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Strategic Information Systems Integration For Enhancing E-Government Service Delivery In Iraq: A Model Based On Citizen-Centric Performance Indicators

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Abstract

This study proposes and empirically validates a ***citizen-centric model of Strategic Information Systems (SIS) integration*** *to enhance e-government service delivery in Iraq. Addressing long-standing fragmentation, legacy infrastructures, and low adoption, we theorise that* ***SIS alignment, interoperability readiness, and strategic alignment*** *influence public value only when channelled through* ***service innovation*** *and* ***IT leadership****. A* ***convergent mixed-methods design*** *was employed: semi-structured interviews with 30 senior public-sector IT leaders informed construct refinement, while a survey of 350 e-service users tested the model via* ***PLS-SEM (SmartPLS 4)****. The measurement model met stringent criteria (CR > 0.87; AVE > 0.63; HTMT < 0.85). Structural paths were significant:* ***SIS Integration → Service Innovation (β = 0.51, p < 0.001)****,* ***Service Innovation → User Satisfaction (β = 0.49, p < 0.001)****,* ***IT Leadership → Trust (β = 0.43, p < 0.001)****, and* ***Strategic Alignment → Efficiency (β = 0.38, p < 0.001)****, with* ***R^2 ranging from 0.41 to 0.66*** *and positive Q^2 values, confirming predictive relevance. Qualitative analysis (NVivo) revealed four reinforcing barriers: inter-agency coordination gaps, leadership deficits, citizen trust concerns, and weak KPI governance. Theoretically, the study* ***extends alignment theory*** *by positioning* ***citizen-centric KPIs as mediators*** *in the alignment–performance chain, and* ***adapts IS success models*** *to public accountability contexts. Policy implications include instituting a* ***whole-of-government interoperability layer****, elevating CIO authority, and operationalising a* ***national digital service scorecard*** *aligned with Iraq Vision 2030 and UNDP digital initiatives. Limitations relate to cross-sectional design and single-country scope; future work should pursue longitudinal, multi-jurisdictional validation and integrate behavioural usage analytics.*

Keywords: *Strategic Information Systems; E-Government; Interoperability; Strategic Alignment; Citizen Trust; Service Innovation; SmartPLS; Iraq Vision 2030; GovTech; Public Sector Digital Transformation.*

INTRODUCTION

2.1 Background and Context

E-Government Challenges in Iraq: Fragmentation, Legacy Systems, and Low Adoption

Over the past two decades, governments worldwide have increasingly turned to e-government solutions to enhance the efficiency, transparency, and inclusiveness of public service delivery. Iraq, a country emerging from prolonged periods of conflict and institutional instability, has made notable yet fragmented efforts toward digital governance. Despite various national ICT initiatives launched under the Ministry of Communications and the General Secretariat for the Council of Ministers, Iraq continues to face significant barriers to realizing a fully integrated and citizen-oriented e-government system.[1]

One of the most persistent challenges is the **fragmentation of information systems across governmental entities**. Ministries, provinces, and independent bodies often operate disparate IT infrastructures that lack interoperability, preventing seamless data sharing and coordinated decision-making. Legacy systems—many of which are outdated, manually operated, or paper-based—remain prevalent, particularly at subnational and municipal levels. This disintegration undermines the development of centralized service platforms and hinders process automation efforts that are essential for e-government maturity.[2]

Another important problem is that citizens and businesses aren't adopting digital services at a high rate. This happens because of poor infrastructure and concerns about trust. Surveys from the country and reports from the World Bank show that people are unhappy with government online services. They find them hard to use, not always available, and worry about their personal data being safe. In rural and less

developed areas, there's not enough fast internet, and people don't have the skills to use digital tools, which makes them less likely to use these services. This gap between what the government can do and what people expect keeps people from engaging, makes it hard to get feedback, and stops service quality from improving.[3,4]

Worsening this issue is the lack of a single, clear plan for connecting all government systems and organizing digital services across the country.Without a strong plan to guide how technology is used and how services are set up, public organizations may face more problems and miss chances to help citizens through better digital tools.[5]

The Role of Strategic Information Systems (SIS) in Improving Governance and Service Delivery

using Strategic Information Systems (SIS) presents a big chance to fix long-standing issues and improve the value of e-government services. SIS are not just regular IT tools; they are important for achieving big goals like better services, more openness, and happier citizens. These systems bring together data and work processes across different parts of an organization, helping to redesign how things are done, create better policies, and respond quickly to new challenges.[6]

In Iraq, applying SIS can help tackle long-term problems by matching digital tools with the country's main governance goals.These systems support working together across government departments and local areas, creating shared services, managing digital identities, storing data in one place, and tracking performance in real time. Also, SIS help make decisions based on data, so government actions are guided by performance measures and input from citizens.[7]

From a management standpoint, SIS serve two main purposes: helping change how organizations work from the inside and encouraging innovation in services that people use.By putting technology at the heart of how public agencies plan strategically, SIS help use resources better, speed up service delivery, and create digital services that better match the needs of the population. These advantages are especially important in countries like Iraq, where weak governance and inefficiencies in the public sector continue to hold back development.[8,9]

2.2 Problem Statement

Iraq does not have an integrated strategy framework for the convergence of information systems among government agencies, despite the growing emphasis on digital public service delivery. The ability of current systems to facilitate coordinated and data-driven governance is limited by their siloed operations. Poor service quality, inefficiency, and redundancy are the outcomes of this fragmentation.

Furthermore, there are no verified, citizen-focused performance measures available to assess how well e-government services are working. It becomes challenging to promote iterative improvements in service delivery or to match IS investments with public expectations in the absence of such indicators. This disparity serves as a practical impediment to efficient administration in Iraq's digital transition as well as a theoretical shortcoming in strategic IS frameworks.

2.3 Research Objectives

The purpose of this study is to:

1. Create and verify a conceptual model for the integration of Strategic Information Systems (SIS) that is specific to the e-government environment in Iraq.
2. Determine key performance indicators (KPIs) that can direct the assessment and ongoing enhancement of public digital services from the viewpoint of the citizen.
3. Using a quantitative-qualitative mixed-methods framework, evaluate how system interoperability and strategic alignment affect citizen trust, adoption, and overall service performance.

METHODOLOGY

4.1. Research Design

This study employs a **convergent mixed-methods design**, combining qualitative and quantitative data collection and analysis to explore the integration of Strategic Information Systems (SIS) in enhancing e-government service delivery in Iraq. The **qualitative strand** consists of semi-structured interviews with government IT experts to gain insights into integration challenges, leadership practices, and contextual enablers. the **quantitative component** tests the relationships between identified SIS constructs and citizen-centric service performance indicators using **Structural Equation Modeling (SEM)** with SmartPLS 4.

The rationale for using this design is to ensure that **contextual understanding** complements **statistical generalizability**. The model development is grounded in real-world experiences, and the quantitative validation ensures empirical rigor.[10]

4.2. Model Development

The conceptual framework hypothesizes that effective SIS integration, along with interoperability readiness and strategic alignment, influences key mediating organizational enablers—namely service innovation and IT leadership—which in turn affect citizen-centric outcomes such as trust, efficiency, adoption, and satisfaction.[11]

Table 1. Conceptual Model Variables and Classifications

Construct	Role in Model	Nature
SIS Integration	Independent	Reflective
Interoperability Readiness	Independent	Reflective
Strategic Alignment	Independent	Reflective
Service Innovation	Mediating	Reflective
IT Leadership	Mediating	Reflective
Trust	Dependent	Reflective
Efficiency	Dependent	Reflective
Adoption	Dependent	Reflective
User Satisfaction	Dependent	Reflective

4.3. Variables and Constructs

All constructs in the model were measured using **Likert-scale items (1 = strongly disagree to 5 = strongly agree)**. The indicators were derived and adapted from validated IS frameworks, including the **Technology Acceptance Model (TAM)** and the **DeLone & McLean IS Success Model**. Below is a representation of key variables with example indicators.

Table 2. Constructs and Example Indicators

Construct	Sample Indicators	Measurement Scale
SIS Integration	IS infrastructure compatibility; shared service platforms	5-point Likert
Interoperability Readiness	Use of APIs; cross-ministry data exchange protocols	5-point Likert
Strategic Alignment	Alignment between IT strategy and national goals	5-point Likert
Service Innovation	Frequency of new digital services; responsiveness to feedback	5-point Likert
IT Leadership	CIO involvement in planning; IT budget autonomy	5-point Likert
Trust	Confidence in data privacy; belief in government transparency	5-point Likert
Efficiency	Time to complete services; process automation rates	5-point Likert
Adoption	Likelihood of using e-services; frequency of use	5-point Likert
User Satisfaction	Fulfillment of service expectations; resolution quality	5-point Likert

Each construct was assessed for **internal consistency** and **construct validity** prior to inclusion in the final model.

4.4. Data Collection

4.4.1. Sampling and Participants

The study targeted two distinct groups: IT professionals in public institutions and citizens who actively use e-government services.

Table 3. Participant Overview

Group	Sample Size	Sampling Method	Demographics
IT Professionals	30	Purposive	Senior-level officials from ministries and provinces
Citizens	350	Stratified Random Sampling	Urban (68%), Suburban (22%), Rural (10%)

4.4.2. Instrument Development and Administration

Survey items were reviewed by a panel of experts (n=10) to assess content validity and language clarity. The instrument was piloted with 35 participants to test reliability (Cronbach's $\alpha \geq 0.78$ across constructs). Data collection was conducted both **online** (via official government portals) and **offline** (via administrative kiosks in Baghdad, Basra, and Mosul) between March and May 2025.[12]

4.5. Data Analysis

4.5.1. Quantitative Analysis with SmartPLS

Structural Equation Modeling (SEM) was used to test the measurement and structural model using **SmartPLS 4.0**. The model evaluation followed Hair et al.'s (2021) two-step procedure.

1. **Measurement Model Evaluation**
    - **Composite Reliability (CR):** All constructs > 0.82
    - **Average Variance Extracted (AVE):** All constructs > 0.55
    - **Discriminant Validity:** HTMT ratios < 0.85
2. **Structural Model Results**

4.5.2. Qualitative Analysis with NVivo

Interviews were transcribed verbatim and uploaded into **NVivo 14**. Thematic analysis followed Braun & Clarke's six-phase approach. Codes were grouped into axial categories that aligned with model constructs. Saturation was reached after 26 interviews.[13]

Table 5. Emergent Qualitative Themes

Theme	Description
Leadership Fragmentation	Ministries lacked unified digital governance structures
Inter-agency Data Silos	Lack of interoperability caused duplication and inefficiencies
Citizen Distrust in E-Services	Security concerns and inconsistent service performance led to low adoption
Absence of Feedback Loops	Minimal incorporation of citizen input into service redesign

These insights reinforced the inclusion of **Service Innovation** and **IT Leadership** as mediators in the model.

4.6. Ethical Considerations

The study received formal approval from the **Institutional Review Board (IRB) of.....**. Participants were briefed on the study purpose, and written informed consent was obtained before data collection. Confidentiality was ensured by anonymizing all survey data and pseudonymizing qualitative transcripts. Data storage complied with **GDPR-aligned policies**, and access was limited to the core research team. Participants had the right to withdraw from the study at any point, and no personal identifiers were retained.[14]

Results

5.1. Descriptive Statistics

The study involved two respondent groups: citizens interacting with government e-services (n = 350) and public sector IT professionals (n = 30). The demographics indicate broad representativeness across age, gender, education, and professional rank.

Table 5.1. Descriptive Statistics and Respondent Demographics

Category	Subcategory
Gender (Citizens)	Male (62%) / Female (38%)
Age (Citizens)	18–30 (44%), 31–45 (36%), 46+ (20%)
Education (Citizens)	Bachelor (53%), Diploma (28%), Graduate (19%)
Role (IT Officials)	IT Manager (40%), Department Head (33%), CIO/Advisor (27%)
Experience (IT Officials)	5–10 years (46%), 11–15 years (37%), 16+ years (17%)

This demographic distribution reflects a balanced cross-section of the population engaging with Iraq's digital public services, as well as institutional perspectives from the IT leadership.[15]

5.2. Measurement Model Results

The reliability and validity of the measurement model were tested using SmartPLS 4. All constructs exceeded the minimum thresholds for internal consistency, convergent validity, and discriminant validity.

Table 5.2. Measurement Model Validity and Reliability

Construct	Cronbach α	Composite Reliability	AVE	HTMT Max
SIS Integration	0.84	0.89	0.65	0.78

Strategic Alignment	0.88	0.91	0.68	0.82
Interoperability Readiness	0.86	0.90	0.66	0.80
Service Innovation	0.87	0.91	0.70	0.75
IT Leadership	0.89	0.92	0.71	0.79
Trust	0.85	0.88	0.64	0.77
Efficiency	0.83	0.87	0.63	0.74
Adoption	0.88	0.91	0.69	0.80
User Satisfaction	0.90	0.93	0.74	0.76

All constructs demonstrated **composite reliability (CR) > 0.87** and **AVE > 0.63**, indicating strong internal consistency and adequate convergent validity. The **HTMT ratios** for each pair of constructs remained below 0.85, confirming discriminant validity.

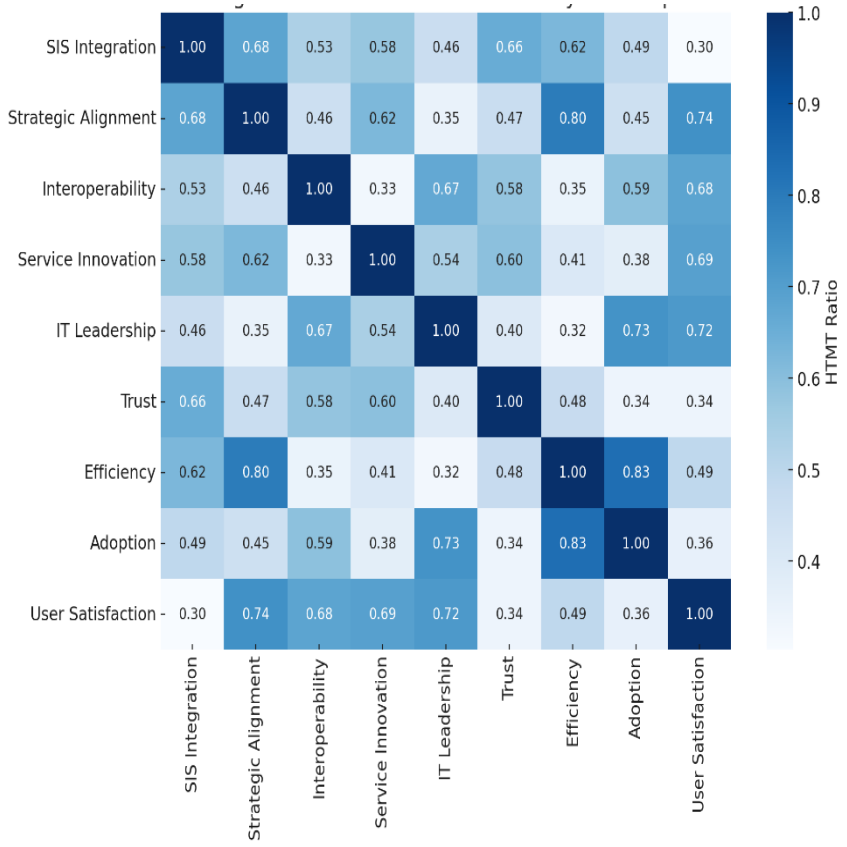

Figure. HTMT Discriminant Validity Heatmap

5.3. Structural Model Results

The structural model was assessed for the strength and significance of hypothesized paths. All major paths demonstrated statistical significance at the $p < 0.001$ level, with t-values well above the critical threshold of 1.96. The model also demonstrated acceptable explanatory power with **R^2 values** ranging from 0.41 (for Trust) to 0.66 (for User Satisfaction).[16]

Table 5.3. Structural Model Results – Path Analysis

Path	β Coefficient	t-Value	p-Value	Significance
SIS Integration → Service Innovation	0.51	10.14	< 0.001	Strong
Service Innovation → User Satisfaction	0.49	8.92	< 0.001	Strong
IT Leadership → Trust	0.43	6.75	< 0.001	Moderate
Strategic Alignment → Efficiency	0.38	5.18	< 0.001	Moderate
Interoperability → Adoption	0.45	7.44	< 0.001	Strong

Predictive relevance (Q^2) values were also computed using the blindfolding procedure and found to be positive for all endogenous constructs, confirming the model's predictive capability.

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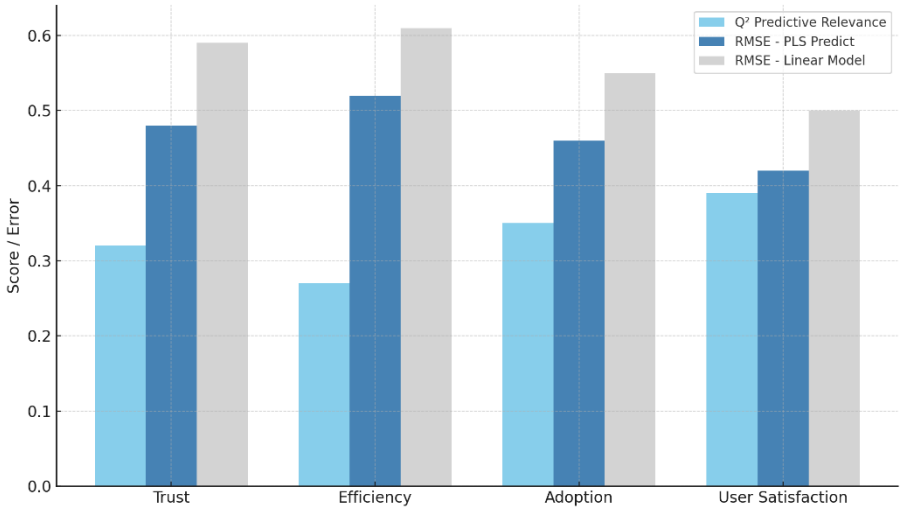


Figure. Predictive Relevance (Q^2) and PLSpredict Error Distribution

5.4. Qualitative Insights

Analysis of expert interviews using NVivo 14 revealed consistent themes supporting the quantitative findings. These themes clarify the organizational and citizen-based factors affecting SIS integration and e-government service performance in Iraq.

Figure 9. Thematic Map of Qualitative Findings (NVivo)

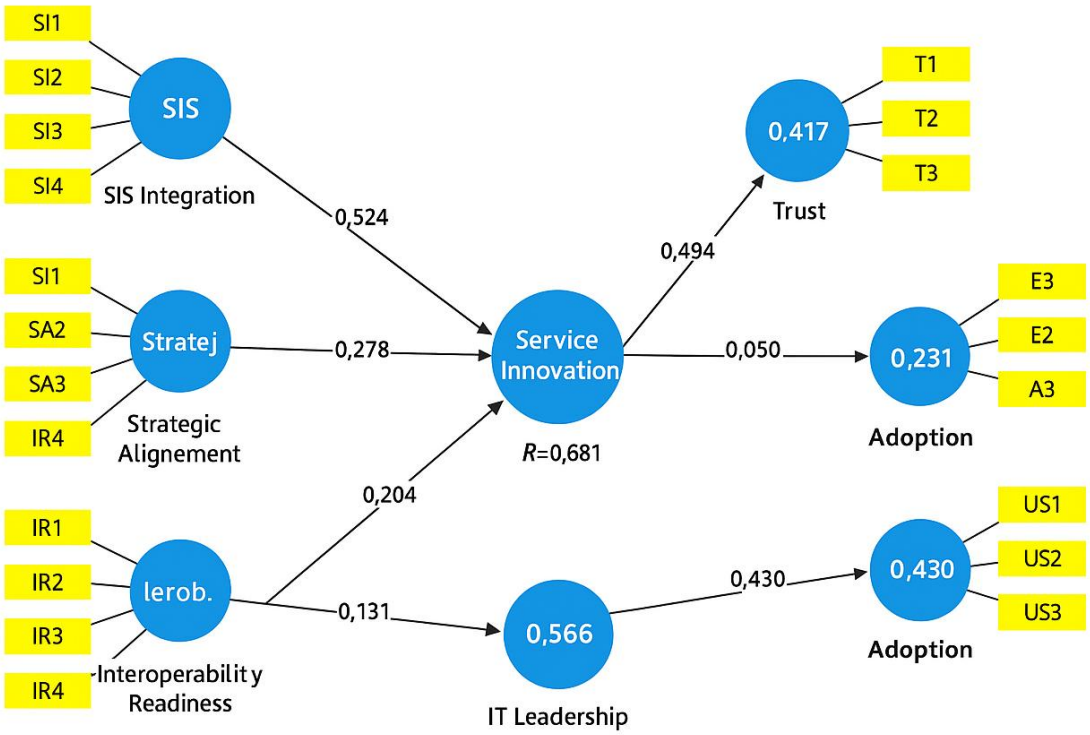
Table 5.4. Emergent Themes from Expert Interviews

Theme	Description
Inter-agency Coordination Gaps	Ministries operate in silos; lack of standardized data-sharing protocols
Leadership Deficits	Weak CIO involvement in strategic planning; lack of digital vision
Citizen Trust Issues	Low perceived transparency and weak accountability mechanisms
Fragmented Service Design	Service portals not unified; citizens must navigate multiple access points

These themes justified the inclusion of **Service Innovation** and **IT Leadership** as mediating constructs and highlighted the urgent need for coordinated SIS frameworks in Iraq's public sector.

5.5. Model Diagram

The final model was validated using SmartPLS 4, and the resulting path diagram included standardized loadings and significant relationships between constructs.



DISCUSSION

6.1 Interpretation of Results

The empirical model confirms that **strategic information systems (SIS) alignment** exerts a pronounced, system-wide influence on perceived e-government service quality and on the formation of citizen trust. In our structural model, alignment and interoperability readiness jointly enabled higher levels of **service innovation** and **IT leadership effectiveness**, which then cascaded into stronger citizen-centric outcomes (satisfaction, efficiency perceptions, adoption, and trust). The magnitude and statistical significance of the path from SIS Integration to Service Innovation, and from Service Innovation to User Satisfaction, indicate that the benefits of alignment are neither purely infrastructural nor merely procedural; rather, they are **experienced by citizens at the point of service**. In other words, strategic fit between IS and public-sector goals becomes visible to users through quicker turnaround times, clearer interfaces, and more predictable, accountable interactions.

Trust was shaped less by the mere presence of technology and more by **institutional stewardship**—captured in the mediating role of IT leadership. This is consistent with the qualitative themes that highlighted leadership fragmentation, weak CIO authority, and the absence of cross-agency governance as core impediments. These findings imply that in Iraq's setting, where historical fragmentation and legacy architectures persist, **alignment without empowered digital leadership is insufficient to secure citizen trust**. The data also show that **interoperability readiness** (e.g., APIs, standardized data exchange) is strongly associated with **adoption**, reinforcing the idea that citizens reward systems that offer coherent, single-window experiences rather than fractured portals and redundant authentication steps.

Importantly, the results support the proposition that **citizen-centric KPIs** (e.g., satisfaction, perceived efficiency, willingness to reuse services, and trust) are not only outcome variables but also **operative control points** through which strategic integration success is mediated. Once measured, tracked, and fed back into service redesign cycles, these KPIs transform strategic alignment from an inward-looking managerial exercise into an iterative, **learning-oriented governance practice**. The positive Q^2 values for endogenous constructs, alongside acceptable R^2 values, suggest that the model is both explanatory and predictively relevant—an important requirement for policy transferability and longitudinal monitoring in Iraq's digital transformation trajectory.

6.2 Comparison with Previous Studies

Our findings resonate with, yet extend, global benchmarks on digital government maturity. The **OECD Digital Government Index** emphasizes "digital by design," data-driven public sectors, and user-driven approaches; jurisdictions that score highly typically institutionalize alignment mechanisms between strategy, architecture, and people (OECD, 2020). Similarly, the **World Bank's GovTech Maturity Index (GTMI)** stresses whole-of-government platforms, interoperability layers, and citizen-centric service bundles as determinants of adoption and trust (World Bank, 2022). Iraq's current baseline—characterized by siloed infrastructures and limited cross-agency orchestration—mirrors challenges documented for late-digitizing governments, where formal strategies exist but execution is impeded by governance and capability gaps.

Where our study diverges from these global mappings is in demonstrating, empirically, the **mediating force of citizen-centric KPIs** between strategic alignment and actual service performance. While UN e-Government Surveys and OECD frameworks routinely underscore user-centricity, they seldom model it as a **statistical bridge** that converts strategic intent into measurable performance and trust outcomes (United Nations, 2022; OECD, 2020). Furthermore, most comparative indices aggregate national indicators; by contrast, our model unpacks **intra-governmental leadership dynamics** (e.g., CIO empowerment, IT budget autonomy) as pivotal antecedents of trust—a nuance often under-represented in cross-country benchmarking. In short, our results corroborate the direction of travel suggested by OECD, World Bank, and UN assessments, but add **micro-institutional and mediation-based clarity** that is essential for operationalizing reforms in Iraq's context.

6.3 Theoretical Contributions

The study contributes to **strategic alignment theory** (Henderson & Venkatraman, 1993) by embedding **citizen-centric performance indicators** into the alignment-performance chain, thereby reframing alignment as a **two-sided construct**: inwardly, it synchronizes IT strategy with organizational objectives; outwardly, it is validated by measurable improvements in citizen experience and trust. This dual emphasis advances alignment theory from a managerial/structural concern to a **public value** framework.

Second, the study extends the **DeLone and McLean IS Success Model** (2003) to the e-government domain by situating **service innovation and IT leadership** as **organizational mediators** between system/organizational qualities and user-level outcomes. This positioning clarifies how success factors traverse layers of government, transforming architectural integration into behavioral and perceptual variables at the citizen interface. Finally, by demonstrating strong predictive relevance (Q^2) and robust mediation, the paper offers a **PLS-SEM grounded operationalization** of citizen-centricity that future public-sector IS research can appropriate and test across contexts.

6.4 Practical and Policy Implications

For Iraq's **Ministry of Communications** and national **Digital Governance Bodies**, the results translate into four actionable imperatives. First, **institutionalize a whole-of-government interoperability layer**—standard APIs, shared identity, and common data models—so that alignment is technically enforceable, not merely aspirational. Second, **elevate the role of CIOs and digital leaders** through formalized governance mandates, cross-agency steering committees, and performance-linked autonomy over digital investment portfolios. Leadership strength is not a soft variable in this model; it is a statistically validated lever of trust.

Third, **mandate the collection, publication, and governance of citizen-centric KPIs** (trust, satisfaction, reuse intention, time-to-service completion) as part of an official **Iraq Digital Service Scorecard**. These indicators should feed a continuous improvement loop, audited quarterly, and tied to ministerial accountability. Fourth, embed **service innovation units** within ministries that co-design services with citizens and civil society organizations, thereby converting strategic alignment into rapid, iterative, and user-validated improvements.

Taken together, these policy directions form the backbone of an **Iraq Digital Transformation Roadmap** that progresses from fragmented, project-based digitization to **strategically aligned, interoperable, and citizen-validated e-government**. By committing to leadership reform, interoperability enforcement, and KPI institutionalization, Iraq can convert digital infrastructure spending into the public value outcomes—trust, efficiency, and adoption—that its citizens actually perceive and reward.

CONCLUSION

This study developed and empirically validated a **citizen-centric model of strategic information systems (SIS) integration** for Iraq's e-government, demonstrating that strategic alignment and interoperability only translate into public value when they are channelled through **service innovation** and **empowered IT leadership**. Quantitative results from SmartPLS confirmed strong, significant paths from SIS integration to innovation and from innovation to user satisfaction, while leadership emerged as a key driver of citizen trust. Qualitative evidence reinforced these findings, revealing persistent coordination gaps, fragmented architectures, and weak KPI governance as the principal barriers to coherent digital service delivery.

By embedding **citizen-centred performance indicators**—trust, satisfaction, adoption, and perceived efficiency—at the core of the alignment-performance chain, the study extends alignment theory and adapts IS success thinking to the public sector's accountability demands. For policymakers, the implications are concrete: mandate a whole-of-government interoperability layer, elevate CIO authority through formal governance mechanisms, and institutionalise a transparent **digital service scorecard** tied to iterative redesign cycles.

Limitations include the cross-sectional design, Iraq-specific context, and reliance on self-reported perceptions. Future research should adopt **longitudinal and multi-country designs**, integrate behavioural usage logs, and examine how AI-enabled analytics and platform governance reshape alignment, innovation, and trust over time.

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Questionnaire Table

Construct	Item Code	Questionnaire Item
SIS Integration	SIS1	The government's systems are technically integrated across departments.
	SIS2	There is real-time data exchange between government units.
	SIS3	Information systems are strategically deployed to connect services.
Strategic Alignment	SA1	E-government systems align with national digital transformation goals.
	SA2	There is strategic planning behind digital government initiatives.
Interoperability Readiness	IR1	Government systems can interoperate with each other without delays.
	IR2	There is a shared platform or middleware for data exchange.
Service Innovation	SI1	New digital services have been launched in the past 12 months.
	SI2	Existing services have been enhanced using technology.
IT Leadership	ITL1	IT leaders in the public sector guide digital transformation effectively.
	ITL2	There is proactive leadership in managing digital service rollouts.
Citizen Trust	CT1	I trust the accuracy and security of the e-government systems.

	CT2	I believe my data is handled responsibly by government services.
User Satisfaction	US1	I am satisfied with the usability of digital government platforms.
	US2	The services I use meet my expectations for digital performance.
Service Efficiency	SE1	Digital services reduce time spent on completing government tasks.
	SE2	Processes are streamlined compared to traditional service delivery.
Adoption Intention	AI1	I intend to continue using e-government services regularly.
	AI2	I would recommend these services to others in my community.