

Contextual Determinants of Theoretical Effectiveness in E-Government Adoption: A Systematic Review Across Development Stages

Agus Sifaunajah¹, Muhyiddin Zainul Arifin², Nurul Yaqin³.

^{1,2}Study Program of Information System, Faculty of Information Technology, Universitas KH. A. Wahab Hasbullah

³Study Program of Informatics, Faculty of Information Technology, Universitas KH. A. Wahab Hasbullah

*Email: agus.syifa85@gmail.com

ABSTRACT

This systematic review synthesizes 40 empirical studies employing 19 theoretical frameworks to examine how theoretical effectiveness in explaining e-government adoption varies across development contexts and implementation stages. The analysis demonstrates that no single framework exhibits universal explanatory superiority; instead, theoretical performance is strongly contingent upon contextual conditions. In developing countries with nascent digital infrastructure, the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) dominate explanatory power. Specifically, extended UTAUT models consistently account for 60% or more of the variance in behavioral intention, identifying transparency as a key predictor. Conversely, in developed contexts characterized by mature institutional and technological environments, individual-level acceptance frameworks prove insufficient. In these settings, organizational and policy-oriented theories—such as Dynamic Capability Theory, Institutional Theory, and Policy Implementation Frameworks—more effectively capture the dynamics of organizational transformation. These findings suggest that future research should adopt a contingency approach, selecting theoretical lenses that align with the specific maturity level of the e-government ecosystem.

Keywords: *E-Government Adoption, Systematic Literature Review, Theoretical Frameworks, UTAUT, Digital Transformation.*

INTRODUCTION

The proliferation of e-government services has evolved from a strategic option to a global imperative for public sector modernization. Governments worldwide are increasingly leveraging digital technologies to enhance transparency, streamline administrative efficiency, and foster greater citizen engagement. In this digital era, the ability of public institutions to deliver seamless electronic services is often viewed as a critical indicator of national competitiveness and governance quality (AlShehhi & Tipu, 2023).

However, despite substantial investments in digital infrastructure, the realization of e-government potential remains uneven. A significant number of initiatives, particularly in developing nations, fail to achieve sustainable adoption or mature into fully integrated systems (Alzayed & Al-Emran, 2024). This "adoption gap" suggests that the availability of technology alone does not guarantee usage. Consequently, understanding the multifaceted barriers—ranging from technical infrastructure to cultural resistance—has become a primary concern for policymakers and researchers alike.

To elucidate these challenges, the academic literature has employed a diverse array of theoretical lenses. Dominant frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) have been widely applied to predict citizen behavior (Ayyash et al., 2022; Hujran et al., 2023). While these models provide valuable insights into individual-level acceptance, the literature remains fragmented. A critical gap exists in understanding how the *effectiveness* of these theoretical frameworks varies across different contextual settings. Specifically, a framework that successfully explains adoption in a developed nation with mature infrastructure may fail to capture the nuances of a developing country facing basic connectivity issues and institutional voids.

Addressing this theoretical ambiguity, this systematic review synthesizes empirical evidence from 40 selected studies to evaluate the performance of 19 theoretical frameworks. Unlike previous reviews that focus solely on success factors, this study aims to critically examine the *contextual determinants* of theoretical effectiveness. By categorizing findings across different development stages, this research

seeks to determine whether specific theories—such as those focusing on individual acceptance versus those emphasizing organizational capabilities—are more applicable in specific socioeconomic contexts. The findings offer a roadmap for researchers to select appropriate theoretical lenses and for practitioners to design more targeted adoption strategies.

METHOD

This study employed a systematic literature review (SLR) methodology to identify which theoretical approaches most effectively explain the barriers and enablers of e-government adoption in public sector organizations. The SLR process comprised three sequential phases: source identification via database search, systematic screening, and structured data extraction and synthesis, leveraging the Elicit AI tool. The steps of the systematic literature review method in this study are visualized in Figure 1 below, which shows the sequence of processes from database search to final synthesis.

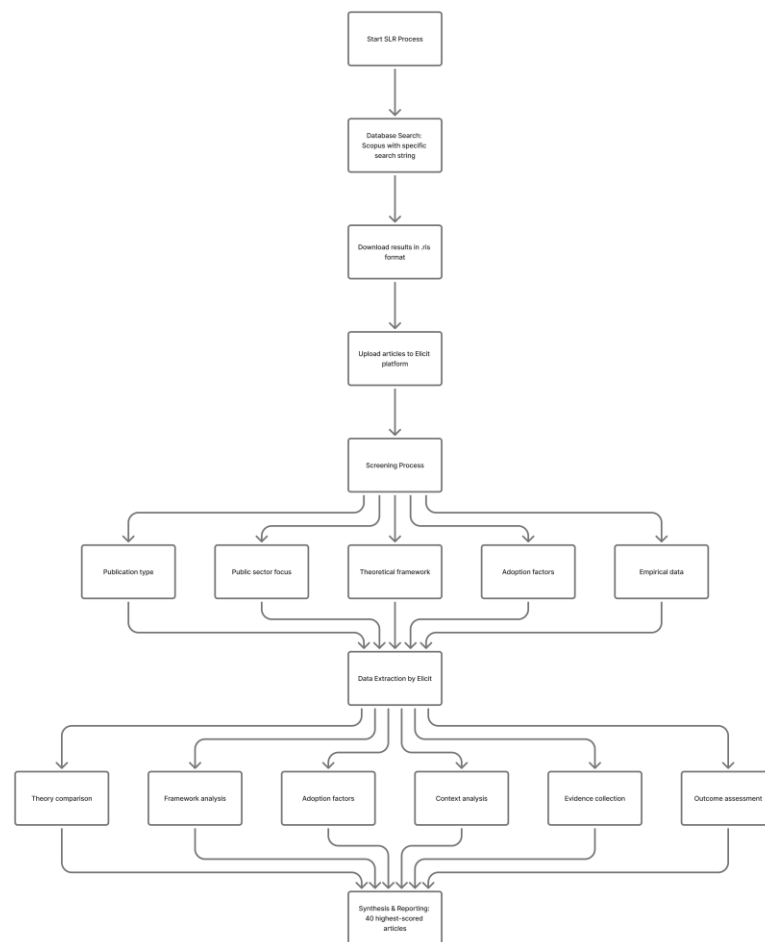


Figure 1. Systematic Literature Review Flowchart

1. Paper Search

The initial corpus of articles was curated through a targeted search in the **Scopus** database, utilizing the following search string:

TITLE-ABS-KEY("e-government" OR "digital government" OR "electronic government" OR "e-governance") AND

TITLE-ABS-KEY("theory" OR "theoretical framework" OR "conceptual framework" OR "model" OR "technology acceptance model" OR UTAUT OR "diffusion of innovation" OR TOE OR "stakeholder theory" OR "institutional theory" OR "business process reengineering" OR BPR OR "maturity model") AND

TITLE-ABS-KEY("systematic literature review" OR "systematic review" OR review) AND
PUBYEAR > 2019 AND

(LIMIT-TO (DOCTYPE,"ar"))

This search was limited to peer-reviewed journal articles published from 2020 to 2025, emphasizing studies concerned with theoretical approaches and systematic reviews of e-government adoption. The results of this search were downloaded in .ris format.

All identified articles in .ris format were then uploaded to the Elicit platform for further screening, data extraction, and synthesis.

2. Screening Process

Screening was performed in Elicit according to the following inclusion criteria:

- **Public Sector Focus:** The study explicitly addresses e-government adoption in public sector organizations.
- **Theoretical Framework Application:** The article applies, tests, or evaluates one or more theoretical frameworks/models (e.g., TAM, UTAUT, TOE, institutional theory).
- **Adoption Factors Analysis:** The study identifies, analyzes, or discusses barriers and/or enablers to e-government adoption.
- **Empirical Evidence:** Inclusion of empirical research (qualitative, quantitative, mixed methods), systematic reviews, or meta-analyses (excluding purely conceptual papers).
- **Publication Type:** Limited to peer-reviewed academic publications, government reports, or reputable conference proceedings.

Articles were judged holistically for inclusion based on cumulative fit across the above criteria.

3. Data Extraction and Synthesis

Elicit was used to systematically extract structured data for each included paper covering:

- **Theoretical frameworks:** Names, application context, empirical testing, key constructs, and extensions.
- **Adoption factors:** Barriers and enablers identified, whether at the individual, technological, organizational, or environmental level.
- **Contextual characteristics:** Type of e-government service, geographic/organizational context, technology platform, and adoption stage.
- **Empirical support for frameworks:** Research design, sample description, model performance, and noted limitations or gaps.
- **Adoption outcomes:** Operational definitions, success metrics, benchmark outcomes.
- **Theory comparisons:** Direct comparison and integration suggestions, theory strengths/limitations, and author recommendations on theory development.

Due to technical constraints, the synthesis and reporting focused on the 40 highest-quality articles (ranked by Elicit screening score) from the total 147 eligible sources.

All extraction followed standardized column-based prompts, and ambiguous decisions were resolved through reviewer discussion. This procedure ensured the review was transparent, rigorous, and reproducible, delivering a nuanced mapping of recent theoretical developments and context-dependent effectiveness for e-government adoption in the public sector. Figure 2 displays a PRISMA diagram depicting the number of articles at each stage of selection according to the transparency and reporting standards of systematic reviews.

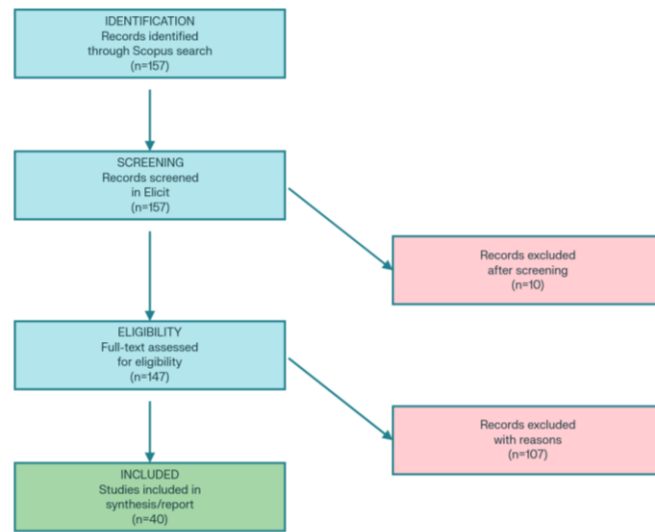


Figure 2. PRISMA Flow Diagram

RESULT AND DISCUSSION

1. Characteristics of Included Studies

The systematic review identified 40 studies examining theoretical approaches to e-government adoption in public sector organizations. Studies spanned diverse geographic contexts, with representation from developing countries (Bangladesh, Indonesia, India, Nepal, Afghanistan), emerging economies (Saudi Arabia, Jordan, South Africa), and developed nations (China, United Arab Emirates, Poland, European Union). Full text was available for only 6 of the 40 studies, with the remaining 34 papers accessible only through abstracts.

Table 1. Characteristics of Included Studies in the Systematic Review

Study	Full Text?	Study Type	Geographic Context	Theoretical Framework(s) Used	Research Question Focus
Ayyash et al., 2022	No	Primary study	Saudi Arabia	Hofstede cultural model, D&M IS Success Model	Cultural effects on adoption, Success factors
Nur Ullah et al., 2024	No	Primary study	Bangladesh	Not specified	Success factors
Kamal et al., 2025	No	Primary study	Indonesia	Edwards III's policy implementation theory	Religious service implementation
Chidama et al., 2023	No	Multiple case studies	Nigeria and Rwanda	Realist evaluation, Affordance actualization, Self-determination theory, Sustainability framework	Value proposition sustainability
Nofal et al., 2021	No	Primary study	Jordan	Technology Acceptance Model	Adoption factors

Eibl et al., 2022	Yes	Systematic literature review	European context	TAM, UTAUT, GAM	Mobile government adoption factors
Zeng et al., 2023	No	Multiple case studies	China	Platform governance	Cross-boundary collaboration
Manda et al., 2021	No	Case study	South Africa	Institutional theory	Power and politics in digital transformation
Syam et al., 2024	No	Systematic literature review	Not specified	TAM, D&M IS, TPB, SCT, UTAUT, TOE	E-participation success factors
Xiao et al., 2023	Yes	Survey	China	Dynamic Capability Theory	Digital transformation impact on performance
Morte-Nadal et al., 2025	No	Mixed methods review	European Union	Not specified	Digital inclusion barriers
Al-Dwairi et al., 2022	No	Primary study	Not specified	Not specified	Cloud computing
Terrance et al., 2023	No	Qualitative study	South Africa	Actor Network Theory	Adoption, Infrastructure and service delivery
Alshaher et al., 2021	No	Primary study	Iraq	D&M IS Success Model, UTAUT	IT capabilities and system success
Anityasari et al., 2024	No	Primary study	Indonesia	Extended TAM	User acceptance success
Khan et al., 2021	No	Case study	Not specified	Proposed framework	Implementation challenges
Indra Sensuse et al., 2022	No	Mixed methods	Indonesia	Not specified	Smart government foundation model
Hujran et al., 2023	No	Primary study	United Arab Emirates	Extended UTAUT	Smart government usage
Alzayed et al., 2024	Yes	Systematic literature review + case study	Not specified	Requirements engineering framework	Project success and failure factors
Escobar et al., 2023	No	Systematic literature review	Not specified	Not specified	Digital transformation success
Alorini et al., 2025	No	Systematic literature review	Not specified	Not specified	AI adoption factors
AlShehhi et al., 2023	No	Systematic literature review	Not specified	Not specified	Digital transformation processes
Abied et al., 2022	No	Systematic literature review	Not specified	Not specified	Cloud computing adoption
Haug et al., 2024	Yes	Systematic literature review	Global	Theoretical framework of digitally-induced change	Incremental vs transformational change
Sharma et al., 2022	No	Literature review + expert opinions	Developing countries	Affordance theory	Mobile governance factors

Sabani et al., 2023	No	Case study	Indonesia	Extended UTAUT	Citizen adoption factors
Xia et al., 2025	No	Multi-criteria decision framework	China	Extended SERVQUAL model	Healthcare e-government service quality
Li et al., 2022	No	Primary study	China	Not specified	Cloud service satisfaction
Dong et al., 2023	Yes	Game theory modeling	China	Evolutionary Game Theory, Stochastic evolutionary game	Cross-department data sharing
MacLean et al., 2022	No	Systematic literature review	Not specified	Public Value Theory	E-government impacts
Choi et al., 2020	No	Conceptual framework	Not specified	Knowledge vacuum framework	Innovation failure
Brink et al., 2024	No	Mixed methods	International	Roger's Innovation Diffusion Theory	Grey digital divide
Sabani et al., 2020	No	Primary study	Indonesia	Extended UTAUT	Transparency effects on adoption
Díaz Calderón et al., 2025	No	Systematic literature review	Global	Not specified	Records management digitalization
Abu Bakar et al., 2022	Yes	Qualitative study	Malaysia	Systems Quality Model, Data Quality Model, SERVQUAL	Legacy systems modernization
Mohammadi et al., 2022	No	Primary study	Afghanistan	Extended UMEGA	Website adoption factors
Sienkiewicz-Małyjurek et al., 2023	No	Mixed methods	Poland	Not specified	AI adoption challenges
Hakeem et al., 2025	No	Primary study	India	TAM, Theory of Reasoned Action, Social Cognitive Theory, Trust	Smart city service acceptance
Gautam et al., 2025	No	Mixed methods	Nepal	Not specified	Implementation barriers
Dobrolyubova et al., 2022	Yes	Systematic literature review	Over 50 countries	Multiple theories (DeLone & McLean, Rogers, TAM, UTAUT, Public Value Theory)	Survey-based performance evaluation

The 40 studies employed diverse methodologies, with 14 systematic literature reviews, 17 primary empirical studies using surveys, 7 case studies, and 2 theoretical modeling studies. Sample sizes for empirical studies ranged from 137 administrative employees to 765 respondents, with most studies falling between 200-400 participants. Studies examined e-government adoption across various service types, including general service delivery, e-participation, smart government, mobile government, cloud computing, and specialized contexts like religious services and healthcare.

2. Theoretical Frameworks Used

Studies employed 19 distinct theoretical frameworks or models, with considerable variation in their application and scope. The Technology Acceptance Model (TAM) and its extensions appeared most frequently, used in 7 studies as a predictive model for examining perceived usefulness and ease of use. The Unified Theory of Acceptance and Use of Technology (UTAUT) and its extensions were applied in 9 studies, typically as explanatory frameworks for citizen and employee adoption behavior.

Table 2. Main Theoretical Frameworks Used to Explain E-Government Adoption

Theoretical Framework	Number of Studies	Application Type	Key Constructs Examined
TAM/Extended TAM	7	Predictive model	Perceived usefulness, perceived ease of use, attitude, trust, perceived risk
UTAUT/Extended UTAUT	9	Explanatory framework	Performance expectancy, effort expectancy, social influence, facilitating conditions, transparency, personalization
D&M IS Success Model	4	Predictive model	Information quality, system quality, service quality, user satisfaction
Dynamic Capability Theory	1	Predictive model	Sensing capability, seizing capability, transformation capability, partnering agility
Institutional Theory	1	Explanatory framework	Power dynamics, politics
Hofstede Cultural Model	1	Predictive model	Power distance, uncertainty avoidance, collectivism, masculinity, face-to-face interactions, nepotism
Edwards III's Policy Implementation Theory	1	Explanatory framework	Communication, resources, disposition, bureaucratic structure
Realist Evaluation	1	Explanatory framework	Mechanisms, contexts, outcomes
Affordance Theory	2	Conceptual lens	Technological cognizance, affordance actualization
Self-Determination Theory	1	Theoretical framework	Autonomy, competence
Actor Network Theory	1	Conceptual lens	Network relationships
TOE Framework	1	Explanatory framework	Technology, organization, environment
TPB	1	Explanatory framework	Behavioral factors
SCT	1	Explanatory framework	Social cognitive factors
Theory of Reasoned Action	1	Predictive model	Behavioral intention
Public Value Theory	2	Conceptual lens	Value creation for different stakeholders
Roger's Innovation Diffusion Theory	2	Explanatory framework	Relative advantage, compatibility, complexity, trialability, observability
SERVQUAL Model	2	Service quality evaluation	Service quality dimensions, empathy, cross-platform interoperability
Evolutionary Game Theory	1	Predictive model	Strategy evolution, payoff matrices

Several studies integrated multiple theoretical perspectives. Alshaher et al. combined the updated D&M IS Success Model with UTAUT to create a comprehensive model incorporating IT capabilities. Chidama et al. employed four theoretical lenses simultaneously—realist evaluation, affordance actualization, self-determination theory, and a sustainability framework—to understand value proposition sustainability in sub-Saharan Africa. Dobrolyubova et al.'s systematic review identified multiple theories used across 216 studies, including the Theory of Change, DeLone and McLean's model, Rogers's theory, TAM, UTAUT, and Public Value Theory.

Theory application varied by development stage. Studies in developing contexts more frequently employed TAM and UTAUT to understand basic adoption intentions, while studies in developed contexts examined more complex dynamics using institutional theory, game theory, and capability-based frameworks. Only 6 studies proposed newly developed frameworks, while the remaining adapted or extended existing models.

3. Barriers and Enablers of E-Government Adoption

The 40 studies collectively identified 89 distinct factors affecting e-government adoption, categorized across individual, technological, organizational, and environmental levels. Barriers and enablers varied significantly by context, with developing countries facing more fundamental infrastructure and capacity challenges while developed nations grappled with coordination and institutional issues.

a. Individual-Level Factors

At the individual level, 18 studies examined user-related barriers and enablers. Digital skills emerged as a critical factor, identified as a barrier when limited but an enabler when adequate. Limited digital skills disproportionately affected vulnerable groups including the elderly, low-income populations, and those with minimal education. In Poland, employees' insufficient knowledge of how to use AI was identified as a barrier limiting adoption, while in China, digital literacy served as an enabler of government performance improvement.

Perceptual factors demonstrated consistent effects across contexts. Perceived usefulness positively influenced adoption in Jordan, Indonesia, and India. However, Anityasari et al. found that in the Indonesian city of Surabaya, trust, perceived risk, attitude towards use, and perceived usefulness all demonstrated negative path coefficients despite the extended TAM model explaining 60% of behavioral intentions. Perceived ease of use functioned as an enabler in multiple studies, with Sabani et al. identifying it as a significant factor in Indonesian e-government adoption.

Self-efficacy and individual cognizance emerged as important mechanisms. Hakeem et al. found that perceived usefulness, perceived ease of use, and self-efficacy positively impacted citizens' attitudes toward smart city services in Kerala, India. Chidama et al. identified technological cognizance, autonomy, and competence as individual mechanisms sustaining implemented e-government projects in Nigeria and Rwanda.

b. Technological Factors

Technology-related factors appeared in 24 studies, with substantial differences between infrastructure-focused barriers in developing contexts and interoperability challenges in developed settings. Infrastructure limitations constituted barriers in South Africa, Nepal, and China, while cross-platform interoperability emerged as a strategic challenge in Chinese healthcare e-government.

System quality factors functioned primarily as enablers. System quality positively impacted adoption in Bangladesh, Iraq, and Indonesia. Information quality served as the key success factor in Bangladesh's union digital centers and contributed positively in multiple other contexts. Service quality similarly enabled adoption across Jordan, Bangladesh, and China.

Cloud computing characteristics presented specific adoption drivers. Al-Dwairi et al. found that mobility, cost, backup and disaster recovery, and scalability and flexibility were key drivers significantly affecting employees' intention to adopt cloud computing for governmental units. Service price, however, dampened user satisfaction of e-government cloud services in China.

Website quality factors and technology adoption factors significantly impacted e-government website adoption in Afghanistan at three maturity levels—information, interaction, and transaction. Access to technology emerged as a barrier particularly affecting vulnerable populations, while inadequate service design disproportionately impacted the elderly, low-income populations, and those with minimal education.

c. Organizational Factors

Organizational-level factors appeared in 27 studies, demonstrating complex interactions between resources, structure, and culture. Resource-related factors showed mixed effects. Adequate budget allocation and funding enabled adoption in Indonesia, Nigeria and Rwanda, and Jordan, while budget constraints created barriers in Indonesia's smart government implementation. Human resource factors similarly varied—good quality human resources enabled adoption despite insufficient quantity in Indonesia, while capacity building and technical skills proved essential in multiple contexts.

Leadership and governance structures played critical roles. Leadership emerged as an enabler in Indonesia's smart government and in Nigeria and Rwanda's sustainable projects. Political and legal

issues constituted barriers in Nepal, while political support enabled sustainability in sub-Saharan Africa. Organizational culture functioned as both barrier and enabler depending on implementation quality, with Abu Bakar et al. identifying it as a factor influencing legacy systems modernization.

Communication effectiveness presented consistent challenges. Communication remained suboptimal with deficiencies in information clarity, transmission, and consistency in Indonesia's religious e-government implementation. Adaptability to policy changes and system updates created barriers in the same context. Bureaucratic structure revealed existing Standard Operating Procedures with fragmentation management challenges, while coordination capacity with leadership support enabled success in Nigeria and Rwanda.

Project management practices proved essential. Good project management practices, user involvement, and creating shared vision emerged as critical enablers in multiple studies. Alzayed et al. identified project management, change management, and risk management as enablers, while insufficient requirement elicitation and limited stakeholder involvement constituted barriers. Organizational resistance to change created barriers particularly in digital transformation contexts.

Strategic and policy factors demonstrated importance across contexts. Lack of digital strategies affected service delivery in South Africa, while insufficient AI policies, laws, and regulations limited adoption in Poland. Sienkiewicz-Malyjurek et al. found that lack of strategy or plans for initial adoption or continued usage of AI was a major barrier, and failure to ensure AI use aligned with human values created additional challenges.

d. Environmental Factors

Environmental-level factors appeared in 19 studies, encompassing trust, transparency, cultural dimensions, and stakeholder dynamics. Trust factors showed complex patterns. Trust positively influenced adoption in Jordan, Afghanistan, and China. Public trust contributed to e-governance success in Bangladesh, but trust in e-government demonstrated weaker influence on attitude than expected in India. Trust in technology alongside trust in government revealed mixed findings across contexts.

Transparency emerged as particularly influential in developing contexts. Sabani et al. found transparency to be the strongest factor influencing Indonesian citizens' decisions to adopt e-government. Perceived transparency significantly influenced adoption in another Indonesian study, and it enhanced perceived ease of use's commitment to e-government adoption in Jordan. Information transparency represented the strongest impact of smart government usage in the United Arab Emirates.

Cultural dimensions shaped adoption patterns. Ayyash et al. found that high power distance, low uncertainty avoidance, high collectivism, high masculinity, face-to-face interactions, and nepotism contributed positively to e-government adoption among Saudi Arabian hospital employees. These cultural factors operated at the environmental level but manifested through individual behaviors. Cultural and social factors more broadly created barriers when they led to cultural discrepancies, hidden agendas, and administrative interference.

Stakeholder and interagency factors influenced adoption outcomes. Different expectations of stakeholders and partners about AI limited adoption in Poland. Dong et al. identified accumulation of interagency trust relationships as gradually eliminating differences in data sharing among departments. Quality of collaboration with internal and external stakeholders enabled digital transformation.

Social influence functioned as a moderately significant enabler in Indonesia and as a significant enabler in another Indonesian study. Government encouragement and facilitating conditions showed moderate significance in Indonesia, while facilitating conditions demonstrated the weakest influence among significant antecedents of smart government usage in the UAE.

Digital exclusion emerged as a critical barrier. Digital exclusion in rural areas created barriers to records management digitalization, and barriers of perception, access, and use excluded older citizens from digital participation. The mismatch between government expectations of digitally competent citizens and older citizens' expectations of service regardless of digital competence created additional challenges.

e. Cross-Cutting Patterns

Several factors demonstrated importance across multiple organizational levels. Perceived security showed moderate significance in Indonesia, while security-related issues created barriers in Nepal. Privacy and security required assurance as conversion factors for mobile governance. Financial issues and cost factors presented as barriers in Nepal and Afghanistan, though cost effectiveness also drove cloud computing adoption.

Value-related factors influenced adoption. Perceived value appeared among mobile government

adoption factors and value co-creation contributed to e-governance success in Bangladesh. Service availability and responsiveness both enabled adoption in Bangladesh, while service provision influenced mobile government adoption.

4. Empirical Evidence for Theoretical Effectiveness

Empirical support for theoretical frameworks varied substantially across methodologies and contexts. Survey-based studies provided the most direct evidence for theory performance, while qualitative and review studies offered in- sights into theory applicability and limitations.

a. Variance Explained and Model Fit

Studies employing structural equation modeling reported varying levels of explanatory power. Anityasari et al.'s extended TAM model effectively represented 60% of users' behavioral intentions in adopting Indonesia's KLAMPID e-government system. Xiao et al. reported good model fit for their dynamic capability framework in China, with chi- square not significant, RMSEA less than 0.05, and AGFI greater than 0.8. Their analysis revealed significant positive effects of sensing capability, seizing capability, transformation capability, and partnering agility on government performance.

Nur Ullah et al. found substantive statistical significance for eight success factors through PLS-SEM analysis of Bangladesh's union digital centers, with information quality identified as the key success factor followed by value co-creation, service availability, public trust, responsiveness, system quality, service quality, and participation as the least contributing factor. Nofal et al. reported that perceived usefulness and perceived ease of use significantly impacted service quality in Jordan, and that trust mediated the relationship between perceived ease of use and e- government adoption.

Several studies identified limitations in theoretical explanation. Anityasari et al. found that trust, perceived risk, attitude towards use, and perceived usefulness demonstrated negative path coefficients despite the model's overall explanatory power. Hujran et al. reported that personalization had no significant effect on smart government usage in the UAE, while performance expectancy showed the strongest impact and facilitating conditions the weakest influence. These divergent findings suggested that standard technology acceptance constructs required context- specific adaptation.

b. Qualitative Theory Validation

Case study research provided nuanced evidence for theoretical mechanisms. Khan et al.'s exploratory case study of Pakistan's Ministry of IT endorsed their proposed framework, confirming the importance of shared vision, adequate funding, good project management practices, user involvement, capacity building, and technical skills. Kamal et al.'s qualitative analysis of Indonesia's SISKOHAT system revealed mixed outcomes across Edwards III's implementation dimensions, with suboptimal communication effectiveness, adequate budget allocation but insufficient human resources, positive implementer attitudes but adaptability challenges, and existing Standard Operating Procedures with fragmentation management challenges.

Chidama et al.'s realist evaluation of Nigeria and Rwanda identified technological cognizance and autonomy as well as competence as individual mechanisms sustaining e-government outcomes, while organizational mechanisms included continuous availability of funds, institutional capacity, administrative capacity, coordinating capacity with leadership and political support, and institutionalizing technology within local settings. The synthesis of findings into an actualized value sustainability framework demonstrated theory building rather than just theory testing.

Abu Bakar et al.'s phenomenology and grounded theory analysis of Malaysian public sector agencies identified hu- man, process, product, and organization aspects as influencing legacy systems modernization. The study's 19 informants provided qualitative support for the comprehensive guideline developed, though the authors noted limitations including COVID-19 pandemic impacts and lack of generalizability to other countries.

5. Systematic Review Findings

Literature reviews revealed patterns in theoretical application and gaps in theoretical development. Dobrolyubova et al.'s analysis of 216 empirical papers examining digital government performance across over 50 countries found that studies primarily focused on adoption of digital public services and digital participation, with outcomes and societal impacts receiving less attention regardless of e-government development level. The review identified decreased focus on outcomes and impacts over time, highlighting a gap in empirical validation for regulation and enforcement contexts.

MacLean et al.'s systematic review of 60 empirical studies classified e-government impacts using public value theory, identifying productivity for taxpayers and clients, client satisfaction and service quality for clients, and improved trust and communications for citizens as the most commonly studied impacts. The review noted limited research in many areas and suggested a complex network of immediate and indirect impacts requiring consideration.

Haug et al.'s PRISMA-based review of 164 studies developed a theoretical framework linking incremental and transformative changes in public sector organizations. The framework identified external drivers including political systems and technological developments, and internal drivers including organizational characteristics, IT infrastructure, quality of collaboration, innovative culture, employee skills, and leadership. However, the authors noted limitations in data extraction subjectivity and skewed representation of change types, calling for further empirical research to test technology's role in transformative change.

Alzayed et al.'s mixed systematic literature review and case study of 208 individuals in E-Government companies identified four major reasons for project failures and significant relationships between failure reasons and requirements engineering practices. The study found that robust RE practices were crucial for preventing or mitigating failure factors, though further research was needed on stakeholder engagement and cultural factors.

6. Context-Specific Theory Performance

Theory effectiveness varied significantly by development context. Studies in developing countries generally reported stronger effects for basic technology acceptance constructs. Sabani et al. found that transparency was the strongest factor influencing Indonesian citizen adoption of e-government, confirming the effectiveness of extending UTAUT with transparency for understanding adoption in that context. Similarly, Hakeem et al. reported that Indian citizens focused more on ease of use and self-efficacy over trust, suggesting that increasing awareness and providing training could be more effective than building trust in encouraging acceptance.

In contrast, developed country contexts revealed more complex dynamics requiring sophisticated theoretical approaches. Xiao et al.'s dynamic capability framework provided important theoretical guidance for understanding how sensing, seizing, and transformation capabilities combined with partnering agility to improve Chinese government performance. However, the study acknowledged limitations in its focus on Jiangsu Province without examining different economic development levels.

Dong et al.'s evolutionary game theory approach demonstrated the value of mathematical modeling for understanding cross-department data sharing dynamics in China. The tripartite stochastic evolutionary game model revealed the existence of a positive stable point in data sharing processes and showed how external effects could be improved through increased investment, the role of interagency trust, and the importance of coordination mechanisms. However, the study lacked empirical data and focused primarily on theoretical modeling.

7. Theory Refinement and Development

Several studies contributed to theory refinement by extending existing frameworks. Six studies proposed newly developed frameworks, while others extended established models. Mohammadi et al. extended the Unified Model of E-Government Adoption (UMEGA) by integrating website quality factors and trust factors, validating the model through a survey of 294 Afghan citizens across four provinces. The findings indicated that website quality, technology adoption, and trust factors significantly impacted e-government website adoption at three maturity levels.

Sienkiewicz-Małyjurek et al.'s systematic literature review and survey of 414 Polish cities identified 15 challenges limiting AI adoption and associated preventive activities. The study provided practical insights for prioritizing AI adoption activities while adding value to digital government theory. The empirical verification of challenges identified through literature review demonstrated an effective approach to theory validation.

Choi et al. proposed a conceptual framework of "knowledge vacuum"—an organizational condition in which excessive exploration and organizational inertia interact to create a vicious cycle of low performance. While the framework provided theoretical implications for understanding e-government innovation failures, the authors acknowledged limitations in understanding the current state and challenges in theoretically explaining overarching dynamics.

8. Synthesis: Comparative Theoretical Effectiveness

The 40 studies reveal substantial heterogeneity in theoretical effectiveness across contexts, with divergent findings reflecting genuine differences in applicable mechanisms rather than mere methodological inconsistencies. Synthesizing these findings requires examining which theories succeed under what conditions and why some frameworks explain adoption better than others in specific margins.

a. Context-Specific Theory Applicability

The most striking pattern concerns the differential effectiveness of theories across development contexts. TAM and UTAUT variants demonstrated strongest predictive power in developing countries where basic infrastructure and digital literacy remained nascent. In Indonesia, extended UTAUT models consistently explained significant variance in adoption intentions, with Anityasari et al. reporting 60% of behavioral intentions explained and Sabani et al. identifying transparency as the strongest factor. This effectiveness derives

from these contexts' alignment with TAM's core assumptions—users face genuine uncertainty about system utility and ease of use, making perceptual factors genuinely predictive rather than post-hoc rationalizations.

In contrast, developed country contexts revealed TAM and UTAUT's limitations. While these frameworks identified significant factors in the UAE and China, they required substantial extension or replacement with more sophisticated frameworks. Xiao et al.'s dynamic capability theory approach proved more effective in China precisely because it addressed organizational transformation capacity rather than individual adoption intentions. The Chinese context—with established digital infrastructure and high digital literacy—required theories explaining how organizations reconfigure resources rather than whether individuals accept technology.

This pattern suggests TAM and UTAUT function as necessary but insufficient frameworks. They effectively identify adoption barriers in early-stage implementations where individual perceptions genuinely predict usage. However, once basic acceptance hurdles are overcome, these theories fail to explain sustained adoption, organizational integration, or performance improvements. The 216-study review by Dobrolyubova et al. confirmed this limitation, finding that while adoption studies dominated the literature, outcomes and impacts received inadequate attention.

b. Study Quality and Theory Validation

Methodological rigor significantly affected apparent theoretical effectiveness. The seven studies with structural equation modeling provided the strongest quantitative evidence, but even these varied in sophistication. Xiao et al.'s model demonstrated superior fit statistics (chi-square not significant, RMSEA < 0.05, AGFI > 0.8) compared to other studies that reported significance without detailed fit indices.

Qualitative studies offered richer mechanistic explanations but lacked generalizability. Chidama et al.'s realist evaluation of Nigeria and Rwanda provided detailed mechanisms sustaining e-government success—technological competence, autonomy, competence, continuous funding, institutional capacity, and leadership support—but these findings emerged from specific implemented projects rather than representative samples. Similarly, Kamal et al.'s analysis of Indonesia's SISKOHAT revealed implementation challenges across communication, resources, disposition, and bureaucratic structure, but the religious service context limited transferability.

The systematic reviews (14 studies) revealed theory usage patterns rather than theory effectiveness. Dobrolyubova et al.'s comprehensive review of 216 papers identified widespread use of De Lone and McLean's model, Rogers's theory, TAM, UTAUT, and extensions, but found that theory selection reflected convention rather than demonstrated superiority. Most studies employed familiar frameworks because of publication precedent rather than theoretical appropriateness for their specific contexts.

c. Mechanistic Explanations for Theory Performance

Three distinct mechanisms explain why certain theories perform better in specific contexts: alignment with adoption stage, match to organizational versus individual focus, and cultural resonance with theoretical assumptions. Adoption stage alignment: Early-stage adoption contexts benefit from individual-focused acceptance theories (TAM, UTAUT) because users genuinely face uncertainty about new systems. Sabani et al.'s finding that transparency was the strongest adoption factor in Indonesia reflects citizens' legitimate concerns about government service reliability rather than mere technology acceptance. Once systems are established, however, continued use depends on organizational factors like resource allocation, leadership support, and institutional capacity—constructs better captured by institutional theory, capability frameworks, or policy implementation models.

Organizational versus individual focus: Theories targeting individual perceptions (TAM, UTAUT, TPB) explain citizen adoption but fail to capture organizational implementation challenges. Khan et al.'s framework emphasizing shared vision, funding, project management, user involvement, and capacity building addressed organizational barriers that individual-level theories ignore. Similarly, Alzayed et al. found that requirements engineering practices—an organizational capability—proved crucial for project success. The 60 studies reviewed by MacLean et al. confirmed this distinction, with most examining individual-level impacts (client satisfaction, trust) rather than organizational transformation.

Cultural resonance Theories developed in Western contexts required modification for non-Western settings. Ayyash et al.'s Hofstede cultural model revealed that high power distance, collectivism, masculinity, face-to-face interactions, and nepotism—factors absent from standard acceptance models—positively influenced Saudi Arabian adoption. This suggests universal theories like TAM and UTAUT omit culturally-specific mechanisms that dominate in non-Western contexts. The "grey digital divide" studied by Brink et al. similarly revealed that Roger's Innovation Diffusion Theory required substantial adaptation for older populations, who forge personal technological pathways incompatible with standard diffusion assumptions.

d. Integration Recommendations and Theory Gaps

Several studies successfully integrated multiple theoretical perspectives, suggesting pathways for improved theoretical frameworks. Alshaher et al.'s combination of D&M IS Success Model with UTAUT and addition of IT capabilities demonstrated how quality-focused and acceptance-focused theories complement each other. Chidama et al.'s synthesis of realist evaluation, affordance theory, self-determination theory, and sustainability frameworks showed how multi-theory approaches capture individual, organizational, and contextual mechanisms simultaneously.

However, three critical gaps persist across the literature:

- 1) Temporal dynamics: No studies adequately modeled how adoption factors change over time. Dobrolyubova et al. noted decreased focus on outcomes and impacts despite growing research on initial adoption, suggesting theories need temporal extensions. The knowledge vacuum framework proposed by Choi et al. attempted to address this gap by modeling vicious cycles of excessive exploration and organizational inertia, but lacked empirical validation.
- 2) Multi-level integration: Most theories operate at a single level (individual, organizational, or environmental) despite adoption being inherently multi-level. Haug et al.'s framework linking incremental and transformative changes represented an advance, but acknowledged limitations in explaining how micro-level changes accumulate into macro-level transformation. Dong et al.'s game theory approach modeled cross-department dynamics but omitted individual user behavior entirely.
- 3) Context-outcome mappings: While studies identified numerous context variables (development level, governance system, service type, cultural factors), none provided systematic frameworks for predicting which theories work best under which conditions. The 40 studies collectively examined 19 theoretical frameworks across diverse contexts but offered minimal guidance for theory selection. Researchers default to familiar frameworks (TAM, UTAUT) regardless of context appropriateness.

e. Refined Theory Selection Guidance

Synthesizing across studies suggests the following context-specific theory recommendations:

For developing countries with nascent e-government, extended UTAUT models incorporating transparency, trust, and cultural factors provide optimal explanatory power. These contexts align with individual acceptance models' assumptions about genuine uncertainty and perceptual barriers.

For developed countries with established infrastructure, capability-based theories (dynamic capabilities, institutional theory) or process theories (policy implementation, requirements engineering) outperform individual acceptance models. These contexts require theories explaining organizational transformation rather than individual adoption.

For cross-boundary and coordination challenges, game theory approaches or network theories (Actor Network Theory) capture strategic interactions that individual-level theories miss. Platform governance models proved particularly effective for understanding horizontal, vertical, and public-private collaboration.

For specialized populations (elderly, specific cultural groups), standard theories require substantial modification. Roger's Innovation Diffusion Theory needed five-factor adaptation for older adults, while Hofstede's cultural dimensions revealed mechanisms invisible to standard acceptance models.

For AI and emerging technologies, existing frameworks show limited applicability. Sienkiewicz-Małjurek et al.'s identification of 15 AI-specific challenges suggested that organizational readiness factors (strategy, policies, alignment with human values) dominate over traditional acceptance constructs.

The field requires development of contingency frameworks that specify theory selection based on adoption stage (intention, initial use, sustained use, organizational integration), development context (infrastructure availability, digital literacy), organizational level (individual, group, organization, inter-organization), and technology characteristics (complexity, disruptiveness, integration requirements). No existing study provided such comprehensive guidance, representing the primary theoretical gap requiring future research.

9. Comparative Analysis: Developing vs. Developed Contexts

The systematic analysis reveals a significant divergence in the applicability of theoretical frameworks depending on the country's development status. While adoption in developing nations is largely driven by fundamental access and trust issues, developed nations face challenges related to organizational complexity and system integration. These contextual distinctions and their corresponding dominant frameworks are summarized in Table 3.

Table 3. Comparison of Theoretical Framework Effectiveness and Adoption Focus between Developing and Developed Contexts

Comparison Aspect	Developing Contexts	Developed Contexts	Supporting Studies
Dominant Theoretical Frameworks	Individual Acceptance Models: TAM, UTAUT, Extended UTAUT. Fokus pada persepsi individu (kemudahan, kegunaan).	Organizational & Systemic Theories: Dynamic Capability Theory, Institutional Theory, Policy Implementation. Fokus pada kapabilitas organisasi dan ekosistem.	Ayyash et al. (2022); Xiao et al. (2023); Eibl et al. (2022)
Primary Barriers Identified	Foundational Issues: Kurangnya infrastruktur TIK, rendahnya literasi digital, masalah kepercayaan (<i>trust</i>), dan kesenjangan digital (<i>digital divide</i>).	Complexity Issues: Interoperabilitas sistem lama (<i>legacy systems</i>), tata kelola data lintas batas, dan inersia birokrasi.	Nur Ullah et al. (2024); Abu Bakar & Usman (2022); Brink & Edwards (2024)
Key Predictors of Success	Transparency & Trust: Transparansi pemerintah dan kepercayaan pada internet adalah variabel penentu utama niat penggunaan.	Agility & Integration: Kemampuan organisasi untuk beradaptasi (<i>partnering agility</i>) dan integrasi layanan lintas departemen.	Sabani et al. (2020); Zeng et al. (2023)
Adoption Stage Focus	Initiation & Adoption: Fokus pada bagaimana mendorong warga untuk mulai menggunakan layanan <i>e-gov</i> .	Integration & Maturity: Fokus pada keberlanjutan (<i>sustainability</i>) dan transformasi proses bisnis internal.	Hujran et al. (2023); Haug et al. (2024)

As detailed in Table 3, individual-centric models like UTAUT are predominant in developing contexts (e.g., Indonesia, Jordan) because the primary barrier remains the citizens' intention to use the technology. Specifically, extended UTAUT models consistently explain variance in behavioral intention by addressing fundamental issues such as digital literacy and trust in government infrastructure. In contrast, studies from developed contexts (e.g., European Union) increasingly favor organizational theories such as Dynamic Capability Theory and Institutional Theory. These frameworks are found to be more effective in explaining how established institutions manage complex interoperability, cross-departmental data sharing, and the sustainability of digital transformation processes.

CONCLUSION

This systematic review examined 40 studies employing 19 theoretical frameworks to assess how e-government adoption is shaped by contextual, organizational, and developmental conditions. The findings demonstrate that no single theory offers universal explanatory superiority. Instead, theoretical effectiveness is strongly contingent upon the maturity of digital infrastructure, institutional capacity, cultural dimensions, and the stage of e-government implementation.

In developing countries, extended UTAUT and TAM models consistently outperform other frameworks because they align with early-stage adoption dynamics dominated by uncertainty, digital literacy constraints, trust issues, and perceived transparency. Conversely, in developed contexts where basic acceptance barriers have been resolved, individual-level theories become insufficient. Organizational and capability-based frameworks—such as dynamic capability theory, institutional theory, and policy implementation models—more effectively capture the mechanisms driving system integration, interagency collaboration, and sustained digital transformation.

Across the 89 adoption factors identified, early adoption is primarily driven by perceptual and usability factors, while later stages depend more strongly on leadership support, resource capacity, organizational readiness, governance quality, and institutional alignment. These findings reveal three persistent theoretical gaps: (1) the lack of models capturing temporal and evolutionary dynamics of adoption; (2) the absence of multi-level frameworks capable of integrating individual, organizational, and environmental mechanisms; and (3) the limited guidance for selecting theories based on development context and technology characteristics.

This review therefore emphasizes the need for contingency-based theoretical models that can specify which frameworks are most appropriate under varying institutional, developmental, and socio-cultural conditions. Future research should advance longitudinal, multi-level, and cross-contextual approaches, develop theory-selection heuristics for researchers and policymakers, and empirically

validate integrated frameworks across countries with different digital maturity levels. By addressing these gaps, scholars can contribute to more context-sensitive and theoretically robust understandings of e-government adoption and its long-term impacts.

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