

DEVELOPMENT OF A DIGITAL INCLUSION MODEL FOR ENHANCING CITIZEN E-PARTICIPATION IN PUBLIC GOVERNANCE: A CONCEPTUAL FRAMEWORK FOR KAZAKHSTAN

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Abstract

Digital government can widen opportunities for citizens to obtain information, express views, and contribute to public decisions. However, the availability of online platforms does not guarantee equal or meaningful participation. Citizens may remain excluded because of unreliable access, limited digital skills, inaccessible interfaces, low trust, weak civic confidence, or the expectation that public institutions will not respond. This article develops a Digital Inclusion–e-Participation in Governance (DI-EPG) model for analysing these interrelated barriers in Kazakhstan and comparable digitalising states. The model is constructed through a theory-driven synthesis of digital inequality, technology acceptance, civic efficacy, e-participation, and responsive-governance literature, supplemented by analysis of Kazakhstan’s digital-government context. It treats citizen digital inclusion as a multidimensional capability comprising meaningful access, digital skills, accessibility and usability, trust and digital safety, and perceived relevance and motivation. The model proposes that these dimensions influence e-information, e-consultation, and e-decision-making both directly and indirectly through civic efficacy and participation readiness. Institutional responsiveness is positioned as both a direct determinant of continued participation and a moderator of the relationship between readiness and actual participation. The article specifies testable hypotheses, measurement indicators, and an empirical validation design using a multilingual citizen survey, structural equation modelling, and follow-up interviews. The proposed framework shifts attention from the mere provision of digital channels to citizens’ practical ability to use them and to see evidence that their participation matters.

Keywords:

digital inclusion; e-participation; public governance; digital divide; institutional responsiveness; civic efficacy; Kazakhstan

Authors' individual contribution:

Conceptualization, validation, supervision, project administration, and review & editing – A.A.; investigation, literature synthesis,

visualization, and original draft – M.M.; methodology and final approval – A.A., M.M.

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The Authors declare that there is no conflict of interest.

1. Introduction

Digital government has moved from being a supplementary service channel to becoming part of the ordinary relationship between citizens and public institutions. Portals, mobile applications, open-data resources, online consultations, petition systems, and digital appeal mechanisms allow citizens to interact with government without being physically present. These tools can lower the time and financial costs of participation, broaden access to public information, and create new routes for citizens whose voices are rarely heard through conventional meetings or formal organisations. Yet the same shift can also produce a quieter form of exclusion. When participation is increasingly organised through digital channels, a citizen who cannot access, understand, trust, or effectively use those channels may be formally included but practically absent.

This distinction is especially important in countries that have achieved rapid progress in digital public-service delivery. Kazakhstan ranked twenty-fourth among 193 United Nations Member States in the 2024 E-Government Development Index, with an index value of 0.9009 (United Nations Department of Economic and Social Affairs [UN DESA], 2024). The country has developed a broad digital-government ecosystem that includes eGov.kz, eGov Mobile, Open Government resources, and e-Otinish, a unified platform through which individuals and organisations can submit and track appeals. These developments demonstrate substantial institutional and technical capacity. They do not, however, answer a different question: which citizens are able and willing to use digital channels to take part in governance, and under what conditions does their participation become meaningful?

Research on the digital divide has progressively moved beyond a simple distinction between people who are connected and those who are not. Contemporary approaches examine differences in the quality of access, skills, patterns of use, and the social outcomes that people obtain from technology (Helsper, 2021; van Dijk, 2020). A person may own a smartphone yet depend on limited mobile data, struggle to authenticate on a government platform, avoid online participation because of privacy concerns, or lack confidence that a contribution will influence an administrative or policy process. These constraints are cumulative. They shape not only whether a citizen can open a platform but also whether the citizen can understand an issue, formulate a view, submit it successfully, and remain engaged after receiving or not receiving a response.

The e-participation literature has developed useful classifications of participation activities, actors, technologies, and policy stages (Macintosh, 2004; Medaglia, 2012; Sæbø et al., 2008). The United Nations commonly distinguishes e-information, e-consultation, and e-decision-making. These levels capture a progression from receiving public information to communicating views and, at the most demanding level, contributing to decisions. Nevertheless, many e-participation models begin with an available platform or a participatory process and pay less attention to the unequal capabilities citizens bring to that process. Conversely, digital inclusion research often measures general internet use or socioeconomic outcomes without connecting those capabilities to specific forms of public participation.

This article addresses that gap by developing a Digital Inclusion–e-Participation in Governance (DI-EPG) model. The central argument is that citizen e-participation depends on more than access and skills. It emerges from the interaction of five inclusion dimensions: meaningful access, digital skills, accessibility and usability, trust and digital safety, and relevance and motivation with citizens' sense of civic efficacy and the responsiveness of public institutions. The model therefore links the citizen side of inclusion to the institutional side of participation.

The article makes three contributions. First, it integrates digital inclusion and e-participation into one explanatory framework rather than treating them as separate policy areas. Second, it introduces institutional responsiveness as a mechanism that can either convert initial participation into sustained engagement or reinforce withdrawal and distrust. Third, it provides an operational measurement design suitable for empirical testing in Kazakhstan through a multilingual survey and follow-up interviews. The framework is presented as a self-contained scholarly contribution and as a model that can be adapted to other digitalising public administrations.

2. Literature Review

2.1. Digital inclusion as a multidimensional capability. Early digital-divide research concentrated on physical access to computers and the Internet. This focus was understandable when connectivity and device ownership were scarce. Over time, however, access became a necessary but insufficient explanation of digital inequality. Norris (2001) showed that information poverty and civic engagement are intertwined with access inequalities, while van Dijk (2020) describes access as a sequential process involving motivation, material access, skills, and usage. Helsper (2021) similarly argues that digital inequalities are embedded in existing social inequalities and become significant through the benefits and harms people experience in different areas of life. Warschauer (2003)

emphasises that meaningful access depends on physical, digital, human, and social resources rather than hardware alone.

This broader perspective changes how digital inclusion should be measured. A household may be technically connected while several members share one device. A rural user may have mobile coverage but experience unstable speed or high data costs. A citizen with sufficient income and equipment may still face barriers because a public platform is not available in a preferred language, is incompatible with assistive technology, or uses administrative terminology that is difficult to understand. Digital inclusion is therefore not a binary status. It is a practical capability to use digital systems in ways that serve a person's goals.

The capability approach provides a useful normative basis for this interpretation. Sen (1999) distinguishes resources from the real freedoms people have to achieve valued outcomes. Applied to digital governance, the relevant outcome is not merely possession of a connected device. It is the genuine opportunity to obtain public information, communicate with authorities, join consultations, and influence decisions without disproportionate cost or risk. This approach also draws attention to conversion factors: personal characteristics, social conditions, and institutional arrangements that determine whether a resource becomes a usable opportunity.

Digital inequality can also be self-reinforcing. People with stronger social, educational, and economic resources often use technology in ways that generate additional benefits, while disadvantaged groups may encounter repeated failures or low-value uses (Ragnedda et al., 2022). In governance, this pattern may mean that already active and well-resourced citizens dominate digital consultations, while groups most affected by public decisions remain less visible. A digital channel may therefore increase the total number of contributions without improving representativeness.

2.2. Citizen e-participation in public governance. E-participation refers to the use of information and communication technologies to support citizen involvement in public affairs and government processes. It covers a wide range of activities: accessing information, commenting on draft policies, signing petitions, reporting local problems, submitting appeals, joining online deliberation, and contributing to public decisions. Macintosh (2004) proposed the influential categories of e-enabling, e-engaging, and e-empowering, while the United Nations framework distinguishes e-information, e-consultation, and e-decision-making. These categories are not simply technological stages. They indicate different distributions of information, voice, and influence.

E-information is the foundation of participation because citizens need timely, understandable, and accessible information before they can form a view. E-consultation creates channels through which citizens can submit opinions, complaints, proposals, or feedback. E-decision-making goes

further by linking citizen input to agenda setting, policy choice, budgeting, rulemaking, or other decisions. In practice, many government platforms are strong in information provision and transactional services but weaker in showing how citizen contributions affect decisions (Le Blanc, 2020).

The literature also shows that participation is shaped by actors, institutions, rules, technologies, and the policy context rather than by platforms alone (Sæbø et al., 2008). Earlier work distinguishes managerial, consultative, and participatory patterns of online state-citizen interaction (Chadwick & May, 2003), while later studies describe citizen co-production and citizen-sourcing as extensions of digital governance (Linders, 2012; Nam, 2012). Comparative evidence also links e-government development with the diffusion of e-democracy practices (Lee et al., 2011). Medaglia (2012) found that e-participation research had expanded but remained fragmented across disciplines and frequently concentrated on projects rather than cumulative theory. Sussha and Grönlund (2012) similarly called for greater conceptual clarity and systematic development of the field. A citizen-centred model should therefore explain both participation capability and the institutional conditions under which participation is recognised.

Technology-acceptance theories offer part of this explanation. Perceived usefulness and ease of use influence whether individuals adopt a system (Davis, 1989), while performance expectancy, effort expectancy, social influence, and facilitating conditions shape use intentions in the unified theory of acceptance and use of technology (Venkatesh et al., 2003). E-government research further identifies trust and perceived risk as central to citizens' willingness to use online public services (Bélanger & Carter, 2008; Carter & Bélanger, 2005). These theories are useful but do not fully capture the civic nature of e-participation. A platform may be easy to use and still attract little participation if citizens see no reason to contribute or believe that authorities will disregard their input.

2.3. Civic efficacy and institutional responsiveness. Civic efficacy refers to the belief that a person understands public affairs sufficiently to participate and that participation can have an effect. The distinction between internal efficacy (confidence in one's own competence) and external efficacy (belief that authorities are responsive) is grounded in classic political-efficacy research (Campbell et al., 1954; Niemi et al., 1991). In the DI-EPG model, internal civic efficacy is measured as an individual psychological belief, whereas institutional responsiveness is measured as an assessment of observable or expected organisational behaviour, including acknowledgement, timeliness, explanation, and visible follow-up. The constructs are therefore theoretically related but not interchangeable, and their discriminant validity will be tested empirically. In a digital environment, civic efficacy is partly shaped by digital capability. Citizens who cannot navigate information,

evaluate sources, or complete an online procedure are less likely to feel competent to participate. At the same time, competence alone is unlikely to sustain engagement when public bodies appear unresponsive.

Institutional responsiveness is therefore a critical link between participation opportunities and participation outcomes. Responsiveness can be observed in acknowledgement of submissions, clarity and timeliness of replies, publication of consultation results, explanation of how contributions were used, and visible changes following citizen input. Government response behaviour can influence whether citizens return to a platform, recommend it to others, or withdraw from future participation. The OECD (2020) stresses that meaningful citizen participation requires a clear link to decision-making and feedback to participants. Without that link, digital engagement risks becoming a one-way collection of views.

The distinction between service interaction and governance participation is also important. A citizen may regularly use e-government to obtain a certificate or make a payment but never engage in a consultation or policy discussion. Service use can develop familiarity and trust, yet it does not automatically produce civic participation. The DI-EPG model therefore treats prior e-service experience as a control and facilitating factor rather than as evidence of e-participation itself.

2.4. Kazakhstan's digital-governance context. Kazakhstan provides a relevant setting for examining the transition from digital service delivery to inclusive digital participation. The national e-government portal was officially launched in 2006 and the wider ecosystem now includes eGov Mobile, open-data and Open Government resources, and the e-Otinish system (Government of Kazakhstan, 2026a; Amanbek et al., 2018). Official guidance describes e-Otinish as a unified channel through which users can submit and track appeals, review interaction histories, evaluate response quality, complain about execution, and, where applicable, file claims with the courts (Electronic Government of Kazakhstan, 2026). The presence of these channels means that the main research problem is no longer whether a digital interface exists. It is whether different groups of citizens can convert those interfaces into effective participation.

Kazakhstan's large territory, uneven settlement patterns, linguistic diversity, and differences in age, education, disability status, and digital experience make a multidimensional approach particularly relevant. National statistics monitor Internet use, household connectivity, and digital literacy, but aggregate connectivity indicators may conceal barriers experienced during specific governance tasks. A citizen who can communicate through social media may still find a formal consultation difficult. A user who can obtain a service through a mobile application may not know where draft policies are published or how consultation outcomes are reported.

The institutional design of participation also matters. E-Otinish is primarily structured around appeals, complaints, and applications, while broader participatory governance includes consultation, deliberation, agenda setting, and co-creation. These activities require not only a submission mechanism but also comprehensible public information, transparent procedures, and feedback on influence. The proposed model is intended to identify where the participation chain breaks: before access, during interaction, or after a contribution reaches the institution.

2.5. International benchmarks and transferable practices. International comparison shows why digital-government maturity and inclusive participation should be assessed separately. In the 2024 United Nations survey, Kazakhstan ranked 24th on the E-Government Development Index (EGDI), with a score of 0.9009, and 27th on the E-Participation Index (EPI), with a score of 0.8493. The leading digital-government systems also recorded higher participation scores: Denmark had an EGDI of 0.9847 and an EPI of 0.9863; Estonia, 0.9727 and 0.9589; Singapore, 0.9691 and 0.9589; and the Republic of Korea, 0.9679 and 0.9726 (United Nations Department of Economic and Social Affairs [UN DESA], 2024). These figures do not establish that a particular platform causes participation. They do, however, show the value of examining the participation layer separately from the maturity of online services.

The OECD's 2025 Digital Government Index provides a second point of comparison. The OECD average rose from 0.61 in 2023 to 0.70 in 2025, while the average for the user-driven dimension rose from 0.61 to 0.71. This dimension is directly relevant to digital inclusion because it assesses whether governments involve users in co-design and testing, use feedback mechanisms, and take strategic and operational measures to address the digital divide. The highest user-driven scores were recorded by Australia (0.95), Portugal (0.94), the United Kingdom (0.93), Korea (0.91), and Chile (0.90) (Organisation for Economic Co-operation and Development [OECD], 2026). The benchmark therefore treats inclusion as a feature of public-sector capability, not simply as a household connectivity issue.

Table 1. International practices relevant to the DI-EPG model

Practice	Official evidence	DI-EPG linkage and lesson for Kazakhstan
Estonia: collective proposals	The official citizen-initiative route allows collective proposals to be submitted to parliament once the applicable eligibility and signature requirements are met. The revised manuscript avoids relying on a sitting-review news item for the operative rules and directs readers to official platform and legislative documentation.	A clear threshold and a formal route to parliament can strengthen relevance, civic efficacy, and confidence that participation reaches a decision-making body. Eligibility, status, and the next procedural step should be visible from the start.

Taiwan: Public Policy Online Participation Platform	The official Directions for Implementing Online Participation in Public Policy specify the procedural conditions for proposals and require a comprehensive response explaining whether public input was adopted and why in the circumstances defined by the Directions (National Development Council, 2018).	Time limits and public reasons turn “responsiveness” into a measurable institutional commitment. Kazakhstan could publish comparable response standards for consultations and collective proposals, with transparent explanations for acceptance, partial adoption, or rejection.
Republic of Korea: e-People and People’s Idea Box	Official ACRC documentation describes e-People as a cross-agency channel for petitions, complaints, proposals, and administrative requests. The revised text uses the source to demonstrate routing and institutional integration and does not treat submission volume alone as evidence of meaningful participation.	A common routing layer can reduce the burden of finding the responsible agency and can support cross-agency analysis. The scale of submissions is useful operational evidence, but volume should be assessed together with response quality, inclusion, and policy consequences.
United Kingdom: assisted digital and accessibility standards	Government service guidance requires support for users who lack access, skills, confidence, trust, or motivation. Support may be provided by phone, in person, or through webchat and should be based on user research. Public-sector websites and apps are expected to meet WCAG 2.2 AA and publish an accessibility statement (Government Digital Service, 2024, 2025).	Assistance and accessibility are treated as core service requirements rather than optional outreach. This maps directly to meaningful access, digital skills, accessibility and usability, and trust. Equivalent support should be available in the user’s preferred language and through non-digital channels where necessary.

Source: Compiled by the authors.

The cases in Table 1 differ in legal tradition and administrative structure, but they converge on a small set of design principles: a formal connection between citizen input and a competent authority; published thresholds and timelines; reasons for institutional decisions; assisted and accessible channels; and reliable routing across agencies. These principles support the DI-EPG model’s emphasis on both citizen capability and institutional responsiveness. They should be adapted rather than copied. In Kazakhstan, adaptation would need to reflect Kazakh- and Russian-language use, rural connectivity, disability-related needs, the relationship between e-Otinish and the Open Government portals, data-protection requirements, and existing administrative procedures.

3. Materials and Methods

This article uses theory-driven conceptual model development. The process consisted of four stages. First, the core phenomenon was defined as citizens’ meaningful use of digital channels to

participate in public governance, rather than general Internet use or routine digital service consumption. Second, established literature on digital inequality, technology acceptance, e-government trust, civic efficacy, e-participation, and responsive governance was synthesised to identify recurring explanatory mechanisms. Third, the mechanisms were organised into citizen-level capabilities, a mediating readiness mechanism, an institutional condition, and participation outcomes. Fourth, each construct was translated into measurable indicators and testable relationships suitable for subsequent empirical validation.

The approach is integrative rather than a claim of exhaustive systematic review. Foundational and recent peer-reviewed studies were combined with international policy frameworks and official information on Kazakhstan's digital-government environment. International benchmarking used official UN and OECD indices together with government documentation from Estonia, Taiwan, the Republic of Korea, and the United Kingdom. The cases were selected purposively because they represent different mechanisms relevant to the model: a formal route for collective proposals, time-bound public responses, cross-agency complaint and idea routing, and assisted digital and accessibility requirements. They are used to identify transferable design principles, not to rank whole governance systems. A construct was retained when it met three criteria: it represented a theoretically distinct barrier or enabler; it could plausibly influence participation; and it could be measured at the citizen or institutional level.

The resulting DI-EPG model contains one multidimensional antecedent construct (citizen digital inclusion), one mediating mechanism (civic efficacy and participation readiness), one institutional construct (responsiveness), and one multidimensional outcome (citizen e-participation). Socio-demographic conditions, place of residence, disability-related needs, preferred language, and prior e-government experience are included as controls and grouping variables.

4. Results and Discussion

4.1. Proposed Digital Inclusion–e-Participation in Governance Model

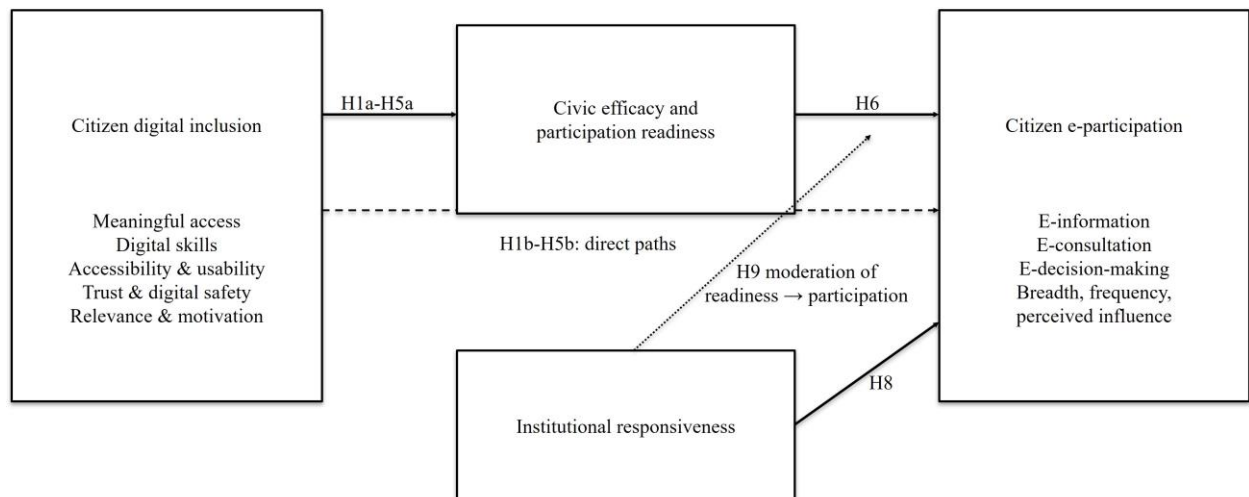


Figure 1. Proposed Digital Inclusion–e-Participation in Governance (DI-EPG) model.

4.1.1. Citizen digital inclusion. Meaningful access is the reliable and affordable availability of an appropriate device, connection, authentication method, and private setting for participation. The word meaningful is important. Occasional connectivity or access through a shared device may be adequate for reading news but inadequate for preparing a detailed submission, attaching documents, or following a consultation over time. Measurement should therefore cover reliability, affordability, device suitability, authentication access, and the ability to participate without depending on another person.

Digital skills refer to operational, informational, communicative, and protective capabilities. Operational skills include navigating a platform, uploading documents, and completing authentication. Information skills include locating official materials, understanding their relevance, and distinguishing authoritative information. Communicative skills involve expressing a view clearly and using the appropriate channel. Protective skills include recognising fraud, managing personal data, and understanding the consequences of online disclosure.

Accessibility and usability concern whether a platform can be used by people with different abilities, languages, devices, and levels of experience. This dimension includes compatibility with assistive technologies, readable layouts, clear navigation, plain language, mobile optimisation, error recovery, and availability in Kazakh and Russian. Accessibility is not a specialised feature for a small group; it is part of general service quality and determines whether citizens can participate independently.

Trust and digital safety combine confidence in the platform, the institution, and the handling of personal data. Citizens may avoid participation when they fear misuse of information, identity exposure, fraud, retaliation, or ineffective protection of personal data. Trust is particularly important

when the contribution concerns a complaint, criticism of an authority, or a sensitive local issue. The construct should distinguish trust in technical security from trust in institutional fairness and integrity.

Relevance and motivation capture whether citizens know that a participatory opportunity exists, understand why it matters, and see the expected effort as worthwhile. Motivation is shaped by personal interest, the perceived importance of the issue, social encouragement, available time, and previous participation experience. This dimension prevents the model from treating non-use as a purely technical problem. Some citizens possess access and skills but do not participate because opportunities are poorly communicated or seem disconnected from everyday concerns.

Taken together, the five dimensions form citizen digital inclusion for governance. They are related but non-interchangeable. Strong skills do not compensate for inaccessible design, and reliable Internet does not compensate for fear that personal data will be mishandled. For empirical analysis, the dimensions should first be tested separately. A higher-order inclusion construct may be estimated if the measurement model demonstrates adequate reliability, validity, and conceptual fit.

4.1.2. Civic efficacy and participation readiness. Civic efficacy and participation readiness explain how inclusion capability becomes action. Internal civic efficacy reflects confidence in understanding a public issue, forming a view, and communicating it through an official channel. Participation readiness adds the immediate willingness and intention to act when a relevant opportunity appears. Digital inclusion is expected to strengthen efficacy because citizens who can find information, navigate systems, and manage risks are more likely to feel capable of participation. Efficacy, in turn, should increase the probability of actual participation.

The mediator is necessary because capability does not always lead directly to behaviour. A digitally skilled citizen may still feel that policy processes are too complex or that only experts should contribute. Conversely, a highly motivated citizen with modest technical skills may seek assistance and participate. To avoid an asymmetric specification, the revised model estimates both mediated and direct paths for each of the five inclusion dimensions. The dimension-level model is tested first. A higher-order citizen-digital-inclusion construct and an aggregate mediation path are estimated only if reliability, convergent validity, discriminant validity, and higher-order model fit are adequate. This two-tier strategy makes the level of analysis explicit and prevents the aggregate hypothesis from being treated as unconditional.

4.1.3. Institutional responsiveness. Institutional responsiveness refers to citizens' experience or reasonable expectation that public bodies acknowledge, consider, and respond to digital contributions. It includes timely acknowledgement, understandable replies, procedural transparency,

publication of consultation summaries, explanation of accepted and rejected proposals, and evidence that contributions can influence decisions. Responsiveness is positioned in the model in two ways.

First, it has a direct effect on participation. Citizens are more likely to continue using a channel when previous engagement produced a clear response. Second, it moderates the relationship between readiness and actual participation. When institutions are perceived as responsive, a willing citizen has a stronger reason to act. When institutions are perceived as unresponsive, even citizens with strong access, skills, and civic confidence may decide that participation is not worth the effort. This interaction reflects a central principle of the model: inclusive participation is jointly produced by citizen capability and institutional behaviour.

4.1.4. Citizen e-participation outcomes. Citizen e-participation is measured across e-information, e-consultation, and e-decision-making. E-information includes searching for and using official information to understand public issues, budgets, draft regulations, programmes, or local plans. E-consultation includes submitting feedback, appeals, complaints, comments, proposals, survey responses, or petitions. E-decision-making includes participation in processes where citizen input is visibly linked to priorities, resource allocation, rulemaking, or collective decisions.

The outcome should capture more than whether a person has ever used a platform. Relevant indicators include breadth of activities, frequency, recent participation, completion of intended tasks, perceived quality of interaction, and perceived influence. Measuring influence is difficult because citizens may not know how a decision was made. It should therefore be assessed through transparent feedback and perceived consideration, not through an unsupported claim that an individual contribution caused a policy outcome.

4.1.5. Research hypotheses. The model generates the following hypotheses for empirical testing:

H1a. Meaningful access positively affects civic efficacy and participation readiness.

H1b. Meaningful access positively affects citizen e-participation.

H2a. Digital skills positively affect civic efficacy and participation readiness.

H2b. Digital skills positively affect citizen e-participation.

H3a. Accessibility and usability positively affect civic efficacy and participation readiness.

H3b. Accessibility and usability positively affect citizen e-participation.

H4a. Trust and perceived digital safety positively affect civic efficacy and participation readiness.

H4b. Trust and perceived digital safety positively affect citizen e-participation.

H5a. Perceived relevance and motivation positively affect civic efficacy and participation readiness.

H5b. Perceived relevance and motivation positively affect citizen e-participation.

H6. Civic efficacy and participation readiness positively affect citizen e-participation.

H7a-H7e. Civic efficacy and participation readiness mediate the relationship between each digital-inclusion dimension and citizen e-participation.

H7f. Conditional on support for a valid higher-order citizen-digital-inclusion construct, civic efficacy and participation readiness mediate the relationship between aggregate citizen digital inclusion and e-participation.

H8. Perceived institutional responsiveness positively affects citizen e-participation.

H9. Institutional responsiveness strengthens the positive relationship between participation readiness and actual e-participation.

RQ1. Do the structural relationships vary across age, urban-rural residence, disability-related accessibility needs, preferred language, and previous e-government experience? Multigroup comparisons are exploratory and will be interpreted only where subgroup sample sizes and measurement invariance are adequate.

4.2. Operationalisation and Empirical Validation Plan

The proposed model can be validated through an explanatory sequential mixed-method design. The quantitative phase should survey adult residents of Kazakhstan who have used the Internet during the previous twelve months. Requiring prior use of a government platform is not recommended for the full sample because complete non-use may itself be an inclusion outcome. A screening question can distinguish non-users, service-only users, and citizens with participation experience.

A target sample of 800-1,000 completed responses is proposed, with the final minimum determined through an a priori power analysis based on the number of predictors, expected effect sizes, significance level, desired statistical power, and planned interaction tests. Quotas or stratification should cover region, urban and rural residence, age, gender, and preferred survey language. For multigroup analysis, the study will aim for at least 120 usable cases in each substantively important comparison group; groups falling below this threshold will be analysed descriptively or combined only where theoretically justified. Measurement invariance will be assessed before comparing structural paths. Additional attention should be given to older adults, people with disabilities, low-income households, and residents of remote settlements because a purely online convenience sample would systematically underrepresent the groups most relevant to a digital inclusion study. Data collection should therefore combine online recruitment with assisted or interviewer-supported completion where ethically and practically possible.

The questionnaire should be developed in English and translated into Kazakh and Russian through forward translation, expert review, and back-translation. A panel of public-administration, information-systems, accessibility, and survey-method experts should assess content validity. Cognitive interviews with approximately 8–12 citizens can identify ambiguous wording, followed by a pilot survey of 30–50 respondents. All participation should be voluntary, based on informed consent, and approved under the applicable university research-ethics process before data collection.

Most latent constructs can be measured with five-point agreement scales. To reduce acquiescence bias, the revised instrument includes a small number of carefully tested reverse-worded items; reverse coding will be applied only to those items. Negatively embedded wording has been removed (for example, “Internet access is affordable for me” replaces a double-negative formulation). Actual participation is measured through yes/no and frequency items with a stated 12-month reference period rather than agreement scales. Attitudinal items are separated from behavioural indicators, and questions conditional on prior participation include screening filters and a “not applicable” option. The item on distinguishing official from fraudulent platforms is assigned to the protective digital-skills domain rather than the trust scale. Near-duplicate readiness and relevance items have been differentiated or removed. Analysis can proceed in four stages: descriptive profiling and non-response assessment; reliability, convergent validity, discriminant validity, and common-method checks; structural model estimation; and exploratory multigroup or interaction analysis.

The qualitative phase should include approximately 15–25 semi-structured interviews selected from contrasting survey profiles. Useful contrasts include citizens with strong skills but low participation, citizens with high motivation but weak access, and previous participants who report high or low institutional responsiveness. Interviews should explore the specific point at which participation became difficult, how citizens interpreted institutional responses, and which changes would make them participate again. The qualitative evidence can explain statistical relationships and reveal barriers not adequately captured by predefined survey items.

Table 2. Proposed constructs and indicative measurement domains

Construct	Indicative domains	Primary theoretical basis
Meaningful access	Reliable connection; affordable data; suitable device; access to authentication; private and independent use	van Dijk (2020); Warschauer (2003)
Digital skills	Navigation; information search and evaluation; form completion; online communication; digital safety	Helsper (2021); van Dijk (2020)

Construct	Indicative domains	Primary theoretical basis
Accessibility and usability	Language availability; mobile compatibility; readable content; assistive-technology support; error recovery	W3C (2023); UNDP (2024)
Trust and digital safety	Platform security; data protection; institutional fairness; absence of fear; confidence in identity handling	Bélanger and Carter (2008); Carter and Bélanger (2005)
Relevance and motivation	Awareness; issue importance; perceived usefulness; time and effort; intention to participate	Davis (1989); Venkatesh et al. (2003)
Civic efficacy/readiness	Confidence to understand, formulate, submit, and defend a view; intention to act	Sen (1999); OECD (2020)
Institutional responsiveness	Acknowledgement; timeliness; clarity; transparent consideration; visible follow-up	OECD (2020); Le Blanc (2020)
Citizen e-participation	E-information; e-consultation; e-decision-making; breadth; frequency; perceived influence	Macintosh (2004); UN DESA (2024)

Source: Compiled by the authors based on the theoretical sources cited in the table.

5. DISCUSSION

The DI-EPG model reframes digital inclusion as part of democratic and administrative capacity. The usual policy sequence build a platform, publish information, invite citizens to participate, assumes that citizens can convert technical availability into effective action. The proposed framework shows why this sequence often fails. Each step requires resources and confidence: a reliable connection, a suitable device, the ability to understand the issue, an accessible interface, trust in the process, motivation to contribute, and an expectation of response. Weakness at any point can interrupt participation.

The model also helps distinguish two types of failure that are often combined. Citizen-side exclusion occurs when people cannot or do not feel able to participate. Institution-side exclusion occurs when a system accepts a submission but does not provide a meaningful route for consideration and feedback. A government may improve the first problem through connectivity, skills training, plain language, assisted digital support, and accessible design. It must address the second through procedural commitments: response standards, publication of consultation outcomes, explanation of decisions, and clear evidence of how participation is connected to governance.

For Kazakhstan, this distinction can support a shift from measuring the volume of digital services and submissions to evaluating the inclusiveness and consequences of participation. High national e-government performance provides a strong foundation, but it may coexist with unequal experiences across regions and social groups. The international benchmarks reinforce this point: Kazakhstan's

2024 EGDI score was very high, while its EPI remained below the scores of several digital-government leaders. The model therefore suggests that evaluation should compare who participates, which channels they use, whether they complete the process, how they evaluate the response, and whether they participate again. The country cases further show that participation quality is shaped by procedural details such as routing, support, deadlines, and published reasons, not by portal availability alone.

The proposed mediation and moderation mechanisms are particularly important. Civic efficacy explains why two citizens with similar technical resources may behave differently, while institutional responsiveness explains why initial participation may or may not become sustained participation. These mechanisms also create actionable policy levers. Skills programmes can include civic and information literacy rather than only operational instruction. Public bodies can improve participation not only by redesigning interfaces but by improving the visibility and quality of follow-up.

The model has limitations. It is conceptual and requires empirical validation. Its dimensions may operate differently across policy fields, levels of government, and types of participation. Appeals and complaints are not identical to deliberative consultation or participatory budgeting. Cross-sectional data would limit causal inference, and self-reported behaviour may be affected by recall and social-desirability bias. Future studies should compare platforms, combine survey responses with administrative or usability data where lawful and ethical, and examine changes over time.

Implications for Public Governance

The framework produces several practical implications for public bodies. First, participation platforms should be evaluated through inclusion audits that combine connectivity, language, accessibility, usability, trust, and response quality. A platform that meets technical availability targets may still exclude citizens through complex authentication, unclear terminology, poor mobile design, or inaccessible documents.

Second, digital-skills initiatives should be connected to real governance tasks. Training can include how to locate a draft regulation, interpret a public budget, submit an appeal, protect personal data, and follow the status of a contribution. Assisted digital participation points at Citizen Service Centres, libraries, universities, or community organisations can help citizens without making them permanently dependent on intermediaries. Consistent with the United Kingdom's assisted digital approach, support should be designed from user research and offered through more than one channel, including in-person and telephone assistance where appropriate.

Third, public institutions should publish participation feedback in a consistent format: what was asked, who participated, which proposals were accepted or rejected, why decisions were made, and

what happens next. Even when a proposal cannot be adopted, a clear explanation signals respect and can preserve willingness to participate. Estonia and Taiwan illustrate how thresholds, responsible authorities, response periods, and reasons can be made part of the procedure rather than left to informal practice. Comparable standards in Kazakhstan could include a visible case owner, a published response deadline, status tracking, and a reasoned closing statement.

Fourth, participation data should be disaggregated, with appropriate privacy protection, by region, age, language, disability-related needs, and channel. The goal is not to profile individuals but to identify groups that are missing from digital participation and to offer alternative channels. Hybrid participation should remain available where digital-only processes would create exclusion.

Finally, the DI-EPG model can be used as a diagnostic dashboard. Low access scores call for infrastructure or affordability measures; low skill scores call for training and support; low accessibility scores call for redesign; low trust scores call for stronger safeguards and communication; low responsiveness scores call for institutional and procedural reform. This makes the model useful not only for academic testing but for prioritising interventions.

6. Conclusion

Digital channels can broaden citizen participation in public governance only when citizens have the practical capability to use them and institutions demonstrate that participation is recognised. The DI-EPG model connects these two sides. It defines digital inclusion through meaningful access, skills, accessibility and usability, trust and safety, and relevance and motivation; explains action through civic efficacy and readiness; and places institutional responsiveness at the centre of sustained participation. E-participation is then assessed across information, consultation, and decision-making rather than reduced to portal visits or service transactions.

For Kazakhstan, the model offers a way to build on advanced digital-government infrastructure while examining who remains excluded and why. Its empirical validation can produce evidence for more accessible platforms, targeted capability development, transparent feedback, and hybrid participation channels. The broader implication is straightforward: a digitally available government is not necessarily a digitally inclusive government. Inclusion is achieved when citizens can participate independently, safely, and with a reasonable expectation that their contribution will be considered.

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Ethics Approval / Informed Consent Statement

This conceptual article does not report research involving human participants. Ethical approval and informed consent will be obtained before the proposed survey and interviews are conducted.

Data Availability Statement

No new dataset was generated. All numerical benchmarks are drawn from publicly available sources cited in the manuscript.

Generative AI Use Disclosure

Generative AI tools were used to assist language refinement, document structuring, and formatting.

Supplementary Material

Supplementary Material S1 contains the revised draft survey instrument proposed for future empirical validation of the DI-EPG model. The revision separates behavioural and attitudinal blocks, adds screening and not-applicable options, introduces a limited number of reverse-worded items, removes double-negative wording, assigns protective-skill items to the digital-skills construct, and eliminates near-duplicate indicators. The instrument has not yet been psychometrically validated.

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АЗАМАТТАРДЫҢ МЕМЛЕКЕТТІК БАСҚАРУҒА ЭЛЕКТРОНДЫҚ ҚАТЫСУЫН АРТТЫРУҒА АРНАЛҒАН ЦИФРЛЫҚ ИНКЛЮЗИЯ МОДЕЛІН ӘЗІРЛЕУ: ҚАЗАҚСТАНҒА АРНАЛҒАН ТҰЖЫРЫМДАМАЛЫҚ НЕГІЗ

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Аңдатпа:

Цифрлық мемлекет азаматтарға ақпарат алуға, пікір білдіруге және қоғамдық шешімдерді әзірлеуге қатысуға кең мүмкіндік береді. Алайда онлайн-платформалардың болуы тең әрі мазмұнды қатысуға автоматты түрде кепілдік бермейді. Тұрақсыз қолжетімділік, цифрлық дағдылардың жеткіліксіздігі, интерфейстердің қолайсыздығы, сенімнің төмендігі, азаматтық ықпалға күмән немесе мемлекеттік органдардың жауап беретініне сенбеу цифрлық шеттетуді сақтауы мүмкін. Бұл мақала Қазақстандағы және цифрландыру үдерісі белсенді жүріп жатқан ұқсас елдердегі өзара байланысты кедергілерді талдауға арналған «Цифрлық инклюзия – мемлекеттік басқаруға электрондық қатысу» (DI-EPG) моделін ұсынады. Модель цифрлық теңсіздік, технологияны қабылдау, азаматтық тиімділік, электрондық қатысу және жауапты мемлекеттік басқару жөніндегі зерттеулерді теориялық тұрғыдан біріктіру және Қазақстанның цифрлық мемлекеттік контекстін талдау арқылы әзірленді. Азаматтардың цифрлық инклюзиясы мағыналы қолжетімділікті, цифрлық дағдыларды, қолжетімділік пен пайдалануға ыңғайлылықты, сенім мен цифрлық қауіпсіздікті, сондай-ақ өзектілік пен уәжді қамтитын көпөлшемді мүмкіндік ретінде қарастырылады. Бұл құрамдастар электрондық ақпараттануға, электрондық консультацияға және электрондық шешім қабылдауға тікелей әрі азаматтық тиімділік пен қатысуға дайындық арқылы жанама әсер етеді деп болжанады. Институционалдық жауаптылық тұрақты қатысудың тікелей факторы және дайындықтан нақты қатысуға өтуді күшейтетін шарт ретінде енгізілген. Мақалада тексерілетін гипотезалар, өлшеу көрсеткіштері және көптілді сауалнама, құрылымдық теңдеулерді модельдеу мен кейінгі сұхбаттарға негізделген эмпирикалық тексеру дизайны ұсынылады. Ұсынылған модель цифрлық арналардың жай ғана болуынан азаматтардың оларды іс жүзінде пайдалану қабілетіне және өз қатысуының маңызды екеніне көз жеткізуіне назар аударады.

Түйін сөздер: цифрлық инклюзия; электрондық қатысу; мемлекеттік басқару; цифрлық теңсіздік; институционалдық жауаптылық; азаматтық тиімділік; Қазақстан

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РАЗРАБОТКА МОДЕЛИ ЦИФРОВОЙ ИНКЛЮЗИИ ДЛЯ РАСШИРЕНИЯ ЭЛЕКТРОННОГО УЧАСТИЯ ГРАЖДАН В ГОСУДАРСТВЕННОМ УПРАВЛЕНИИ: КОНЦЕПТУАЛЬНАЯ ОСНОВА ДЛЯ КАЗАХСТАНА

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Аннотация:

Цифровое государство расширяет возможности граждан получать информацию, выражать мнение и участвовать в принятии публичных решений. Однако само наличие онлайн-платформ не обеспечивает равного и содержательного участия. Исключение может сохраняться из-за нестабильного доступа, недостаточных цифровых навыков, недоступных интерфейсов, низкого доверия, слабой гражданской уверенности или ожидания, что государственные органы не отреагируют. В статье разрабатывается модель «Цифровая инклюзия – электронное участие в государственном управлении» (DI-EPG), предназначенная для анализа взаимосвязанных барьеров в Казахстане и других странах, проходящих активную цифровизацию. Модель сформирована на основе теоретического синтеза исследований цифрового неравенства, принятия технологий, гражданской эффективности, электронного участия и отзывчивого управления с учетом казахстанского контекста цифрового государства. Цифровая инклюзия рассматривается как многомерная способность, включающая содержательный доступ, цифровые навыки, доступность и удобство использования, доверие и цифровую безопасность, а также воспринимаемую значимость и мотивацию. Предполагается, что эти компоненты влияют на электронное информирование, консультирование и участие в принятии решений непосредственно и опосредованно через гражданскую эффективность и готовность к участию. Институциональная отзывчивость выступает прямым фактором устойчивого участия и модератором перехода от готовности к фактическому участию. Предложены проверяемые гипотезы, показатели измерения и дизайн эмпирической проверки с использованием многоязычного опроса, моделирования структурными уравнениями и последующих интервью. Предлагаемая модель смещает акцент с простого наличия цифровых каналов на практическую способность граждан пользоваться ими и видеть подтверждение того, что их участие имеет значение.

Ключевые слова: цифровая инклюзия; электронное участие; государственное управление; цифровое неравенство; институциональная отзывчивость; гражданская эффективность; Казахстан

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Supplementary Material S1

Draft Survey Instrument for Empirical Validation of the DI-EPG Model

Purpose and administration

This instrument is designed for a future empirical study of digital inclusion and citizen e-participation in public governance. Items should be translated and back-translated into the study languages, reviewed by subject and accessibility experts, tested through cognitive interviews, and piloted before full deployment.

Unless otherwise stated, respondents may answer the construct items on a five-point agreement scale from 1 (strongly disagree) to 5 (strongly agree). Behavioural participation items should use a defined reference period, such as the previous 12 months. For items 31-35, include 'Not applicable / no previous experience' and use skip logic. Items 36-44 use the stated frequency, count, or perceived-influence formats rather than the agreement scale.

Suggested background variables

- Age group
- Gender (with prefer-not-to-answer option)
- Region and urban/rural residence
- Highest education
- Employment status
- Household income band (optional)
- Disability-related accessibility requirements (optional)
- Primary language for public-service interaction
- Frequency of Internet and e-government use
- Digital participation activity during the previous 12 months

Proposed questionnaire items

Construct	Draft item
Meaningful access	1. I have reliable Internet access when I need to use a government platform.
Meaningful access	2. Internet access is affordable enough for me to participate in public matters online.
Meaningful access	3. I have a device that is suitable for completing government participation tasks.

Construct	Draft item
Meaningful access	4. I can use the required identification or authentication method without assistance.
Meaningful access	5. I can participate online in a sufficiently private and safe setting.
Digital skills	6. I can find official information about a public issue or proposed decision.
Digital skills	7. I can judge whether online government information is current and authoritative.
Digital skills	8. I can complete and submit an online form or appeal without assistance.
Digital skills	9. I can clearly express my opinion or proposal through a digital channel.
Digital skills	10. I know how to protect my personal information when interacting with government online.
Accessibility and usability	11. Government participation platforms are available in the language I prefer to use.
Accessibility and usability	12. The instructions on government platforms are easy for me to understand.
Accessibility and usability	13. Government participation platforms work well on the device I normally use.
Accessibility and usability	14. I can recover from an error or find help when a digital procedure is difficult.
Accessibility and usability	15. The design of government platforms accommodates my accessibility needs.
Trust and digital safety	16. I trust official digital participation platforms to protect my personal data.
Trust and digital safety	17. I believe my identity is handled securely when I submit a contribution.
Trust and digital safety	18. I feel safe expressing a respectful critical opinion through an official digital channel.
Trust and digital safety	19. I trust public institutions to treat online contributions fairly.
Digital skills (protective)	20. I can distinguish official participation platforms from fraudulent or unofficial sites.
Relevance and motivation	21. I know where to find opportunities to comment on public issues that affect me.

Construct	Draft item
Relevance and motivation	22. Online participation can be useful for addressing issues in my community.
Relevance and motivation	23. The effort required to participate online is worthwhile.
Relevance and motivation	24. I am interested in receiving notifications about relevant consultations or decisions.
Relevance and motivation	25. I am willing to invest time in digital participation when an issue is relevant to me.
Civic efficacy and readiness	26. I am confident that I can understand the main points of a public proposal.
Civic efficacy and readiness	27. I am capable of preparing a meaningful comment, appeal, or proposal.
Civic efficacy and readiness	28. I know which public body or platform should receive my contribution.
Civic efficacy and readiness	29. I am ready to prepare and submit a contribution through an official digital channel when a public decision affects me.
Civic efficacy and readiness	30. Citizens like me can contribute useful knowledge to public decision-making.
Institutional responsiveness	31. Public bodies acknowledge digital submissions within a reasonable time.
Institutional responsiveness	32. Responses from public bodies are clear and address the main point raised.
Institutional responsiveness	33. Consultation results explain how citizen views were considered.
Institutional responsiveness	34. Public bodies provide reasons when a citizen proposal cannot be accepted.
Institutional responsiveness	35. Previous experience gives me confidence that online participation is taken seriously.
Citizen e-participation: e-information	36. During the previous 12 months, how often did you use official online information to understand a public policy, budget, programme, or local issue? Response: Never / Once / 2-3 / 4-6 / 7+ times.
Citizen e-participation: e-information	37. During the previous 12 months, how often did you use official online information to compare options or prepare for participation in a public issue? Response: Never / Once / 2-3 / 4-6 / 7+ times.

Construct	Draft item
Citizen e-participation: e-consultation	38. During the previous 12 months, how often did you submit an online appeal, complaint, proposal, comment, or consultation response? Response: Never / Once / 2-3 / 4-6 / 7+ times.
Citizen e-participation: e-consultation	39. During the previous 12 months, how often did you follow the status or published outcome of a digital submission or consultation? Response: Never / Once / 2-3 / 4-6 / 7+ times.
Citizen e-participation: e-decision-making	40. During the previous 12 months, how often did you take part in an official online process in which citizens could help shape a public decision or priority? Response: Never / Once / 2-3 / 4-6 / 7+ times.
Citizen e-participation: e-decision-making	41. During the previous 12 months, how often did you vote, rank options, allocate priorities, or otherwise contribute to an official digital decision-making process? Response: Never / Once / 2-3 / 4-6 / 7+ times.
Citizen e-participation: breadth	42. During the previous 12 months, how many types of official digital participation did you use: e-information, e-consultation, and e-decision-making? Response: None / One / Two / All three.
Citizen e-participation: frequency	43. Overall, how often did you use official digital channels to participate in public issues or decisions during the previous 12 months? Response: Never / Once / A few times / About monthly / More than monthly.
Citizen e-participation: perceived influence	44. Thinking about your most recent digital participation experience, to what extent do you believe your contribution influenced the institutional response, public discussion, or decision? Response: Not at all / A little / Somewhat / Quite a lot / A great deal / Not applicable.

Scoring and validation notes

- Reverse-code only explicitly reverse-worded items retained after cognitive testing.
- Assess content validity, item clarity, missingness, floor/ceiling effects, and internal consistency.
- Use exploratory and confirmatory factor analysis before testing structural relations.
- Test measurement invariance across language, age, region, and other policy-relevant groups where sample size permits.
- Retain or revise items based on evidence rather than solely on initial theoretical assignment.

- For items 31-35, use skip logic and code 'Not applicable / no previous experience' as missing, not as the scale midpoint.
- Keep items 36-44 in their stated behavioural response formats; do not combine them automatically with agreement-scale items.
- Assess e-information, e-consultation, e-decision-making, breadth, frequency, and perceived influence separately before testing a higher-order citizen e-participation construct.