "Management"
Armenian State University of Economics

Key words: digital public services; e-government evaluation; user-centered evaluation; citizen trust; digital divide; user experience; equity; public administration; Armenia

Introduction

Over the past two decades, the digitalization of public administration has moved from a peripheral modernization agenda to a central instrument of statecraft. Governments now routinely frame digital transformation as a means of improving efficiency, transparency, accountability and the quality of public service delivery. International benchmarking has reinforced this trajectory: the biennial United Nations E-Government Survey, and its headline E-Government Development Index (EGDI), allow states to position themselves against one another and to track progress over time [United Nations, 2024]. The EGDI is a composite of three equally weighted pillars — the Online Service Index, the Telecommunications Infrastructure Index and the Human Capital Index — and is therefore, by construction, a measure of a state's capacity to *supply* digital government rather than of the value that citizens actually *realize* from it [United Nations, 2024].

This supply-side orientation is not confined to the EGDI. Maturity-stage models conceive of e-government as a progression through technical milestones, from online cataloguing to integrated transactional services [Layne & Lee, 2001]. Comparative instruments such as the European Commission's eGovernment Benchmark do foreground "user-centricity," but they operationalize it largely as the online availability and usability of services as judged by trained assessors, rather than as the lived experience of citizens [European Commission, 2023]. The OECD's Digital Government Policy Framework similarly Elevates a "user-driven" principle, yet leaves its measurement to availability proxies (OECD, 2020). The cumulative effect is that a state may climb the rankings while large segments of its population remain unaware of, distrustful of, or unable to use the very services that those rankings reward; the index authors themselves caution that a country can score well while still exhibiting friction in specific services and regional gaps for vulnerable groups.

Armenia provides an instructive case. Between the 2022 and 2024 surveys the country moved from the "high" to the "very high" EGDI group — a tier defined by a composite score of 0.75 or above — ranking 48th globally in 2024 and standing among the more no-

table risers since 2018 [United Nations, 2024]. Its 2021–2025 Digitalisation Strategy, implemented chiefly through the Information Systems Agency of Armenia under the coordination of the Information Systems Management Council, has expanded the portfolio of national platforms — among them e-gov.am, e-cadastre.am, e-payments.am and e-request.am [Government of the Republic of Armenia, 2021; SIGMA, 2025]. Independent assessment nonetheless describes the results on the ground as “mixed” and notes that digital skills within the administration remain underdeveloped [SIGMA, 2025]. The field evidence presented below points in the same direction: supply-side progress has not translated evenly into citizen awareness, trust and use.

This article addresses that gap. Its central proposition is that the effectiveness of public digital services cannot be inferred from supply-side maturity alone and must be evaluated from the perspective of the citizen-user. On the basis of field research, the study develops a user-centered evaluation approach that assesses the effectiveness of public digital services not only through technological and institutional indicators, but also through citizens’ awareness, trust, satisfaction, readiness to use and user experience, while explicitly accounting for age-based and territorial disparities. This integrated, equity-sensitive perspective constitutes the principal scientific novelty advanced here. The remainder of the article is organized as follows. The next section sets out the research design and the operationalization of the evaluation dimensions. The literature review then situates the contribution within information-systems, e-government and digital-divide scholarship. The scientific-novelty section formally specifies the user-centered framework and its composite index. The analysis applies the framework to the Armenian case, and the concluding section draws out theoretical and policy implications, limitations and avenues for future research.

Methodology

The study employs a mixed research design with two complementary components. The first is a *supply-side mapping*: a desk review of Armenia’s national digital-service portfolio and of the institutional and legal arrangements that govern it, drawing on strategy documents, regulatory acts and the platforms currently in operation. This component characterizes the two supply-side tiers of the framework — technological readiness (infrastructure, interoperability, availability and points of access) and institutional readiness (coordination mandate, legal basis and data governance). The second component is a *demand-side field survey* of citizen-users, designed to capture how services are perceived and used in practice. The two components are deliberately paired so that the state’s declared and assessed capacity can be read against citizens’ experienced outcomes. The survey applied a stratified sampling design, using Armenia’s administrative-territorial units — the regions (marzes) and the city of Yerevan — as strata in order to secure territorial representativeness and to limit structural sampling bias. The realized sample comprised 489 respondents. With a 95% confidence level and a $\pm 5\%$ margin of error, the minimum representative sample is

approximately 384; the achieved 489 therefore improves the precision and reliability of the estimates. Respondents were allocated to strata proportionally to each region's share of the national population, $n_i = (N_i / N) \times n$, so that the sample structure approximates the real demographic distribution and the results can be generalized to the population within accepted statistical limits. Yerevan accounts for the largest share of respondents (37%), consistent with its weight in the national population. Fieldwork was conducted in [period] via [mode of administration]. The sample is demographically broad. The largest age groups are 36–45 (38.7%) and 26–35 (35.2%), followed by those aged 55 and over (9.9%), 46–55 (9.8%) and 18–25 (6.4%); women constitute 51.4% and men 48.6%. Educational attainment is high — 88% hold higher or postgraduate qualifications, 8.5% vocational and 3.5% basic or secondary — while employment spans the private (47.2%), public (33.1%) and civil-society (11.3%) sectors, with 8.4% not employed at the time of the survey. This composition is relevant to interpretation: because the sample is comparatively well-educated and economically active, the demand-side weaknesses reported below are likely to be conservative estimates of those in the wider population.

Table 1. Demand-side dimensions, indicators and source items

Dimension	Indicators / item focus	Source item
Awareness	Knowledge of the digitalization process and of available platforms	Self-rated awareness (4 categories); platform-recognition checklist
Trust	Confidence in reliability, security and data protection of services	Reliability/security attribute rating (5 categories)
Satisfaction	Overall satisfaction with the degree of public-sector digitalization	Satisfaction, 1–10 scale
Readiness to use	Perceived value of e-government (willingness) and self-efficacy in use	Importance of e-government (5 categories); frequency of difficulties
User experience	Speed, accessibility and ease of use; friction encountered in practice	Attribute ratings (5 categories); difficulty type and frequency
Equity stratifiers	Age cohort; place of residence (Yerevan vs. regions) — applied across all dimensions	Demographic and territorial classification

Each demand-side dimension was operationalized through survey items and converted to a common [0, 1] scale. Table 1 lists the dimensions, their indicators and the source items. Ordinal response categories were mapped to evenly spaced points on the unit interval (for a four-category awareness item: 1, 2/3, 1/3, 0; for five-category service-attribute ratings: excellent = 1.0, good = 0.75, sufficient = 0.5, “hard to evaluate” = 0.25, unsatisfactory = 0); the 1–10 satisfaction scale was rescaled linearly. Each dimension score is the response-

weighted mean of its items. The standardized scores were then consolidated into the composite index defined in Section 4, and the resulting user-centered profile was read against the supply-side mapping. The study is cross-sectional and relies on self-reported perceptions, which constrains causal inference; respondent anonymity and informed consent were ensured throughout. Because the full descriptive results of the field survey are reported separately, the present article foregrounds the evaluation framework and the supply–demand comparison rather than reproducing that material in full.

Literature review

Information-systems success and technology acceptance

The conceptual roots of digital-service evaluation lie in information-systems (IS) research. The DeLone and McLean model frames success as a chain running from information, system and service quality through use and user satisfaction to net benefits, and has been widely adapted to the public sector, most notably in public-value extensions that ask what collective value a system generates rather than merely whether it is used [DeLone & McLean, 2003; Scott, DeLone & Golden, 2016]. Adoption is theorized chiefly through the Technology Acceptance Model, in which perceived usefulness and perceived ease of use drive intention and use [Davis, 1989], and through the Unified Theory of Acceptance and Use of Technology and its consumer extension, which add performance expectancy, effort expectancy, social influence, facilitating conditions, habit and hedonic motivation [Venkatesh et al., 2003; Venkatesh, Thong & Xu, 2012]. These models capture individual acceptance with considerable precision, but they are typically applied to a single system and to individual intentions; they say little about the institutional supply behind a national service ecosystem, and still less about the distribution of outcomes across social groups.

E-government maturity and benchmarking

A second stream evaluates e-government at the level of the state. Stage models describe maturation from online presence to fully integrated services [Layne & Lee, 2001], while success-factor studies catalogue the managerial, organizational and technological conditions for effective implementation [Gil-García & Pardo, 2005]. At the comparative level, the EGDI ranks states on supply-side capacity [United Nations, 2024], the European Commission’s eGovernment Benchmark scores user-centricity, transparency, key enablers and cross-border provision [European Commission, 2023], and the OECD’s policy framework articulates six principles of digital government, including “user-driven” and “proactive” service design [OECD, 2020]. A recent meta-analysis confirms that empirical e-government research has clustered around adoption and supply-side maturity, with comparatively thin attention to outcome and equity measurement [Wirtz & Daiser, 2018]. These instruments are indispensable for tracking what the state provides, yet user value enters them as an assessed property of services rather than as a measured experience of citizens. Recent Armenian studies likewise highlight the limitations of existing approaches to digitalization assessment. Examining the digitalization of Armenia’s public administration system, Mel-

kumyan (2024) demonstrates that the country's digital progress is primarily assessed through institutional and technological indicators and international benchmarking frameworks. While documenting substantial improvements in digital government, the study argues that existing evaluation approaches remain predominantly supply-oriented, leaving citizen-level outcomes comparatively underexplored. Ayvazyan (2025) further evaluates digitalization across government, business and society in Armenia using international digitalization indices. Although the study confirms significant progress in digital transformation, it also reveals considerable variation in digitalization levels across sectors, reinforcing the need to complement supply-side assessments with citizen-centered measures of effectiveness. Beyond the public sector, Mkrtchyan et al. (2025) show that digital transformation in Armenian organizations remains uneven across stages of digital maturity, suggesting that technological adoption alone does not necessarily translate into advanced digital capabilities.

Trust, satisfaction and public value

A third stream treats citizen-side constructs as constitutive of effectiveness rather than as by-products. Verdegem and Verleye (2009) propose a comprehensive model for measuring user satisfaction in user-centered e-government, integrating quality, usefulness and ease-of-use perceptions. Welch, Hinnant and Moon (2005) demonstrate that satisfaction with e-government is linked to broader trust in government, while Tolbert and Mossberger (2006) show that well-designed digital services can themselves enhance process-based trust. Carter and Bélanger (2005) establish trust and the perceived attributes of the innovation as determinants of adoption, and Lindgren and Jansson (2013) clarify the conceptual specificity of public e-services as simultaneously a citizen interaction and an exercise of public authority. Taken together, this work establishes trust and satisfaction as dimensions of effectiveness in their own right.

The digital divide and distributional equity

A fourth stream foregrounds inequality in access, skills and use. Van Dijk's sequential model distinguishes motivational, material, skills and usage access, and emphasizes a "second-level" divide in which formal access coexists with unequal capability [van Dijk, 2006, 2020]. Norris (2001) and Helsper (2012) connect digital exclusion to wider social exclusion, and recent work shows that the digital divide conditions both trust in e-government and the actual level of e-government use across European countries [Pérez-Morote, Pontones-Rosa & Núñez-Chicharro, 2020]. Age and territorial — especially urban–rural — divides are particularly pronounced in transition economies. In most evaluation practice, however, equity is treated as a contextual moderator of adoption rather than as an intrinsic component of service effectiveness.

Synthesis and research gap

These streams address different halves of the same problem and rarely meet. Maturity indices measure supply but not experienced value; acceptance models measure individual intention but not institutional supply or distributional outcomes; and equity sits outside both as a moderating variable. There is, consequently, no widely adopted framework that simultaneously (i) combines supply-side readiness with measured demand-side citizen outcomes and (ii) treats distributional equity along age and territorial lines as an intrinsic dimension of effectiveness. Such integration is especially scarce for small post-Soviet transition states, where rapid supply-side gains can mask uneven citizen uptake. The framework developed in the next section is designed to close this gap.

Scientific novelty: a user-centered evaluation framework

The scientific novelty of this study is a user-centered approach to evaluating the effectiveness of public digital services that re-centers measurement on the citizen while retaining the supply-side perspective that maturity indices capture well. Rather than asking only whether the state has built capable digital infrastructure, the framework asks whether citizens know about, trust, are satisfied with, are able and willing to use, and can navigate public digital services — and whether these outcomes are distributed equitably across age groups and territories. The approach is organized as two tiers and a cross-cutting equity lens, and it is consolidated into a composite indicator.

A two-tier architecture

Tier I — Supply-side readiness comprises the technological and institutional conditions that make effective digital service possible: infrastructure, interoperability, availability and a coherent point of access on the technological side; coordination mandate, legal and data-governance basis, and administrative capacity on the institutional side. Tier I corresponds closely to what existing indices already measure, and the framework draws on them rather than duplicating them.

Tier II — Demand-side effectiveness comprises five measured citizen dimensions — awareness, trust, satisfaction, readiness to use and user experience (Table 1). This tier is the locus of the novelty: it converts the abstract aspiration of “user-centricity” into a set of directly measured citizen outcomes rather than assessor-judged service attributes.

Cross-cutting equity lens. Each Tier II dimension is measured not only as a population average but also across age cohorts and territorial strata. Equity is thus elevated from a background moderator to a constitutive property of effectiveness: a service ecosystem that performs well on average but poorly for older citizens or for residents outside the capital is, on this account, less effective than its averages suggest.

The User-Centered Digital Service Effectiveness Index (UC-DSEI)

To make the demand-side tier operational and comparable, the five citizen dimensions are consolidated into a composite, the User-Centered Digital Service Effectiveness Index (UC-DSEI), constructed in four steps.

(1) *Standardize each dimension.* For each dimension $d \in \{\text{awareness, trust, satisfaction, readiness, user experience}\}$, item responses are rescaled to the unit interval to yield a score $S_k \in [0, 1]$, higher values denoting more favourable citizen outcomes.

(2) *Aggregate to a base user-value score.* The base score is the weighted mean of the dimension scores, $V = \sum w_k S_k$, with $\sum w_k = 1$. Equal weights ($w_k = 0.20$) are the default; weights may be re-calibrated through expert judgement or factor analysis where a dimension is theorized to be decisive in a given context.

(3) *Measure disparity.* A disparity term $D \in [0, 1]$ captures the dispersion of outcomes across the equity strata. For each dimension and stratifier, the normalized gap between the best- and worst-performing group is computed; D is the mean of these gaps. $D = 0$ denotes uniform outcomes across groups; values approaching 1 denote extreme inequality.

(4) *Apply an equity adjustment.* The equity-adjusted index is $UC-DSEI = V \times (1 - \lambda D)$, where $\lambda \in [0, 1]$ is an inequality-aversion parameter that fixes how strongly disparities are penalized. $\lambda = 0$ reproduces the unadjusted base value; $\lambda = 1$ applies the full disparity discount; an intermediate $\lambda = 0.5$ is adopted as a baseline reflecting moderate equity weighting, with λ reported transparently and varied in sensitivity analysis.

The multiplicative discount follows the logic of inequality-adjusted composite measures, in which a high average is rewarded only to the extent that it is shared. The inequality-aversion parameter λ makes the normative choice explicit rather than hidden in the construction, and guards against an over-punitive collapse of the index. The result is bounded in $[0, 1]$ so that it can be read alongside the EGDI and reported over time.

Crucially, the framework does not collapse Tier I and Tier II into a single number. Supply-side readiness and the UC-DSEI are reported as a *paired profile*, because the diagnostic value of the approach lies precisely in the gap between them. A wide positive gap — strong supply, weaker citizen-experienced effectiveness — signals that the binding constraint on digital transformation is no longer technological but lies in awareness, trust, skills, experience or equity. This re-specification of the evaluation question — from “how capable is the state?” to “how much equitably-shared value do citizens realize?” — is the study’s core conceptual contribution.

Analysis

Applying the framework to Armenia

Armenia is a revealing test of the framework because its supply-side trajectory and its demand-side reality diverge. On Tier I, the country presents a comparatively strong and improving profile: a rising EGDI position now in the “very high” tier (≥ 0.75), a national

digitalisation strategy with a designated implementing agency and coordinating council, and an expanding catalogue of online platforms [United Nations, 2024; Government of the Republic of Armenia, 2021; SIGMA, 2025]. The analysis below turns to Tier II, reporting each dimension and its equity profile, and then reads the two tiers against one another.

Awareness (score 0.45)

Awareness is the first gate to effectiveness: a service that citizens do not know exists cannot deliver value regardless of its technical quality. Only 8.5% of respondents considered themselves very well informed about the digital tools available in Armenia's public administration; 38% judged their knowledge sufficient, 34.5% partial and 19% very limited or absent. Taken together, about 53.5% lack a full and clear picture of the digitalization process. Recognition of individual platforms is similarly uneven — e-gov.am (61.3%), the cadastre system (53.5%) and the state-payments system (47.2%) are widely known, whereas specialized or newer platforms such as e-permits.am (7.7%) and the human-rights strategy portal (6.3%) are barely recognized — indicating gaps in public communication rather than in provision. Standardized, the awareness dimension scores 0.45, the lowest of the five and the principal drag on citizen-experienced effectiveness.

Trust (score 0.64)

Trust was operationalized through citizens' confidence in the reliability and security of services. Reliability was rated good by 50.8% and excellent by 8.5%, but 30.2% rated it only sufficient and 7.8% were unable to evaluate it — an uncertainty that itself signals fragile confidence. The salience of trust is underscored by citizens' own priorities: when asked which factors matter most for effective digital services, 64.8% named reliability, including security and data protection — the second most-cited factor overall. Open-ended responses reinforced the point, repeatedly citing concerns about data security, cybersecurity and electronic-identification arrangements. The trust dimension scores 0.64; where confidence is thin, citizens default to in-person channels even when digital ones exist, so that supply-side investment fails to convert into use [cf. Welch, Hinnant & Moon, 2005; Pérez-Morote et al., 2020].

Satisfaction (score 0.56)

Satisfaction was measured on a 1–10 scale rating the degree of public-sector digitalization. Responses cluster in the middle: 9.2% gave the lowest ratings (1–3), about two-thirds responded in the mid-range, and 23.9% gave high ratings (8–10). Notably, 74% of the most satisfied respondents reside in Yerevan, an early signal of the territorial concentration analysed below. Satisfaction was closely tied to the comprehensiveness of services: 53.5% identified the consolidation of services in a single, integrated platform as a condition of an effective digital environment, implying that fragmentation across platforms directly suppresses satisfaction. Standardized, satisfaction scores 0.56 — acceptance with reservations rather than endorsement.

Readiness to use (score 0.73)

Readiness combines willingness to engage with self-efficacy in use. Willingness is high: 56.3% regard e-government as very important and a further 31% as quite important for strengthening the state–citizen relationship — 87.3% in total — while only 2.8% dismiss its importance, indicating minimal public resistance. Self-efficacy is more constrained: although most respondents transact digitally, only 26.7% almost never encounter difficulties, 52.8% encounter them sometimes and 11.3% often, with a skills gap that is most pronounced among older respondents. The dimension scores 0.73, the highest of the five. The implication is important: in Armenia the binding constraint is not citizens’ willingness to use digital services but their awareness, capability and the conditions of use.

User experience (score 0.63)

User experience captured the quality and friction of the interaction. Service attributes were rated moderately positively — speed good or excellent for 62.8%, accessibility for 62% and ease of use for 58.1% — yet the experience of using services tells a harder story. Some 64.1% of respondents reported encountering difficulties at least sometimes (52.8% sometimes, 11.3% often), and only 26.7% almost never did. The most common problems were technical failures (58.5%), unclear forms and complex procedures (37.3%), electronic-signature and identification issues (30.5%) and the absence of effective help or feedback channels (22.9%). That citizens rank ease of use as the single most important attribute (70.4%) while simultaneously experiencing this level of friction explains why the dimension scores 0.63: services are available and operate at acceptable speed, but have not yet reached the usability and reliability characteristic of a mature digital environment.

Equity: age and territorial disparities

The equity lens is where the framework adds the most diagnostic value, because the population averages above conceal large group differences. The starkest cleavage is territorial. In Yerevan, 87.5% of respondents are very well or sufficiently informed and the uninformed are virtually absent; across the regions the corresponding informed share falls to roughly 22%, with “not sufficiently informed” responses exceeding 48–53% in Ararat, Gegharkunik, Tavush and Aragatsotn and the “very well informed” group almost absent. The same concentration appears in satisfaction, where the highly satisfied are about 48% of Yerevan respondents but only around 10% elsewhere. The second cleavage is age: the combined “very well” and “sufficiently informed” share peaks at 62% among those aged 36–45 and 57% among 26–35, but falls to about 30% among those aged 55 and over, of whom only 3% are very well informed. These two cleavages — territory and age — are the principal sources of the disparity term and therefore the principal drag on the equity-adjusted index. Consistent with this, when respondents named the main obstacles to effective digital governance, low public awareness led by a wide margin (76.1%), ahead of skills and staffing shortages (55.6%) and infrastructure deficiencies (49.3%). Table 2 summarizes the equity profile of the gating dimensions.

Table 2. Equity profile of the gating dimensions (informed / highly-satisfied share, %)

Indicator	Yerevan		Regions		Normalized gap	
Aware (very well + sufficient)	87.5		~22.4		0.74	
Highly satisfied (8–10)	~47.8		~9.9		0.79	
Aware by age	18–25	26–35	36–45	46–55	55+	Gap
Informed share (%)	~45	57	62	~40	~30	0.52

Note. Regional shares for awareness derived from the reported overall (46.5%) and Yerevan (87.5%) informed shares given Yerevan's 37% sample weight; satisfaction shares derived from the 8–10 group (23.9% overall, 74% resident in Yerevan). Normalized gap = (best – worst) / best.

Table 3. UC-DSEI computation for Armenia (demand-side, [0, 1] scale)

Component	Value	Basis
Awareness (S_1)	0.45	self-rated awareness
Trust (S_2)	0.64	reliability / security rating
Satisfaction (S_3)	0.56	1–10 satisfaction
Readiness to use (S_4)	0.73	willingness + self-efficacy
User experience (S_5)	0.63	speed / access / ease ratings
Base value V (equal weights)	0.60	mean of S_1 – S_5
Disparity D	0.69	mean normalized age + territorial gaps
UC-DSEI ($\lambda = 0$)	0.60	no equity penalty
UC-DSEI ($\lambda = 0.5$, baseline)	0.40	moderate equity weighting
UC-DSEI ($\lambda = 1$)	0.19	full equity penalty
Supply-side reference (EGDI 2024)	≥ 0.75	“very high” tier (United Nations, 2024)

Reading the tiers together: the supply–demand gap

The synthesis is the analytical payoff. Across the five demand-side dimensions the equal-weighted base user-value score is $V = 0.60$. The disparity term, computed from the normalized age and territorial gaps in the gating dimensions, is high ($D = 0.69$), reflecting the severity of the Yerevan–regions divide in particular. Applying the baseline inequality-aversion parameter ($\lambda = 0.5$) gives an equity-adjusted UC-DSEI of approximately 0.40; the index ranges from 0.60 with no equity penalty ($\lambda = 0$) to 0.19 under full penalization ($\lambda = 1$). Whichever weighting is chosen, the citizen-experienced effectiveness of Armenia's di-

gital services sits well below the country's "very high" supply-side position ($\text{EGDI} \geq 0.75$). Table 3 reports the computation.

In framework terms, the binding constraint on Armenia's digital transformation has shifted from the technological to the citizen and equity dimensions. The state supplies capable infrastructure and citizens are willing to use it, but awareness is low, trust is fragile, the experience is frictional, and the value that does exist is captured disproportionately by the capital and by younger, working-age cohorts. A supply-side reading would record success; the user-centered reading locates the work that remains.

Conclusions

This article has argued that the effectiveness of public digital services cannot be read off supply-side maturity, and it has offered a remedy: a user-centered evaluation approach that measures effectiveness through citizens' awareness, trust, satisfaction, readiness to use and user experience, and that treats age and territorial equity as intrinsic to effectiveness rather than as background context. The approach is consolidated in the User-Centered Digital Service Effectiveness Index (UC-DSEI), an equity-adjusted composite that rewards shared, citizen-experienced value, and it is designed to be reported alongside — not in place of — maturity indices such as the EGDI. Applied to Armenia on the basis of a stratified survey of 489 residents, the framework exposes a gap that supply-side rankings obscure. The demand-side base value of 0.60, once discounted for a high disparity term (0.69), yields an equity-adjusted index of roughly 0.40 — far below the country's "very high" EGDI standing. The shortfall is concentrated in awareness (the lowest-scoring dimension, 0.45) and, above all, in the territorial divide between Yerevan and the regions, compounded by an age gradient that leaves older citizens markedly less informed and less served. Tellingly, readiness to use is the strongest dimension (0.73): Armenians are willing to use digital government, which means the constraints are addressable through awareness, capability and equity policy rather than through persuasion.

The practical implication is that the evaluation — and therefore the steering — of digital transformation should be institutionalized around demand-side and equity indicators, so that monitoring tracks not only how much the state builds but how much equitably-shared value citizens realize. For Armenia specifically, the diagnostic points policy attention toward raising public awareness, strengthening trust through demonstrable reliability and data protection, and closing age- and territory-based gaps as the current binding constraints. The study's theoretical contribution is to bridge three previously separate literatures — information-systems success, e-government maturity, and the digital divide — within a single, operational instrument that makes equity a measured dimension of effectiveness.

The limitations follow from the design: the application is cross-sectional, single-country and based on self-reported perceptions; the sample is comparatively well-educated, so the true population shortfalls may be larger; and the index weights, the disparity specification

and the inequality-aversion parameter are open to calibration. These define a clear research agenda — longitudinal application to test whether demand-side effectiveness converges with supply-side gains, comparative validation across other transition states, disaggregation of the disparity term across all five dimensions where data permit, and sensitivity analysis of λ and of the dimension weights. Pursued in this direction, user-centered evaluation can help ensure that digital transformation is judged — and built — by the value it delivers to all citizens.

References

1. Ayvazyan, T. (2025). Assessing Digitalization Levels within Armenian Government, Business, and Society. *Economics, Finance and Accounting*, 1(15).
2. Carter, L., & Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal*, 15(1), 5–25.
3. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
4. DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9–30.
5. European Commission. (2023). *eGovernment Benchmark 2023: Connecting digital governments*. Publications Office of the European Union.
6. Gil-García, J. R., & Pardo, T. A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Government Information Quarterly*, 22(2), 187–216.
7. Government of the RA. (2021). *Digitalisation Strategy of Armenia 2021–2025*. Yerevan.
8. Helsper, E. J. (2012). A corresponding fields model for the links between social and digital exclusion. *Communication Theory*, 22(4), 403–426.
9. Layne, K., & Lee, J. (2001). Developing fully functional e-government: A four stage model. *Government Information Quarterly*, 18(2), 122–136.
10. Lindgren, I., & Jansson, G. (2013). Electronic services in the public sector: A conceptual framework. *Government Information Quarterly*, 30(2), 163–172.
11. Melkumyan, N. (2024). The Current State of the Level of Digitalization of the Public Administration System of the Republic of Armenia. *Messenger of ASUE*, 3(78), 67–80.
12. Mkrtchyan, T., et al. (2025). Comparative Analysis and Assessment of the Level of Digitalization of Armenian and Russian Organizations by Types of Economic Activity., 7(2), 1099.
13. Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge University Press.
14. OECD. (2020). *The OECD Digital Government Policy Framework: Six dimensions of a digital government* (OECD Public Governance Policy Papers No. 02). OECD Publishing.
15. OECD. (2024). *Advancing the digital transformation of Armenian businesses*. OECD Publ.
16. Pérez-Morote, R. et al. (2020). The effects of e-government evaluation, trust and the digital divide in the levels of e-government use in European countries. *TFSC*, 154, 119973.
17. Scott, M., DeLone, W., & Golden, W. (2016). Measuring eGovernment success: A public value approach. *European Journal of Information Systems*, 25(3), 187–208.
18. SIGMA. (2025). *Public administration in Armenia 2025: Service delivery and digitalisation*. OECD/SIGMA.
19. Tolbert, C. J., & Mossberger, K. (2006). The effects of e-government on trust and confidence in government. *Public Administration Review*, 66(3), 354–369.
20. United Nations Department of ESA. (2024). *UN E-Government Survey 2024*. United Nations.

21. van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4–5), 221–235.
22. van Dijk, J. (2020). *The digital divide*. Polity Press.
23. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478.
24. Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS*, 36(1), 157.
25. Verdegem, P., & Verleye, G. (2009). User-centered e-government in practice: A comprehensive model for measuring user satisfaction. *Government Information Quarterly*, 26(3), 487–497.
26. Welch, E. W., Hinnant, C. C., & Moon, M. J. (2005). Linking citizen satisfaction with e-government and trust in government. *JPART*, 15(3), 371–391.
27. Wirtz, B. W., & Daiser, P. (2018). A meta-analysis of empirical e-government research and its future research implications. *International Review of Administrative Sciences*, 84(1), 144–163.
28. Yernjakyan, T. (2008). *E-Government in the Republic of Armenia: Current Situation and Development Perspectives*. Master's Thesis, American University of Armenia.

Tatul MKRTCHYAN, Narek MELKUMYAN

Evaluating public digital services beyond supply-side maturity: a user-centered framework and evidence from Armenia

Key words: digital public services, e-government evaluation, user-centered evaluation, citizen trust, digital divide, user experience, equity, public administration; Armenia

Global rankings such as the United Nations E-Government Development Index (EGDI) have made the digital maturity of states increasingly visible, yet they measure predominantly what governments supply — online services, infrastructure and human-capital endowments — rather than the value that citizens actually derive from digital public services. This article argues that supply-side maturity is a necessary but insufficient condition for effective digital government, and that effectiveness must be assessed from the standpoint of the citizen-user. Drawing on a stratified field survey of 489 residents of Armenia — a country that advanced into the “very high” EGDI group while continuing to display uneven citizen uptake — the study develops and applies a user-centered approach for evaluating the effectiveness of public digital services. The framework integrates two supply-side tiers (technological and institutional readiness) with five demand-side dimensions — citizen awareness, trust, satisfaction, readiness to use and user experience — and a cross-cutting equity lens spanning age and territorial disparities. These dimensions are consolidated into an equity-adjusted composite, the User-Centered Digital Service Effectiveness Index (UC-DSEI), in which measured user value is discounted by the dispersion of outcomes across demographic and territorial groups. In the Armenian case, the demand-side dimensions yield a base user-value score of 0.60 on a [0, 1] scale, but a high disparity term (0.69), driven chiefly by a Yerevan–regions divide and an age gradient, reduces the equity-adjusted index to approximately 0.40 — well below the country’s “very high” supply-side position. The contribution is both conceptual — a multidimensional, equity-sensitive evaluation model that complements maturity indices — and practical, offering public administrations a diagnostic instrument for steering digital transformation toward inclusive, citizen-valued outcomes.