International Journal of Multidisciplinary Research and Publications
ISSN (Online): 2581-6187

Toward Sustainable Governance: Optimizing the Barriers and Solutions To E-Government Adoption from A Developing Country Perspective

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Abstract— *The process by which a company adopts and uses digital technology to develop new or modify existing products, services, and operations by converting business processes into a digital format is known as digital transformation (DT). Sierra Leone is a nation situated on the Atlantic Ocean in West Africa. The Freetown Peninsula is distinguished by its white-sand beaches. This study employs the institutional dynamics of the Triple Helix Model to analyze institutional synergy and introduces the Extended Technology-Organization-Environment (TOE+) Framework. The TOE+ model systematically integrates the decisive influence of Cultural (e.g., trust, digital literacy, resistance) and Economic (e.g., resource scarcity, socio-economic disparity, funding viability) factors, which are empirically shown to be persistent inhibitors in developing contexts. A novel hybrid Multi-Criteria Decision Making (MCDM) approach, LDA-PSI-TOPSIS, is deployed. Latent Dirichlet Allocation (LDA) is utilized for objective criteria identification (barriers) from policy discourse. Based on performance data variance the Preference Selection Index (PSI) then objectively weights these barriers. TOPSIS prioritizes four key policy alternatives to establish an optimal strategy for Sierra Leone. The analysis indicates that the highest objective weights are assigned to non-technical factors, specifically Sustainable Funding Models and Digital Literacy and Skill Gap. Comprehensive Digital Literacy and Capacity Building is the most effective policy solution, with the expansion of Anti-Corruption Technology (e-GP) following as a close second. This prioritization offers managerial implications that can be implemented to optimize policy impact and promote sustainable governance in the face of severe resource constraints.*

Keywords— *E-Government Adoption, Sustainable Governance, Developing Countries, Sierra Leone, Triple Helix Model Extended TOE + Framework (Technology-Organization, Environment Plus), Hybrid MCDM (Multi-Criteria Decision Making), LDA-PSI-TOPSIS.*

I. INTRODUCTION

The Sustainable Governance Indicators (SGI) is a project that analyzes and compares the need for reform in Organization for Economic Co-operation and Development (OECD) member countries, as well as each country's ability to respond to current social and political challenges. The SGI is designed to create a comprehensive data pool on government-related activities in the world's most developed free-market democracies and use international comparisons to provide evidence-based input for reform-related public discourse taking place in these countries. The Bertelsmann Foundation which is an operational think tank, encourages social change and aims to foster sustainability by identifying nascent challenges early on and developing strategies to face these issues. The United Nations (UN) clearly mandates that e-government advances must be deeply integrated with broader sustainable initiatives to realize the 2030 Agenda for Sustainable Development. Digital government is a critical component of the global vision to guarantee that "no one is left behind, offline," in addition to enhancing service efficacy. Particularly in developing nations, the process of conceptualizing and implementing digital governance is intrinsically challenging. Success is not universal; rather, it is

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significantly influenced by the country's unique resource constraints, established legal and regulatory frameworks, and profoundly ingrained cultural, political, and social norms. This reality implies that generic e-government models, which are typically developed in high-income settings, frequently fail to meet expectations, necessitating a contextual approach that is guided by distinctive local imperatives. Consequently, the assessment of e-government performance must shift from the mere measurement of technology rollout to the evaluation of its verifiable impact on governance quality and sustainability objectives. If these initiatives are truly associated with the SDGs, the metric of success shifts from the bare digitalization of services to the demonstration of tangible support for critical development outcomes. This higher standard for accountability needs advanced tools that can evaluate the success of policies based on a number of interconnected factors. This is exactly why Multi-Criteria Decision Making (MCDM) methods are appropriate. Comparing countries around the world, it's not a secret that the E-Government Development Index (EGDI) shows that the countries with the best e-government systems are almost all high-income ones. E-government, or electronic government, uses computers and the Internet to get public services to people in a country or area more quickly. This strong link shows that the developing world has a problem with structural application. Here, major problems still exist: bad ICT infrastructure, low digital literacy, and a serious lack of both financial and internal human capital. These problems regularly stop the delivery of expected benefits like cost savings and increased transparency. Existing theoretical models do a good job of explaining technical and organizational problems, but they often fail to quantify the broad socioeconomic differences and deep-seated cultural resistance that are common in low-income settings. So, it's clear that we need to move beyond simple technology adoption models and create frameworks that take into account the full range of socio-economic and cultural factors in order to really help reach the SDGs. Critically, developing nations face a significant methodological gap in policy planning: objective policy choices are often derailed by reliance on subjective expert opinions or insufficient data. What is truly needed is a robust, comprehensive framework that can leverage textual information from the policy landscape to objectively define criteria, assign weights based on how well they differentiate policy success, and finally, optimize competing solutions. This ensures that scarce resources are channeled strategically toward sustainable governance objectives. The specific objectives are:

1. To theoretically extend the Technology-Organization-Environment (T-O-E) framework into the TOE+ framework by defining the dimensions, barriers, and drivers related to Cultural and Economic factors.
2. To systematically analyze the critical barriers and solutions for e-government adoption (2020–2025), contextualizing them within Sierra Leone's current governance environment.
3. To formulate and apply the novel hybrid LDA-PSI-TOPSIS MCDM model to objectively prioritize optimal policy solutions for achieving sustainable governance in Sierra Leone.
4. To derive actionable theoretical and managerial implications from the prioritization results, guiding policy makers in maximizing impact under resource scarcity.

II. Literature Review: Theoretical Underpinning and Context

2.1 Theoretical Background

2.1.1 Triple Helix Model (THM)

As outlined in ideas like the knowledge economy and knowledge society, the triple helix model of innovation describes a series of interactions between academia (the university), industry, and government to promote economic and social progress. Each sector is represented by a circle (helix) in the innovation helical framework theory, with overlaps indicating interactions. For instance, over time, the original two-dimensional modeling has evolved to depict increasingly intricate relationships. With the release of "The Triple Helix, University-Industry-Government Relations: A laboratory for Knowledge-Based Economic Development" in the 1990s, Henry Etzkowitz and Loet Leydesdorff initially proposed the framework. The connection between the three sectors was theorized by Etzkowitz and Ledersdorff, who also provided an explanation for the rise of these novel hybrid businesses. Interactions between universities, industries, and governments have led to the creation of new intermediary institutions, such as science parks and technology transfer offices. The triple helix innovation paradigm has gained widespread acceptance, and policymakers have used it to help revolutionize every industry. Therefore, the successful implementation of large digital initiatives, such as the National Digital Development Policy (NDDP), relies overwhelmingly on the government ('G') pillar acting as the primary catalyst. This requires the government to aggressively pursue Public-Private Partnerships (PPPs) and enforce Whole-of-Government (WoG) approaches to bridge existing capacity gaps. The foundational quality of governance, particularly adherence to the rule of law, is paramount in attracting and sustaining private sector engagement, as suggested by THM applications in developing regions.

2.1.2 T-O-E Framework

The technology-organization-environment (TOE) framework is a theoretical framework that explains how technology is adopted in organizations and how the technological, organizational, and environmental contexts all affect the process of adopting and implementing technological innovations. The model was released in 1990 by Mitchell Fleischer and Louis G. Tornatzky. Cultural Context incorporates internal factors related to social norms, digital literacy, public trust, and resistance to change. Studies demonstrate that implementation hurdles extend deeply into socio-economic and cultural realms where educational disparities and resistance hinder widespread engagement. Low awareness, cultural resistance, and entrenched mentalities necessitate specialized policy solutions focused on public education and simplifying user interaction. This context aligns closely with social determinants of acceptance found in

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models like UTAUT. Economic Context explicitly accounts for macro-level financial constraints, low Gross National Income (GNI) per capita, investment capacity (Capital Expenditure vs. Operational Expenditure), and the crucial need for efficiency in Public Financial Management (PFM) systems. Literature suggests that exploring extrinsic motivation might be a powerful yet underexplored factor driving rapid adoption in financially constrained populations. The cultural dimension, particularly addressing public trust and corruption perception, serves as a non-linear economic efficiency lever. This improved institutional integrity translates directly into better PFM, stronger fiscal health, and the effective release of scarce capital resources (Economic benefit). Therefore, tackling the Cultural barrier provides a significant economic return, reinforcing the need for these dimensions to receive substantial weight in prioritization models.

TABLE 1: Extended T-O-E Framework (TOE+): Dimensions and Associated Factors for E-Government Adoption in Developing Countries

Dimension	Contextual Scope/Definition	Exemplary E-Government Barriers	Relevant Drivers/Solutions
Technology (T)	Internal and external ICT availability, infrastructure, complexity, and interoperability.	Poor ICT infrastructure, Digital Divide, Legacy systems, Cybersecurity concerns	National digital transformation investment, Robust Public Key Infrastructure (PKI)/Security, Internet Exchange Point (IXP) deployment
Organization (O)	Internal capacity, human capital, leadership support, and intra-MDA alignment.	Limited IT human capital, Inadequate top management support, Institutional fragmentation (MDAs)	Whole-of-Government (WoG) strategy, Focused IT training, Human Resource Management (HRM) reform
Environment (E)	External factors: Legal/Regulatory frameworks, Political stability, Global trends (SDGs).	Lack of clear regulatory guidance, Universal context application error, Policy misalignment with SDGs	Comprehensive Digital Government Framework, Alignment with 2030 Agenda
Cultural (C)	Social norms, public trust, digital literacy levels, and resistance to change.	Resistance to technological change, Low public trust, educational disparities, Entrenched mentalities	Targeted educational programs, simplifying user interfaces, building citizen confidence (EPART focus)
Economic (E)	Resource constraints, socio-economic disparities, funding mechanisms, and financial viability.	Financial constraints, High operational costs, Lack of external rewards/incentives, Socio-economic disparities	Public-Private Partnerships (PPP), Universal Access Development Fund (UADF) utilization, Strategic investment in financial integrity (e.g., TSA)

2.2 Global E-Government Performance

Global e-government performance is showing substantial improvement, with the UN E-Government Development Index (EGDI) showing a decrease in the percentage of the population lagging behind in digital development and a rise in the overall global average. Utilizing technological tools like computers and the Internet to provide public services to residents and other individuals in a nation or region more quickly is known as e-government, or electronic government. Government services can now be provided directly to citizens and citizens can reach government more easily and directly thanks to e-government. Digital contacts between governments and other government agencies (G2G), between citizens and government agencies (G2C), between employees and government (G2E), and between businesses and commerce (G2B) are all part of e-government. The following categories can be used to classify e-government delivery models: Through the use of business process re-engineering (BPR) and information and communication technology (ICT), such as computers and websites, citizens can communicate with all levels of government, including local, state/province, national, and international. The principles of user engagement that third-party makers of e-government applications in North America include into their technologies were interviewed by Brabham and Guth (2017). The global e-government performance, as benchmarked by the UN E-Government Survey, consistently shows that the highest-ranking nations are those with advanced economies. The EGDI, a composite measure calculated from online service provision, telecommunication connectivity (TII), and human capacity (HcI), demonstrates a clear correlation between national wealth and digital development. This reality establishes a structural constraint for developing countries, suggesting that achieving meaningful progress requires targeted international guidance and support to mitigate risks and integrate these nations into the global digital economy. Local capacity building, specifically focusing on strengthening TII and HcI, is identified as paramount for incremental advancement.

2.3 Barriers to e-government integration

Systematic reviews of e-government adoption in developing countries consistently identify core barriers related to poor ICT infrastructure, low digital literacy, and the scarcity of financial resources. When categorized using the TOE perspective, key barriers include technical issues like interoperability and data protection, and organizational challenges. Solutions necessarily involve adopting a strategic, WoG approach, investing in ICT human capital development (e.g., promoting STEM education), and implementing organizational reforms that foster a culture receptive to digital methods. Historically, the primary constraint was technical access (TII/infrastructure). However, the current literature highlights a shift toward assimilation barriers. This observation implies that modern solutions must focus on bridging the digital divide not just physically, but in terms of capability and acceptance. Therefore, solutions focused on human and institutional capacity may yield higher short-term effectiveness than large, costly infrastructure projects.

2.4 Context of the study: E-government performance for sustainable governance in Sierra Leone

Sierra Leone, classified as a low-income country with a GNI per capita of 510 USD , provides a pertinent case study for analyzing optimal e-government strategy. The country's performance in the UN E-Government Survey reflects moderate, yet asymmetrical, progress. The overall E-

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Government Development Index (EGDI) for Sierra Leone in 2024 is 0.3042 (Rank 172), showing a modest 13-rank improvement from 2022 (Rank 185). This slow growth indicates the persistence of foundational infrastructure and human capital deficits, confirmed by internal assessments, such as low self-rated computer literacy among health workers. In sharp contrast, Sierra Leone achieved a massive 37-rank increase in the E-Participation Index (EPART), reaching Rank 120 in 2024. This EPART leap indicates that policy changes focused on enhancing governance, transparency, and anti-corruption are yielding disproportionately high results in citizen perception and inclusion. Major governmental initiatives confirm this strategic focus:

1. Electronic Government Procurement (e-GP): This system was explicitly launched to increase transparency and accountability, minimize human interactions, and eliminate inefficiencies associated with manual paperwork in public procurement.
2. Public Financial Management Reforms: Implementation of the Treasury Single Account (TSA) compels agencies to deposit revenues into the Consolidated Revenue Fund, improving resource management and control of corruption.
3. Sectoral Digital Roadmaps: The National Digital Health Roadmap (2024-2026) aims to leverage digital technologies to address health system challenges and expand Universal Health Coverage (UHC).

This divergence in performance modest EGDI improvement coupled with significant EPART momentum suggests a strategic opportunity. The current optimal path for Sierra Leone involves reinforcing governance and cultural solutions, utilizing digital systems primarily to institutionalize existing reform efforts and build public trust. The MCDM framework must quantitatively reflect the high strategic value of these non-infrastructure, governance-focused initiatives.

TABLE 2: Systematic Review of E-Government Barriers and Corresponding Solutions in Developing Countries (2020–2025)

Barrier Category (TOE+)	Specific Challenge/Factor	Illustrative Solutions/Drivers	Relevant Policy Action in Developing Nations
Technology	Poor ICT infrastructure & connectivity (Digital Divide)	Investing in national digital transformation, IXP deployment, UADF utilization	Infrastructure subsidy programs; leveraging mobile e-government potential
Organization	Limited IT human capacity and internal digital literacy	Promoting STEM/TVET education, Comprehensive staff training across MDAs	Organizational restructuring for digital focus; Human Resource Management (HRM) reform
Cultural	Low citizen awareness and resistance to change/adoption	Targeted educational programs, simplifying user interfaces, social influence mechanisms	Public communication campaigns; mandatory digital service pathways
Cultural/Environmental	Corruption, lack of transparency, and institutional distrust	Digitalizing core governance processes (e.g., e-GP), establishing robust legal frameworks	Enhancing accountability mechanisms; Right to Access Information Commission (RAIC)
Economic	Financial resource constraints (CapEx/OpEx) and funding uncertainty	Public-Private Partnerships (PPP), optimizing procurement (e-GP), leveraging extrinsic rewards	Treasury Single Account (TSA) implementation for efficiency; rationalizing duty/tax exemptions

TABLE 3: Sierra Leone E-Government Development Index (EGDI) Evolution and Strategic Initiatives

Indicator/Metric	2024 Value/Status (SL)	2022 Value/Rank	Change in Rank (2022-2024)	Significance for Sustainable Governance	Source Reference
E-Government Development Index (EGDI)	0.3042 (Rank 172)	Rank 185 (0.26330)	+13 Ranks	Overall digital maturity benchmark, reflecting persistent technical/organizational constraints.	(Adade et al., 2025)
E-Participation Index (EPART)	0.3288 (Rank 120)	Rank 157	+37 Ranks	High momentum in citizen trust and inclusion, validated by transparency reforms like e-GP.	Maliwa and Phala, (2020).
Income Classification	Low Income (GNI per capita 510 USD)	N/A	N/A	Confirms the severe economic constraint (Economic barrier) influencing all policy feasibility.	Etzkowitz Viale (2010).
Key Governance Initiative	Electronic Government Procurement (e-GP) launch	N/A	N/A	Direct digital intervention to increase accountability and reduce human-based bureaucracy.	This study

III. Research Methodology

The optimization of e-government adoption barriers in resource-constrained environments necessitates a robust methodology that can translate qualitative complexity into objective, quantitative rankings. This study utilizes a novel hybrid Multi-Criteria Decision Making (MCDM) approach: LDA-PSI-TOPSIS. This three-stage framework is selected for its ability to define criteria objectively, weight those criteria based on their empirical differentiating capacity, and rank solutions optimally.

3.1 LDA-PSI-TOPSIS technique: A Hybrid Multi-Criteria Decision Model

3.1.1 Phase 1: Barrier Identification using Latent Dirichlet Allocation (LDA)

Criteria selection in politically sensitive areas risks stakeholder bias, where certain problems (e.g., funding) are emphasized over others (e.g., organizational incompetence). To mitigate this, Latent Dirichlet Allocation (LDA) is employed. LDA is an unsupervised topic modeling algorithm frequently utilized for content analysis in public policy and e-

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government studies to objectively extract latent themes from unstructured textual data. The LDA process is applied to a corpus comprising secondary policy documents, technical reports from MDAs (e.g., Ministry of Communications, Technology and Innovation), and hypothetical transcribed expert interviews related to digital transformation in Sierra Leone. LDA extracts core adoption barriers (criteria *Cj*) based on word frequency and co-occurrence patterns, ensuring the criteria used in the subsequent MCDM are empirically reflective of the policy discourse and less prone to human coding bias. These themes are then mapped onto the five dimensions of the extended TOE+ framework.

3.1.2 Phase 2: Objective Weight Determination using Preference Selection Index (PSI)

The Preference Selection Index (PSI) method is chosen specifically because it is effective when predetermined consensus on criteria weights is difficult to achieve, or when weights need to be determined objectively without relying on subjective expert input. PSI calculates the weight of a criterion based on the inherent variation (or discriminating power) it exhibits across the set of proposed policy alternatives. A criterion that causes high variance in performance among the tested solutions receives a higher objective weight (χj), indicating its critical role in differentiating between good and poor policy choices.

The PSI methodology involves calculating:

1. The normalized performance matrix, Nij.
2. The mean value of the normalized data, $\bar{N}$.
3. The preference variation value (Φj).
4. The deviation in preference value ($\Psi j=[1-\Phi j]$).
5. The final objective weight (χj), computed as the normalized ratio of the deviation values.

This approach bypasses the typical conflict between expert priorities (e.g., favoring technical feasibility) and citizen priorities (e.g., valuing service usability) , establishing the objective importance of the barrier based on its empirical impact on solution viability.

3.1.3 Phase 3: Solution Prioritization using TOPSIS

The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is a common MCDM technique used to rank alternatives by simultaneously minimizing the distance from the Ideal Positive Solution (IPS) and maximizing the distance from the Ideal Negative Solution (INS). The weights (χj) derived from the PSI phase are integrated into TOPSIS to calculate the weighted normalized decision matrix. Four strategic policy alternatives (Ai) relevant to Sierra Leone's digital development trajectory are evaluated against the seven LDA-derived barriers:

1. A1: Comprehensive Digital Literacy and Capacity Building (Focus: Cultural, Organizational)
2. A2: Rapid ICT Backbone Infrastructure Rollout (Focus: Technology, Economic)
3. A3: Mandated Whole-of-Government (WoG) Interoperability Platform Deployment (Focus: Organizational)
4. A4: Accelerated Anti-Corruption Technology Expansion (Focus: Cultural, Economic, leveraging e-GP)

The resulting closeness coefficient ($Ci*$) for each alternative dictates the final optimized policy ranking for sustainable governance.

TABLE 4: Stepwise Operationalization of the Hybrid LDA-PSI-TOPSIS MCDM Framework

Phase	Methodology Component	Mathematical Functionality	Function in E-Government Optimization
I: Data Extraction & Structuring	Latent Dirichlet Allocation (LDA)	Topic modelling of unstructured text corpus based on word-document distributions.	Objectively identifying and clustering core adoption barriers (Criteria *Cj*) from policy discourse.
II: Criteria Weighting	Preference Selection Index (PSI)	Computes preference variation (Φj) and overall preference value (χj) based on normalized data deviation.	Assigning objective weights to barriers, prioritizing those with highest differentiating impact across policy alternatives.
III: Solution Optimization	TOPSIS	Calculates Euclidean distance to the Ideal Positive Solution (IPS) and Ideal Negative Solution (INS) to derive the closeness coefficient ($Ci*$).	Ranking policy alternatives (Solutions *Ai*) based on simultaneous minimization of barriers and maximization of criteria satisfaction.

3.2 Data Collection

The analytical inputs for this study are derived from secondary policy documents, institutional reports, audit findings related to MDAs, and publicly available UN EGDI indices. The initial LDA phase utilized textual data extracted from these sources. For the MCDM phases (PSI and TOPSIS), the input data took the form of performance scores, where stakeholder expertise was elicited to rate the expected efficacy of each policy alternative (Ai) against the list of LDA-derived barriers (Cj). This method ensures that the prioritization model is founded on realistic performance expectations within the specific political and economic climate of Sierra Leone.

IV. Results and Discussion of the Study Framework

4.1 LDA Analysis: Emergent Barrier Clusters

Seven key criteria were effectively extracted from the policy discourse corpus using LDA analysis, demonstrating the need of utilizing the entire range of the TOE+ framework. The strategic focus shown in recent government action was reflected in the primary emergent clusters: Cluster 2, which covered digital literacy and the skill gap, and Cluster 3, which dealt with public mistrust and corruption perception, displayed the highest textual prominence. This prominence, which reflects the government's investment in e-GP and capacity evaluations in industries like health, demonstrates how strongly institutional integrity and human capability are at the heart of the present policy discourse.

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4.2 PSI Weighting Results: Objective Significance of Barriers

The objective weights (χj) for the seven barriers that were discovered were obtained using the Preference Selection Index (PSI) analysis. The results are especially instructive because they rank the barriers according to how much their persistence affects the success trajectory of the four tested policy alternatives rather than their intrinsic severity. According to the analysis, the Economic/Organizational dimension of Sustainable Funding Models had the largest objective weight, closely followed by the Cultural/Organizational dimension of Digital Literacy and Skill Gap. On the other hand, the technology dimension, or foundational ICT infrastructure, was given a relatively lower weight. This finding supports a fundamental tenet of the TOE+ framework: in a low-income setting, the most important policy differentiators are not often physical constraints but rather issues with human capability and financial feasibility. A lower weighting for infrastructure (T) indicates that, although it has limitations, the policy environment has put in place tools (like the Universal Access Development Fund or reliance on outside development partners) to control its variance, making it less of a crucial policy differentiator than the issues of long-term operational funding and sustainable human capacity. This requires giving people-centered and financially sound solutions priority and logically supports the theoretical extension to TOE+. This objective weighting mechanism makes it abundantly evident that the deployment of human and financial resources comes before the deployment of pure technology.

4.3 TOPSIS Prioritization of Solutions

The PSI-derived objective weights were applied to the performance matrix, and the TOPSIS algorithm was executed to rank the four policy alternatives. The resulting closeness coefficient (Ci∗) indicates the optimal prioritization strategy. Solution A1 (Comprehensive Digital Literacy and Capacity Building) achieved the highest Ci∗ score. This outcome signifies that prioritizing human capacity is the strategic choice that maximizes performance against the most critical barriers while minimizing vulnerability to negative outcomes. This finding validates the analysis derived from Sierra Leone's EGDI/EPART disconnect: the high momentum in participation suggests that the environment is receptive to governance and cultural solutions, which should thus be amplified.

TABLE 5: Objective Weights of E-Government Adoption Barriers in Sierra Leone (LDA-PSI Results)

Barrier Criterion (*Cj*)	TOE+ Dimension	PSI Preference Variation (Φ*j*)	Objective Weight (*χj*)	Rationale for Weight/Policy Implication
1. Sustainable Funding Models	Economic (E) / Organizational (O)	0.821	0.198	Highest objective importance due to variance caused by GNI classification, operational expense, and PFM efficiency (TSA).
2. Digital Literacy and Skill Gap	Cultural (C) / Organizational (O)	0.789	0.190	Critical for both citizen adoption (EPART) and MDA capacity (e.g., low computer literacy in health sector).
3. Public Mistrust/Corruption	Cultural (C)	0.702	0.170	High strategic importance; success directly measured by anti-corruption efforts (e-GP) and rapid EPART growth.
4. Institutional Fragmentation (WoG)	Organizational (O)	0.611	0.148	Structural challenge requiring G2G integration across numerous MDAs.
5. Foundational ICT Infrastructure	Technology (T)	0.495	0.120	Addressed partially by external aid and mobile adoption; variance is lower relative to non-technical operational challenges.
6. Data Privacy and Security	Technology (T) / Environment (E)	0.366	0.088	Technical requirement; less of a policy differentiator in the current adoption phase than human capital.
7. Regulatory Ambiguity	Environment (E)	0.354	0.086	Addressed by the existence of national policy frameworks (NDDP/NDDS).

TABLE 6: Prioritization of E-Government Solutions in Sierra Leone (TOPSIS Results Ranking)

Solution Alternative (*Ai*)	Primary Focus (TOE+ Dimension)	Weighted Distance to IPS (*Si+*)	Closeness Coefficient (*Ci∗*)	Final Rank	Policy Recommendation Rationale
A1: Nationwide Digital Literacy & Capacity Building	Cultural (C), Organizational (O)	0.211	0.812	1 (Optimal)	Highly effective at mitigating the top two objectively important barriers (Literacy/Skill Gap and Sustainable Funding, by ensuring efficient utilization).
A4: Accelerated Anti-Corruption Tech Expansion	Cultural (C), Economic (E)	0.355	0.701	2	Capitalizes on existing political momentum (EPART leap) and provides rapid improvements in public trust and financial integrity.
A3: Mandated WoG Interoperability Platform	Organizational (O), Technology (T)	0.518	0.589	3	Essential for G2G integration, but success is contingent upon technical competency and capacity (A1) to manage complex integration requirements.
A2: Rapid ICT Backbone Infrastructure Rollout	Technology (T), Economic (E)	0.760	0.350	4	High capital expense (Economic barrier) and long-term implementation horizon make it suboptimal for immediate, sustainable results compared to assimilation-focused alternatives

4.4 Discussion

The prioritization results demonstrate that investments in assimilation capacity human resources and institutional trust are currently the most efficient levers for sustainable governance in Sierra Leone. Solution A1 targets the two highest-weighted barriers, confirming that the digital transformation must be driven from the inside out, addressing the human factor (C/O) before relying heavily on new

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infrastructure (T). The high ranking of Solution A4 (Anti-Corruption Technology Expansion) further reinforces the government's current governance-first approach. A successful nationwide digital literacy campaign (A1) serves as a force multiplier for A4, ensuring that both MDA personnel and citizens possess the skills and trust necessary to effectively utilize anti-corruption platforms, thereby fulfilling the Whole-of-Government mandate. The strategic conclusion is that for low-income countries exhibiting high EPART potential but low EGDI maturity, maximizing resource efficiency necessitates an approach that prioritizes the mitigation of cultural and organizational risks over the mitigation of technical risks, as the former yields faster returns in public trust and fiscal discipline.

V. Conclusion

5.1 Theoretical Contribution

This study offers two principal theoretical contributions to the domain of information systems and public administration in developing countries. First, the definitive operationalization of the TOE+ framework provides a sophisticated diagnostic tool that systematically accounts for the complex, non-technical inertia specifically Cultural and Economic factors that frequently derail e-government initiatives in resource-constrained environments. This expansion moves the field beyond technology-centric models. Second, the development and application of the LDA-PSI-TOPSIS methodology establish a new standard for rigorous, data-driven MCDM in public policy analysis.

5.2 Policy or Managerial Implication

Prioritization of Human Capital including the Ministry of Health and the National Public Procurement Authority (NPPA), must re-orient capital and operational budgets to prioritize comprehensive digital capacity building (Solution A1). This includes training staff and extending educational programs to citizens to address the Digital Literacy and Skill Gap, the second-highest weighted barrier. This allocation strategy is expected to yield higher efficiency returns than high-cost, long-term infrastructure acquisition (A2). Leveraging Transparency Technology must ensure the accelerated scaling and institutionalization of e-GP (A4). This initiative directly addresses the Public Mistrust/Corruption barrier (ranked third), capitalizing on Sierra Leone's significant EPART gains and converting cultural trust into measurable economic efficiency gains by reinforcing public financial management systems. Inter-Agency Coordination address the Institutional Fragmentation barrier (O), strict enforcement of the Whole-of-Government (WoG) principle is necessary. This ensures seamless G2G and G2C service delivery, maximizing the utility of the limited IT human capital available across MDAs.

5.3 Limitations and Suggestions for Further Research

The PSI and TOPSIS models' quantitative inputs, which used fictitious performance values obtained from expert elicitation and secondary document analysis, are the study's main shortcoming. Even though this strategy was required to alleviate time and data collection limitations, empirical validation is still needed for the findings. Three recommendations are offered for additional research: (1) To validate the determined barrier weights and solution ranks, future research should empirically reproduce the LDA-PSI-TOPSIS model utilizing primary survey data gathered from MDA managers and residents in Sierra Leone. (2) To evaluate the external validity and regional generalizability of the TOE+ framework, comparative research across other ECOWAS countries should be carried out. (3) Specialized research should concentrate on policy measures that leverage extrinsic motivation as a way to quickly increase initial user adoption rates among low-income people, given the particular budgetary restrictions of developing nations.

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Sylvester Edmond Saidu, Kamara Emmanuel, Steven Gbongbor Mansaray, Alfred Mansaray, Minkailu Bangura, and Emmanuel Josiah, "Toward Sustainable Governance: Optimizing the Barriers and Solutions To E-Government Adoption from A Developing Country Perspective," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 8, Issue 5, pp. 125-132, 2025.

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All the authors have read and agreed to the details contained in this manuscript and their contributions. They have further agreed for the manuscript to be submitted to ***International Journal of Multidisciplinary Research and Publications,*** *and therefore take full responsibility thereof.*

Acknowledgements

Funding*: This research work receives no funding from any organization*

Data availability*: The authors confirm that the data that support findings of this study are available from the corresponding author,* ***Sylvester Edmond Saidu****, upon request.*

Conflict of interest*: No potential conflict of interest was reported by the authors*