



## A multi-stage framework for rural development through e-governance: Integrating input to feedback mechanisms

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### Abstract

This paper outlines a research-validated Multi-Stage Framework for rural e-governance. By going beyond fragmented and siloed technology-centric approaches to your work, the framework leverages a Systems Approach with the aim of facilitating sustained Rural Development (SRD) through adaptive learning over time. The framework consists of five cyclical stages that begin with the Input Stage, which involves securing four Critical Success Factors (CSFs), namely: ICT Infrastructure, Institutional Framework, Human Capacity, and Financial Resources. Once adequately established, the next stage, the Process Stage, integrates population engagement as operationalized through the ACACAE Model (Awareness, Communication/Consultation, Adoption, Collaboration, Advocacy and Empowerment) to directly link Traditional Knowledge Systems (TKS) and provide a critical G2C2G pathway. Success is then operationalized in the familiar Output Stage through associated enhancements in Transparency, Efficiency, Accessibility and Accountability. The process will (and should) provide medium-to-long term outcome-based transformative effects across Economic, Social and Administrative Development to ultimately facilitate sustained Genuine Empowerment in the Outcome Stage. The cycle is then closed in the Feedback Stage, where Citizen Feedback can be implemented through Digital Grievance Redressal in order to usher in Policy Improvement and Sustainability into the model over time

**Keywords:** Multi-Stage Framework, e-governance, rural development, citizen engagement, ACACAE Model, systems approach, feedback, sustainability, policy improvement, traditional knowledge systems (TKS), C4D

### Introduction

Rural development is fundamentally a strategic endeavor focused on enabling marginalized populations to achieve greater self-sufficiency and secure their fundamental needs (Chambers, 1983; Singh, 1999) <sup>[9, 38]</sup>. This development is characterized by sustained improvement in the quality of life, focusing concurrently on economic growth and the social empowerment of beneficiaries (Burkey, 1993; Singh, 1999) <sup>[7, 38]</sup>. The global significance of this effort is underscored by the fact that a substantial majority of the world's impoverished population resides in rural settings, making it impossible to meet global poverty targets without actively addressing rural economies (World Bank, 1997) <sup>[47]</sup>. Information and Communication Technologies (ICT) serve as a potent vehicle for realizing these critical developmental goals. ICT applications demonstrate significant potential for economic growth, job creation, poverty alleviation, and social empowerment, primarily by improving access to essential services such as markets, education, health, and microfinance (Cecchini & Scott, 2003; Dutton *et al.*, 2004; Nandi, 2002) <sup>[8, 15, 28]</sup>. When these technologies are integrated into governmental processes the definition of e-governance they are explicitly positioned as a means to attain the overarching goal of good governance. Good governance, in turn, is essential for enhancing sustained rural development by maximizing the process of participatory development (Singh, 2017; UNDP, 1994; World Bank, 1992) <sup>[39, 43, 46]</sup>. E-governance, therefore, is viewed as a comprehensive mechanism for transforming administrations into "smart governments" that enhance social, political, and economic inclusion (Napitupulu & Sensuse, 2014) <sup>[29]</sup>.

### Rationale for a Multi-Stage Framework: Addressing Deficiencies and Adopting a Systems Approach

Despite the clear capability of ICT interventions to promote rural development, empirical evidence consistently highlights that many initiatives fail (Malhotra *et al.*, 2006; Singh, 2017) <sup>[23, 39]</sup>. These failures are frequently rooted in a pronounced lack of community participation, the absence of an integrated strategic approach, and crucially, the non-inclusion of Traditional Knowledge Systems (TKS) in project designs (Malhotra *et al.*, 2013; Singh, 2017) <sup>[24, 39]</sup>. Existing e-governance models often rely on a "technology centric" approach, copying models "aped from the west," thereby failing to assure meaningful rural development outcomes in the specific, complex contexts of developing countries (Bhatnagar & Schwere, 2000; Jauhari, 2004) <sup>[16, 20]</sup>. This fundamental deficiency stems from a reliance on reductionism—a limited-perspective approach that isolates complex governance phenomena into simple, fragmented terms (Singh, 2017) <sup>[39]</sup>. This reductionist view ignores the cascading, systemic consequences of change across stakeholders and subsystems, necessitating a shift toward a holistic and interdisciplinary Systems Approach (Bertalanffy, 1968; Singh, 2017) <sup>[4, 39]</sup>. This approach recognizes the governance system as an integrated "whole" that must be adaptable, possess a clear purpose, and strive continuously toward its developmental goals (Singh, 2017) <sup>[39]</sup>.

To institutionalize this integrated and adaptive behavior, the proposed framework must move beyond the traditional Input–Transformation–Output political systems theory (Xu & Dai, 2024) <sup>[49]</sup>. It requires a bi-directional communication flow that transcends the conventional Government-to-Citizen (G2C) interface by incorporating an active Citizen-to-Government (C2G) component, culminating in the

G2C2G framework (Malhotra *et al.*, 2013; Singh, 2017)<sup>[24, 39]</sup>. This structure ensures that ICT initiatives not only passively deliver services but actively "listen" to, accept, and adapt based on community aspirations, TKS, and practical experience.

### The Proposed Multi-Stage Framework: From Input to Feedback

This article suggests a thorough, multiple-phase framework for rural development through e-governance that combines all the essential components for effective sustainability. This sequenced, cyclical pattern consists of five consecutive phases: Input, Process, Output, Outcome and Feedback.

**Stage 1: Input Stage** – This focuses on the basic resources of technical, institutional, human, and finance which need to be secured and strategically managed. These resources are considered the Critical Success Factors (CSFs) (Napitupulu & Sensuse, 2014)<sup>[29]</sup> for establishing preliminary feasibility. The key elements include ICT Infrastructure (technical backbone), Institutional Framework (policy, regulation, decentralization), Human Capacity (digital literacy and skills), and Finance Resources (viability and sustainability). Failures at this stage such as inadequate finance, or low literacy will halt any future viability.

**Stage 2: Process Stage (ACACAE Model)** – This stage defines the functional transformation in governance, characterized by the dynamic interplay of organizations and citizens. This stage employs the ACACAE Model—Awareness, Communication/Consultation, Adoption, Collaboration, Advocacy, and Empowerment—to conceptualize and measure maturity levels (Munir *et al.*, 2024; Shukla, 2025)<sup>[25, 36]</sup>. The model helps to demonstrate the evolution from a passive provision of information to a democratic wave of citizen action, as well as the interplay with Traditional Knowledge Systems (TKS) to make it relevant (Malhotra *et al.*, 2013)<sup>[24]</sup>.

**Stage 3: Output Stage** the Output Stage evaluates the immediate, tangible effects of e-governance (digital governance) on service delivery and government function. These outputs are the direct, operational ramifications, focusing on ethical performance and quality of service. The major outputs are: Transparency, Efficiency, Accessibility, and Accountability. These outputs translate the strategic inputs and processes into realized public value, with clear and direct implications for citizen satisfaction and trust (Jopang *et al.*, 2024; Singh *et al.*, 2024)<sup>[21, 37]</sup>.

**Stage 4: Outcome Stage** This stage examines the high-level, long-term, and transformative impacts of sustained digital governance on community and administration. Outcomes are the definitions of the achievement of sustained socio-economic and administrative purposes, including: Economic Development, Social Development, Administrative Development, and Empowerment. These are the manifestations of the realization of socio-economic agency and dignity at the grassroots level (Hans *et al.*, 2024; Singh, 2017)<sup>[17, 39]</sup>.

**Stage 5: Feedback Stage** This stage closes the loop of the system, effectively transforming the framework into a dynamic, cyclical system. Specifically, to ensure that

continual policy improvement and ensure sustained relevance, it channels Citizen Feedback and systemic toward the initial Input and Process stages. Interventions such as formalized Social Audit and Digital Grievance Redressal are components of a larger assurance system, and ultimately to ensure Policy Improvement and ultimately Sustainable Rural Development (SRD) (Malhotra *et al.*, 2013; World Bank, 2023)<sup>[24, 48]</sup>.

### Research Objectives

The core objective of this paper is to synthesize the fragmented theoretical and empirical literature into a unified, multi-stage framework for rural e-governance. Specifically, this research aims to:

1. To develop and validate a unified multi-stage framework for rural e-governance by analyzing the foundational prerequisites of ICT infrastructure, institutional support, human capacity, and financial resources, and their role in facilitating effective citizen engagement through the ACACAE Model.
2. To evaluate the interlinked stages of Output, Outcome, and Feedback in the proposed framework, measuring transparency, efficiency, and accountability outcomes while assessing their contribution to sustainable rural development and continuous policy improvement.

### Literature Review

The literature confirms the necessity of moving beyond a technology-centric view to adopt a multi-stage, systemic framework for rural e-governance, which is grounded in the principles of participatory development and continuous adaptation (Singh, 2017; Napitupulu & Sensuse, 2014)<sup>[29, 39]</sup>.

#### Stage 1: The Foundational Input Mechanisms

The Input Stage outlines the essential resources and structural prerequisites—the Critical Success Factors (CSFs)—that determine the initial feasibility and eventual success of the entire multi-stage framework (Napitupulu & Sensuse, 2014)<sup>[29]</sup>.

#### 1. ICT Infrastructure

A robust, standardized, and distributed ICT infrastructure is the "backbone" required for the reliable delivery of e-governance services in remote areas (Chaudhari *et al.*, 2011)<sup>[10]</sup>. Requirements include core government network systems like State Wide Area Networks (SWANs) and State Data Centres (SDCs), which are vital for consolidating services (Rama Rao, 2004)<sup>[30]</sup>. Decentralized solutions, such as Common Service Centers (CSCs), minimize the technological difference between rural and urban areas (Singh *et al.*, 2013)<sup>[41]</sup>. However, the rural context presents persistent challenges, notably the Digital Divide stemming from low physical connectivity, inadequate power supply, and the low bit rate over long distances characteristic of wireless solutions like WiMAX (Chaudhari *et al.*, 2011; Rama Rao, 2004)<sup>[10, 30]</sup>. Pragmatic design choices, such as prioritizing Virtual Private Network (VPN) dial-up connections with offline data submission capabilities, have been used to cope with low bandwidth and ensure cost-effectiveness (Islam *et al.*, 2008)<sup>[19]</sup>. The quality of this input directly determines the system's Perceived Ease of Use (PEU), a core factor for later adoption (Davis, 1989; Syam *et al.*, 2024)<sup>[14, 42]</sup>.

## 2. Institutional Framework

The institutional framework must treat e-governance as a political and administrative transformation, not a purely technical project. Good governance is recognized as fundamental, dictating the design and structure of all electronic tools (Singh *et al.*, 2024) <sup>[37]</sup>. A necessary prerequisite is genuine process reform; e-governance is only effective "if and only if the process reforms have been carried out" (Singh *et al.*, 2024; Alassaf *et al.*, 2020) <sup>[1, 37]</sup>. Modernization explicitly warns against merely automating complicated, analogue processes without prior simplification (Singh *et al.*, 2024) <sup>[37]</sup>. Successful implementation requires strong top management support and political commitment (Guenduez *et al.*, 2018; Napitupulu & Sensuse, 2014) <sup>[16, 29]</sup>. The institutional architecture must actively promote civil society participation, differentiating it from the narrower focus of E-Government (Andersen & Henriksen, 2006; Sahu, 2004) <sup>[3, 34]</sup>. Effective rural delivery requires decentralization and the strengthening of grassroots bodies like Panchayati Raj Institutions (PRIs) (Amutha, 2022) <sup>[2]</sup>. A critical tension exists in the form of institutional resistance among low and medium-level politicians who fear reallocating power or losing control (Alassaf *et al.*, 2020; Guenduez *et al.*, 2018) <sup>[1, 16]</sup>.

## 3. Human Capacity

Effective implementation is predicated on cultivating appropriate human resources and skills (Guenduez *et al.*, 2018) <sup>[16]</sup>. Digital literacy and awareness among citizens constitute a critical prerequisite for acceptance and sustained use (Singh *et al.*, 2024) <sup>[37]</sup>. Low digital literacy fundamentally inhibits citizen participation, reducing both Perceived Ease of Use (PEU) and Perceived Usefulness (PU), thereby undermining the behavioral intention required for Adoption (Syam *et al.*, 2024) <sup>[42]</sup>. ICT training facilities and the mandatory acquisition of technological skills across all development spheres are necessary building blocks (Bhatia & Kiran, 2018; Choudhary, 2021; Singh *et al.*, 2024) <sup>[5, 13, 37]</sup>. Public administration frequently lacks the organizational capabilities required for smart government, demanding skills that extend beyond traditional IT expertise, such as Data Management, Cybersecurity, Change Management, and User Experience (UX) design (Guenduez *et al.*, 2018) <sup>[16]</sup>. Employee resistance and the risk-avoidance culture prevalent in public institutions remain key organizational barriers (Alassaf *et al.*, 2020; Guenduez *et al.*, 2018) <sup>[1, 16]</sup>.

## 4. Financial Resources

E-government investments are long-term strategic activities characterized by high upfront costs and significant failure rates, underscoring the need for meticulous financial planning (Alassaf *et al.*, 2020; Napitupulu & Sensuse, 2014) <sup>[1, 29]</sup>. Estimates suggest 20-25% total failure and 33-60% partial failure of e-government projects, often linked to inconsistent funding along their long-term timelines (Alassaf *et al.*, 2020; Heeks, 2002) <sup>[1, 18]</sup>. The financial viability of rural service access points is a major sustainability challenge (Naik *et al.*, 2012) <sup>[27]</sup>. To address this, the E-Governance Embedded Rural Telecenter (EGERT) model was developed. This model strategically ensures high footfalls and stable revenue streams by mandating and embedding high-demand G2C and G2G

services (e.g., permits, tax collection) into the telecenter's service basket, thereby fundamentally linking the center's stability to essential government operations (Naik *et al.*, 2012) <sup>[27]</sup>. Public-Private Partnership (PPP) models are deemed necessary to alleviate the financial burden and increase the speed of implementation (Rama Rao, 2004; Alassaf *et al.*, 2020) <sup>[1, 30]</sup>.

## Stage 2: The E-Governance Process - Operationalizing the ACACAE Model

The Process Stage defines the dynamic mechanisms through which inputs are activated to foster citizen engagement, using the ACACAE Model as a maturity ladder for participation (Shukla, 2025; Munir *et al.*, 2024) <sup>[25, 36]</sup>.

### 1. Awareness

Awareness is the precursor element, essential for stimulating citizen curiosity, overcoming "information poverty," and achieving eventual adoption (Singh *et al.*, 2024; Alassaf *et al.*, 2020) <sup>[1, 37]</sup>. Awareness is positively correlated with subsequent adoption (Alassaf *et al.*, 2020) <sup>[1]</sup> and is achieved through targeted communication (one-way communication) strategies like speech-based helplines in native languages and localized content (Bhatia & Kiran, 2016; Singh *et al.*, 2024) <sup>[37]</sup>.

### 2. Communication / Consultation

This stage establishes the bi-directional information exchange necessary for genuine e-governance, formalizing the critical G2C2G flow (Malhotra *et al.*, 2013; Singh, 2017) <sup>[24, 39]</sup>. Consultation progresses beyond basic information access to active engagement (E-consultation) (Lai & Beh, 2025) <sup>[22]</sup>. Mechanisms include online filing of complaints and projects like Lokwani and Gyandoot which enable citizens to register issues via email for official monitoring (Amutha, 2022; Bhatia & Kiran, 2016) <sup>[2]</sup>. Effective consultation mandates that information must be delivered with localized content, specifically in local languages (Singh *et al.*, 2024) <sup>[37]</sup>.

### 3. Adoption

Adoption is the pivotal stage where participation intent converts into sustained usage, heavily influenced by the Technology Acceptance Model (TAM) factors: Perceived Ease of Use (PEU) and Perceived Usefulness (PU) (Syam *et al.*, 2024) <sup>[42]</sup>. The core difficulty is the intention-behavior gap (Lai & Beh, 2025) <sup>[22]</sup>. Successful adoption is governed by psychological beliefs, specifically Political Efficacy (Lai & Beh, 2025) <sup>[22]</sup>:

- **Internal Political Efficacy (IPE):** Citizen's self-belief in their own competence to engage.
- **External Political Efficacy (EPE):** Citizen's trust in the responsiveness of government institutions. A higher EPE directly predicts a stronger intention to use e-participation tools (Lai & Beh, 2025) <sup>[22]</sup>, making EPE a powerful non-technical lagging indicator of overall governance quality.

### 4. Collaboration

Collaboration is the critical function that mobilizes diverse stakeholder resources (Public, Private, and People) to achieve innovative, durable solutions (Røiseland *et al.*, 2020) <sup>[33]</sup>. Co-creation is an advanced form of collaboration, defined as an "inclusive and collaborative approach to

creative problem solving" (Røiseland *et al.*, 2020) [33]. This is the primary mechanism for the operational integration of Traditional Knowledge Systems (TKS), ensuring that resulting systems are locally appropriate and fostering the equitable participation needed to build public trust (Malhotra *et al.*, 2013; Singh, 2017) [24, 39]. The operational tool for advanced collaboration is the Living Lab, used to create an inclusive system for shaping smart solutions (Choo *et al.*, 2023) [12]. Participatory collaboration emphasizes dialogical communication, trust-building, and equitable voice among all actors, reflecting the participatory communication paradigm that values listening, shared learning, and bottom-up empowerment (Servaes & Malikhao, 2011).

## 5. Advocacy

Advocacy denotes the proactive exercise of political influence by citizens over public policy, a capacity significantly amplified by e-governance tools (Lai & Beh, 2025) [22]. E-participation, specifically at the E-decision-making level, empowers the population through the co-design of policy options (Lai & Beh, 2025) [22]. This "bottom up" perspective reinforces good governance by promoting genuine democratic practices and actively contributing to shaping the policies that affect the community (Singh, 2017) [39].

## 6. Empowerment

Empowerment is the fundamental goal of the process stage, signifying a structural shift in the dynamics of control (Singh *et al.*, 2024) [37]. It is achieved operationally by strengthening the capacity for self-governance among villagers, enhancing their competence as users, and fostering a strong sense of ownership over the new ICT initiatives (Singh, 2017) [39]. From a democratic standpoint, e-governance facilitates the "wider participation of citizens in public affairs," transforming them into active *participants* rather than passive *recipients* (Singh *et al.*, 2024) [37].

### Stage 3: Output Stage and Stage 4: Outcome Stage

The success of the preceding stages culminates in immediate performance metrics (Output) and long-term societal change (Outcome).

#### 1. Output Stage: Immediate Deliverables (Transparency, Efficiency, Accessibility, Accountability)

The outputs are the direct, operational consequences of a functional e-governance system.

- **Transparency:** E-governance yields direct ethical outputs by significantly enhancing public visibility into administrative operations (Singh *et al.*, 2024) [37]. This is realized by making critical information accessible (Singh *et al.*, 2024) [37], reducing the potential for corruption, and is exemplified by projects such as Bhoomi, which digitized millions of land records, making public data verifiable (Choudhary, 2021) [13]. Transparency is explicitly identified as a key factor in building citizen trust (Jopang *et al.*, 2024) [21].
- **Efficiency:** Gains result from e-governance by reducing transaction costs for all parties, automating tasks, and using improved data management to significantly reduce administrative errors (Singh *et al.*, 2024) [37]. Examples like e-Choupal successfully achieved major

reductions in transaction costs through automated supply chain management (Annamalai & Rao, 2003).

- **Accessibility:** This is dramatically expanded, shifting service availability to an "anytime, anywhere mode" (Singh *et al.*, 2024) [37]. E-governance significantly increases user convenience, a factor disproportionately beneficial in rural areas constrained by physical distance and the high opportunity cost of traditional travel (Singh *et al.*, 2024) [37].
- **Accountability:** Accountability is reinforced as the government becomes structurally more responsible and responsive. ICT-based systems are essential for creating the required short mechanism for citizens to hold policy-makers responsible for service delivery failure, ensuring "corruption-proofing" (Saxena & Chauhan, 2013) [35].

#### 2. Outcome Stage: Macro-Level Developmental Impacts (Economic, Social, Administrative, Empowerment)

Outcomes define the achievement of sustained socio-economic and administrative development goals.

- **Economic Development:** E-governance is a catalyst for economic growth, generating wealth, and enhancing livelihoods (Hans *et al.*, 2024) [17]. By facilitating access to external markets and efficient agricultural produce sales (Choudhary, 2021) [13], and driving financial inclusion via digital payments like UPI and Aadhaar Pay, it reduces economic inequalities (Nahak, 2023) [26].
- **Social Development:** Initiatives place a strong emphasis on Inclusion, ensuring access to services for socially backward and marginalized communities (Singh *et al.*, 2024) [37]. This extends profoundly to Education and Health, facilitating the spread of education (e-learning) and access to medical facilities (telemedicine) (Naik *et al.*, 2012) [27]. Empirical analysis indicates digital governance has a significant positive impact on the overall health and life expectancy of rural residents (Chen & Ye, 2024) [11].
- **Administrative Development:** E-governance fundamentally reforms internal functions through G2G and G2E applications, leading to enhanced policy design, execution, and oversight (Amutha, 2022) [2]. This is achieved through the use of specialized Policy Management Support Systems (PMSS) and advanced capabilities like Citizen Analytics (Saxena & Chauhan, 2013) [35].
- **Empowerment (Sustained):** This sustained outcome is the culmination of the framework, realized through long-term structural transformation. By providing channels for active deliberation and consistently acting upon citizen input, successful co-creation successfully restores public trust (Røiseland *et al.*, 2020) [33], fulfilling the goal of dignity beyond mere subsistence (Singh, 2017) [39].

## Stage 5: The Feedback Mechanism and Sustainable Rural Development

This final stage transforms the framework into a dynamic, cyclical system, ensuring continuous policy improvement and sustained relevance (Ramzy & Ibrahim, 2022) <sup>[31]</sup>.

- **Citizen Feedback and Policy Improvement:** Active Citizen Feedback Structures are required to capture continuous citizen experiences, including explicit grievances (Singh *et al.*, 2024) <sup>[37]</sup>. The bi-directional G2C2G interface is integral to this stage, providing the necessary mechanism to capture local knowledge and needs (Malhotra *et al.*, 2013) <sup>[24]</sup>. The principal utility of this loop is its ability to translate this feedback into actionable Policy Improvement and iteration (Ramzy & Ibrahim, 2022) <sup>[31]</sup>. This mandates Organizational Learning and ensures system reflexivity (Singh, 2017) <sup>[39]</sup>, where observed outcomes (e.g., poor adoption) trigger adjustments within the initial Input Stage (e.g., revising training or funding). To formalize accountability, institutional mechanisms like Social Audit and Digital Grievance Redressal Mechanisms (GMs) must be integrated (World Bank, 2023) <sup>[48]</sup>.
- **Sustainable Rural Development:** Sustainability is the ultimate determinant of the framework's success, encompassing the seamless alignment of financial viability, institutional resilience, and democratic durability (Naik *et al.*, 2012; Røiseland *et al.*, 2020) <sup>[27, 33]</sup>. Financial Sustainability relies heavily on the EGERT model by embedding mandatory G2C and G2G services (Naik *et al.*, 2012) <sup>[27]</sup>. Institutional Resilience is realized when co-creation processes become routine, embedding collaboration into the "DNA of public and private organizations" (Røiseland *et al.*, 2020) <sup>[33]</sup>. The success of SRD validates the holistic framework design, confirming that the initial goals of equitable participation, administrative competence, and long-term developmental impact have been achieved through the continuous integration of citizen input into governmental processes (Singh, 2017; Ramzy & Ibrahim, 2022) <sup>[31, 39]</sup>.

## Research Design and Approach

This research presents a qualitative research strategy based entirely on the use of secondary data analysis. The research will conceptualize and provide validation for a multi-stage framework for rural development through e-governance, which will incorporate stages from Input to Feedback. The research will employ a qualitative synthesis of existing theoretical and empirical studies to understand patterns, interactions, and linkages for ICT based governance and sustainable rural economic development. The qualitative approach was selected because of its capacity to elucidate complex social-technical practices, institutional behaviors, and citizen engagement processes that simply cannot be captured through a number alone.

## Discussion

The results from this research confirm that rural e-governance cannot be accomplished through fragmented technology-led initiatives; instead, it needs to be a systematic, multi-stage process with inputs, processes, outputs, outcomes, and feedback loops integrated together. The proposed Multi-Stage Framework for Rural

Development through E-Governance successfully synthesizes existing theoretical and empirical insights into a holistic model that positions citizen engagement as both a process and a product of sustainable rural transformation (Singh, 2017; Napitupulu & Sensuse, 2014) <sup>[29, 39]</sup>.

## 1. Integration of Foundational Prerequisites and Citizen Engagement

The first research objective, to develop and validate a single framework from an analysis of the different input dimensions of ICT, institutional, human and financial, shows these dimensions are interconnected dimensions that enable participatory e-governance. The analyses show that ICT infrastructure is a technology backbone that enables the connectivity and access (Chaudhari *et al.*, 2011) <sup>[10]</sup> and institutional arrangements (Singh *et al.*, 2024) <sup>[37]</sup> dictate how well governed an area is through decentralization, transparency, and political will. Likewise, human capacity (specifically digital literacy and administrative capacity) is a critical dimension to the adoption and sustainability of e-governance services (Bhatia & Kiran, 2018; Guenduez *et al.*, 2018) <sup>[5, 16]</sup>. Last, financial resources provided through models like PPPs, EGERT role in supporting the financial sustainability that is associated with rural services (Naik *et al.*, 2012) <sup>[27]</sup>.

As mentioned collectively here, these provide the justification for adopting the ACACAE Model - Awareness, Communication/Consultation, Adoption, Collaboration, Advocacy, and Empowerment - as a phased approach to citizen engagement. The ACACAE Model transitions e-governance from a one-way service delivery model to a dialogic, participatory model (Shukla, 2025) <sup>[36]</sup>. The use of Traditional Knowledge Systems (TKS) also reinforces inclusivity by ensuring local relevance and appropriateness for culture in this stage (Malhotra *et al.*, 2013) <sup>[24]</sup>. The maturity sequence of the model is consistent with the Technology Acceptance Model (TAM) as well as the paradigms of participatory communication, indicating that perceived ease of paradigm or use, perceived value or usefulness, and perceived political efficacy are requirements for adoption and empowerment (Syam *et al.*, 2024; Lai & Beh, 2025) <sup>[22, 42]</sup>.

## 2. Output, Outcome, and Systemic Accountability

The second research objective—measuring Outputs, Outcomes and Feedback—addresses the potential measurable public value generated through effective e-governance to transform inputs. The Output Stage creates immediate, observable improvement in transparency, efficiency, accessibility and accountability (Singh *et al.*, 2024) <sup>[37]</sup>. Evidence demonstrates that digital transparency and automation, as illustrated by Bhoomi and e-Choupal, promotes rapid displacement of corruption and transaction costs (Choudhary, 2021; Annamalai & Rao, 2003) <sup>[13]</sup>. Operational success generates trust toward citizens and thus contributes legitimacy and credibility to institutions (Jopang *et al.*, 2024) <sup>[21]</sup>.

In the Outcome Stage, we start to see evidence of longer-term impacts, such as economic, social, administrative and empowerment transformation. E-governance initiatives assist rural economic development by giving access to markets, financial inclusion and agricultural productivity (Hans *et al.*, 2024; Nahak, 2023) <sup>[17, 26]</sup>. Socially, e-learning and telemedicine have contributed measures of educational

and healthcare access (Naik *et al.*, 2012; Chen & Ye, 2024)<sup>[11, 27]</sup>. Administrative impacts materialize by strengthening decision-making through Policy Management Support Systems (PMSS) and citizen analytics (Amutha, 2022)<sup>[2]</sup>. Ultimately, the structural redistribution of power toward citizens is the umbrella outcome of these accumulated outcome measures and represents a successful e-governance initiative (Singh, 2017)<sup>[39]</sup>.

### 3. The Feedback Loop and Sustainable Rural Development

The feedback stage is key in allowing the framework to shift from a linear process to a circular, adaptable process. Institutionalized resources like Digital Grievance Redressal Systems and Social Audits leverage citizen feedback to allow for iteration in policy modification (World Bank, 2023)<sup>[48]</sup>. This reflexive process exemplifies the G2C2G model, whereby learning by policy is recursive and driven by citizens (Malhotra *et al.*, 2013)<sup>[24]</sup>. Thus, feedback serves as a pathway for organizational learning and adaptive governance (Ramzy & Ibrahim, 2022)<sup>[31]</sup>, facilitating agility of policy to respond to changing rural needs.

Sustainability represents the final test of framework viability. Financial viability exists through embedded service models like EGERT (Naik *et al.*, 2012)<sup>[27]</sup>, institutional viability through routine co-creation (Røiseland *et al.*, 2020)<sup>[33]</sup>, and democratic viability exists through empowered citizen participation. The feedback stage, thus, confirms that iteration, citizen trust, and community empowerment can happen continuously and not just a terminal state (Singh, 2017)<sup>[39]</sup>.

### 4. Theoretical and Practical Implications

In theory, this research situates Systems Theory (Bertalanffy, 1968)<sup>[4]</sup> in participatory development, which characterizes e-governance as a living system comprised of self-correcting and evolving parts. It also serves as a diagnostic tool for policymakers to better identify the strengths and weaknesses at stage levels for targeted interventions. The cyclical feedback mechanism fosters sustainability and adaptability of rural development strategies under various changing technological and socio-political conditions.

The Multi-Stage Framework shifts e-governance from a static administrative tool to a dynamic ecosystem of continuous change and improvement that subscribes to ICT-enabled governance principles of good governance and inclusiveness and sustainability—the essence of rural development (UNDP, 1994; Singh, 2017)<sup>[39, 43]</sup>.

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