



The role of E-Government implementation in advancing Jordan's economic modernization vision: A Study of municipal service delivery transformation

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Abstract

Digital transformation has become an important mechanism through which governments seek to improve public administration, strengthen service delivery, and support broader economic modernization. In Jordan, e-government implementation has developed as part of a wider national effort to modernize public services and improve the relationship between government institutions, citizens, and businesses. Nevertheless, the existence of digital platforms and infrastructure does not by itself guarantee effective transformation at the municipal level. This study examines the role of e-government implementation in advancing Jordan's economic modernization vision through the transformation of municipal service delivery. The study focuses on four principal explanatory dimensions: e-government implementation level, e-government adoption rate, service delivery enhancement, and implementation barriers, with economic modernization alignment treated as the principal outcome. A quantitative, cross-sectional survey design was employed. Data were collected using a structured five-point Likert-scale questionnaire, and the study used a stratified approach to capture different municipal contexts, including large urban municipalities, governorate-center municipalities, and smaller rural municipalities. Seventy-two questionnaires were distributed and 46 valid responses were obtained, representing a response rate of 63.89%. The analysis employed descriptive statistics, factor analysis, reliability testing, diagnostic testing, and regression analysis.

The findings indicate that e-government implementation is positively associated with economic modernization alignment. Service delivery enhancement produced the strongest reported relationship, with $R = .590$ and $R^2 = .348$, while e-government implementation level produced $R = .526$ and $R^2 = .277$. E-government adoption rate was also significantly related to economic modernization alignment ($R = .486$, $R^2 = .237$). In contrast, implementation barriers showed a significant inverse relationship with modernization alignment ($R = .560$, $R^2 = .314$). Reliability analysis produced Cronbach's alpha values ranging from .712 to .911 across the five constructs. The study therefore indicates that the economic value of municipal digital transformation depends not only on the availability of technology but also on adoption, service-quality improvements, institutional readiness, and the ability to overcome financial, technical, organizational, and digital-literacy barriers. The findings provide a municipal-level perspective on the relationship between digital governance and Jordan's economic modernization agenda.

Keywords: e-government; digital transformation; municipal service delivery; economic modernization; Jordan; e-government adoption; implementation barriers; public administration.

1. Introduction

1.1 Background and Context

The transformation of public services through digital technologies has become a central feature of contemporary public-sector reform. E-government refers broadly to the use of information and communication technologies to improve government operations and to provide public information and services through digital channels. In the Jordanian context, e-government has been positioned as an important component of public-sector modernization because it can improve efficiency, reduce administrative burdens, increase transparency, and provide citizens and businesses with more accessible services (Alqudah & Muradkhanli, 2024; Alzyadat & Alarabiat, 2022).

Jordan's e-government journey began in the early 2000s, with the national e-Government Program established in 2001. The original research draft identifies this initiative as an important starting point for the country's systematic use of ICT in government administration. Subsequent initiatives expanded the digital infrastructure, electronic service provision, coordination mechanisms, and institutional capabilities supporting digital government. The evolution from basic online information toward more transactional and integrated services has created a foundation for broader public-sector digital transformation (Alqudah & Muradkhanli, 2021; Blakemore & Dutton, 2003).

The strategic importance of e-government has increased as Jordan has pursued economic and public-sector modernization. Digital government can contribute to modernization by simplifying procedures, lowering transaction costs, improving the timeliness and accuracy of public services, and supporting a more predictable environment for citizens and businesses. These effects are particularly relevant in municipalities because local government is often the level at which residents experience government services most directly. Consequently, municipal digital transformation provides an important setting for examining whether national digital ambitions translate into observable improvements in service delivery.

The relationship between e-government and economic modernization should therefore be understood as multidimensional. It is not limited to the presence of websites, applications, or digital databases. Effective transformation requires organizational capacity, appropriate infrastructure, capable personnel, financial sustainability, citizen adoption, and coordination between national strategies and local implementation. Research on Jordan has repeatedly identified adoption, trust, digital literacy, institutional readiness, infrastructure, and organizational barriers as important

determinants of e-government outcomes (Abu-Shanab, 2021; Almaiah & Nasereddin, 2020; Al-Haddad et al., 2023; Alryalat et al., 2023).

At the municipal level, these issues may become more visible because municipalities differ in size, resources, technical capacity, organizational structures, and the populations they serve. Large urban municipalities may possess greater technological and administrative capacity, whereas smaller and rural municipalities may experience stronger resource constraints and more limited digital readiness. The original research therefore treats municipal service delivery as a critical point at which the broader objectives of digital transformation can be assessed.

1.2 Research Problem

Despite progress in Jordan's e-government development, a continuing challenge is the conversion of digital investment into consistent and measurable improvements in municipal service delivery. The research draft identifies a gap between the existence of technological capabilities and their practical outcomes. Traditional bureaucratic procedures may remain embedded in municipal operations, while digital systems can be difficult to integrate with existing workflows. As a result, digitization may coexist with procedural duplication rather than completely transforming the service process.

The problem is further complicated by differences in digital literacy among citizens and municipal employees, unequal access to technological resources, limited financial capacity, and institutional resistance to organizational change. These factors can restrict both the implementation of e-government and the willingness or ability of citizens to use digital services. The research literature cited in the original study associates these challenges with uneven service quality and differences in the effectiveness of digital transformation across contexts (Alwaely et al., 2024; Masadeh et al., 2023; Saleh et al., 2021).

A second dimension of the problem concerns strategic alignment. National modernization policies may establish broad priorities for digital transformation, while implementation occurs within municipalities that operate under different administrative and financial conditions. The central research problem is therefore not simply whether Jordanian municipalities have adopted e-government, but whether the implementation of e-government at the local level contributes to better service delivery and whether these improvements are aligned with the country's economic modernization objectives.

1.3 Research Gap

The literature reviewed in the original research draft indicates that a substantial portion of Jordanian e-government research has concentrated on citizen adoption, general development indices, technological acceptance, trust, or national-level digital transformation. These studies provide important evidence concerning why users adopt or resist digital services. However, comparatively less attention has been directed toward the organizational and operational implementation of e-government within municipalities and its relationship with economic modernization outcomes.

The present study addresses this gap by bringing together five related dimensions: the level of e-government implementation, the rate of e-government adoption, improvements in municipal service delivery, barriers to implementation, and alignment with economic modernization. This framework allows the study to examine implementation not as an isolated technological phenomenon but as a process that connects institutional capacity, user adoption, service outcomes, and national development objectives.

1.4 Research Objectives

- To analyse how Jordanian municipalities are currently implementing e-government.
- To evaluate how e-government efforts affect the effectiveness of municipal service delivery.
- To determine the factors that encourage and hinder e-government implementation in Jordanian municipalities.
- To analyse the extent to which Jordan's economic modernization strategy aligns with local e-government initiatives.

1.5 Research Questions

- To what extent have Jordanian municipalities adopted e-government solutions?
- What measurable improvements in service delivery have resulted from the use of e-government?
- What are the principal obstacles preventing Jordanian municipalities from implementing e-government effectively?
- How can national economic modernization objectives be better aligned with municipal e-government services?

1.6 Hypotheses

H1: E-government implementation at the municipal level has a significant positive impact on advancing Jordan's economic modernization vision through improved service delivery efficiency and effectiveness.

H2: Municipalities with stronger organizational capacity, including leadership support, staff technical competence, and dedicated implementation capacity, demonstrate higher levels of successful e-government implementation and service transformation.

H3: The degree of alignment between municipal e-government initiatives and national digital transformation strategies positively influences service delivery outcomes and economic development indicators.

H4: E-government implementation at the municipal level is associated with measurable economic benefits, including reduced transaction costs for businesses, increased local investment, and improved business registration rates.

1.7 Significance of the Study

The study is significant at theoretical, empirical, managerial, and policy levels. Theoretically, it connects e-government implementation with public administration, technology acceptance, and innovation diffusion perspectives. Empirically, it focuses on the municipal level, where digital transformation is experienced through concrete public services. From a managerial perspective, the study identifies implementation conditions that can influence service quality and adoption. From a policy perspective, the findings can help clarify the relationship between local digital initiatives and wider modernization objectives.

The municipal focus is particularly important because digital transformation can have different outcomes depending on institutional capacity and local circumstances. Understanding these differences can support more realistic implementation strategies and can help decision-makers distinguish between technological availability and effective technological use.

2. Literature Review

2.1 E-Government Development in Jordan

Jordan's e-government development has evolved through several stages, beginning with efforts to place government information and services online and progressing toward more integrated digital

governance. The original research identifies the 2001 e-Government Program as a foundational step in this process. The program was designed to improve public-sector efficiency, service delivery, information access, and technological infrastructure. The development of digital government has subsequently involved institutional coordination, electronic service platforms, secure networks, government information systems, and capacity-building activities (Ministry of Digital Economy and Entrepreneurship, 2020).

Alqudah and Muradkhanli (2021) examined Jordan's e-government development in relation to international development indicators and emphasized the continuing importance of institutional and technological development. Alzyadat and Alarabiat (2022), through a meta-analytic review of e-government research in Jordan, further demonstrated that Jordanian e-government research has addressed a broad range of adoption and implementation questions. More recent work has considered artificial intelligence, smart government maturity, digital transformation, and the development of more integrated public services (Al-Haddad et al., 2023; Hujran et al., 2023; Alqudah & Muradkhanli, 2024).

The transition toward smart and integrated government also changes the meaning of e-government implementation. It is no longer sufficient for a municipality to provide isolated electronic forms or information pages. Effective digital transformation requires systems that can support transactions, information exchange, process integration, user access, and continuous improvement. Hujran et al. (2023) argue for maturity-based approaches that recognize digital government as a progressive transformation rather than a single implementation event.

2.2 Barriers to E-Government Implementation

The literature identified in the original study presents implementation barriers as multidimensional. Financial resources are important because digital government requires not only initial investment but also continuing maintenance, security, upgrades, and technical support. Municipalities with limited resources may struggle to sustain systems after initial implementation. The problem can become more serious as technologies evolve and citizens expect increasingly sophisticated services.

Technical infrastructure is another major dimension. Connectivity, system integration, legacy technologies, data management, and information security influence whether digital services can operate consistently. Qusef et al. (2021) emphasized the importance of backend architecture and service-oriented integration in Jordanian e-government. More generally, research on digital

transformation shows that legacy systems can create structural constraints when organizations attempt to move toward integrated digital services (Irani et al., 2023).

Human capacity is equally important. Employees need the skills required to operate digital systems, redesign processes, interpret information, and manage change. The research draft emphasizes that digital transformation cannot be achieved simply by purchasing hardware and software. Organizational culture, staff capabilities, leadership, and change management must develop alongside technical systems (Madaki et al., 2024; Saleh et al., 2021).

Citizen digital literacy also affects implementation. Even technically capable services may produce limited public value if citizens cannot easily access, understand, trust, or use them. Studies in Jordan have linked e-government adoption to demographic characteristics, digital readiness, trust, perceived usefulness, and user experience (Abu-Shanab, 2021; Almaiah & Nasereddin, 2020; Ahmad & Dhoon, 2024). The digital divide therefore represents both an access problem and an adoption problem.

2.3 Citizen-Centric E-Government and Public Trust

A citizen-centric approach places user needs and service experience at the centre of digital government design. Rather than measuring success solely by the number of services digitized, a citizen-centric model considers accessibility, usability, reliability, responsiveness, satisfaction, and the extent to which digital services solve actual user problems. Research on e-government adoption indicates that trust, digital literacy, perceived usefulness, ease of use, and service experience can influence continued use of digital government channels (Abdulkareem & Mohd Ramli, 2022; AbdulKareem & Oladimeji, 2024).

Public trust is especially relevant because government digital services require users to provide information and depend on institutions to manage transactions accurately and securely. Dmour (2021) examined the relationship between e-government and public trust in Jordan, while Al-Haddad et al. (2023) addressed behavioural acceptance. These studies support the view that technical implementation and social acceptance are interconnected.

The municipal context reinforces this relationship. When residents use digital services for everyday administrative needs, service reliability can influence their broader perception of local government. Conversely, failures, confusing interfaces, repeated requirements, or inaccessible channels may discourage adoption. Citizen-centric design therefore functions not only as a usability principle but also as a mechanism for strengthening the practical value of digital government.

2.4 Municipal Service Delivery Transformation

Municipalities occupy a distinctive position within public administration because they provide services that directly affect residents and local economic activity. Digital transformation at this level can simplify procedures, reduce waiting times, improve information accuracy, and lower administrative costs. It may also improve the ability of municipal organizations to coordinate activities and monitor service performance.

Evidence from Greater Amman indicates that digital transformation, leadership, and entrepreneurial motivation can influence business decision-making and process performance (Hanandeh et al., 2023). The research draft uses this municipal context to emphasize that digital government can contribute to operational improvement when technology is combined with organizational change.

The broader literature supports the proposition that digital public-service transformation can improve efficiency. Nawafleh (2022), for example, found that e-government strengthened the relationship between development programs and service efficiency in Jordan. This supports the logic of examining service delivery enhancement as a separate construct rather than treating it merely as a consequence of implementation. The current study therefore measures service delivery through reductions in delivery time and operational errors, increases in citizen satisfaction, and reductions in administrative costs.

2.5 E-Government and Economic Modernization

The economic relevance of e-government arises from its ability to change the cost, speed, transparency, and predictability of interactions between government and economic actors. Digital procedures can reduce the time required to complete administrative transactions and can make information more accessible. For businesses, this may reduce transaction costs and administrative uncertainty. For government, process automation may reduce repetitive work and improve the allocation of administrative resources.

The research draft links these effects to Jordan's modernization objectives through four aspects of alignment: direct support for modernization priorities, coordination with national economic development plans, improvement of the business climate, and consistency with national transformation priorities. This framework recognizes that local digital government can contribute to modernization when municipal services support a more efficient and predictable environment for residents and businesses.

The relationship is not automatic. The economic benefits of e-government depend on actual use, service quality, organizational capability, and the removal of implementation barriers. This is why the present study simultaneously examines implementation level, adoption rate, service delivery enhancement, and barriers rather than relying on a single measure of digitalization.

2.6 Sustainable Development and Future Directions

The literature reviewed in the original study places e-government within a wider process of sustainable digital transformation. Feleke and Lessa (2024) emphasize maturity as a critical condition for sustainable e-government, while Dhaoui (2022) links e-government with sustainable development in MENA countries. These perspectives suggest that digital government should be evaluated in terms of long-term institutional capacity rather than short-term technology deployment.

The future direction identified in the literature includes more integrated platforms, mobile government, smart-government models, artificial intelligence, blockchain, and data-driven administration. However, the research draft emphasizes that emerging technologies should be connected to actual administrative and service-delivery needs. Technology adoption without institutional readiness may create additional complexity rather than improving public services.

2.7 Theoretical Framework

2.7.1 New Public Management Theory

New Public Management provides a useful perspective for understanding reforms that emphasize efficiency, performance, responsiveness, and service quality. Rosenbloom et al. (2022) describe public administration as a field in which management, politics, law, and institutional arrangements interact. Within the present study, NPM helps explain why governments seek to redesign processes, improve performance measurement, reduce administrative inefficiencies, and increase responsiveness to service users.

E-government can operationalize several of these principles by automating processes, improving information availability, supporting performance monitoring, and making service delivery more accessible. Nevertheless, digital transformation also requires attention to public values and institutional accountability. The study therefore treats e-government as an administrative transformation rather than as a purely managerial technology project.

2.7.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) proposed by Davis (1989) explains technology acceptance through perceived usefulness and perceived ease of use. The model is relevant to municipal e-government because citizens and employees are more likely to use digital services when they believe that the services are useful and can be used without excessive difficulty.

The current study does not treat TAM as a stand-alone adoption equation; rather, it provides a theoretical basis for understanding the adoption dimension of the research framework. The adoption-rate construct reflects the extent to which online services are available, citizens use digital platforms, municipal employees embrace digital tools, and adoption has increased over time.

2.7.3 Diffusion of Innovation Theory

Rogers' (2003) Diffusion of Innovations theory explains how innovations spread through social systems over time. The theory is relevant to municipal e-government because digital government is an innovation that must move through organizations and user communities. The rate of diffusion depends on how an innovation is perceived and on the characteristics of the social and organizational environment.

In the present research, diffusion theory helps explain why municipalities may progress at different speeds even when they operate under the same national policy framework. Differences in organizational capacity, staff readiness, citizen digital literacy, infrastructure, and perceived value can influence the pace and depth of digital adoption.

2.8 Synthesis of the Literature

The literature collectively indicates that effective e-government requires alignment between technology, institutions, people, and policy. Jordan has developed a substantial e-government foundation, but implementation outcomes can vary across organizational and geographic settings. The central gap addressed by this study is therefore the need to connect municipal implementation conditions with observable service-delivery outcomes and economic modernization alignment.

The conceptual logic of the study is that higher levels of implementation and adoption should be associated with stronger service delivery enhancement and greater alignment with economic modernization, while higher levels of implementation barriers should be associated with weaker outcomes. The empirical analysis tests these relationships using data from municipal-sector respondents.

3. Methodology

3.1 Research Design

The study employed a quantitative, cross-sectional research design. A quantitative approach was selected because the research questions concern measurable relationships between defined constructs and because the study seeks to assess the direction and strength of associations between e-government factors and economic modernization alignment. The cross-sectional design allowed the researcher to collect standardized responses within a defined period and compare perceptions across municipal contexts.

The study's design is consistent with previous quantitative research on e-government adoption in Jordan. The use of standardized indicators supports descriptive comparison, reliability assessment, factor analysis, and regression analysis. The design also enables the study to test the stated hypotheses rather than relying solely on narrative interpretation.

3.2 Data Collection Instrument

Data were collected through a structured questionnaire using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The research draft states that the instrument was informed by established e-government adoption and utilization research, particularly Xin et al. (2022), and was adapted to the municipal and economic-modernization context. The questionnaire included demographic questions and five principal construct sections.

Construct	Measurement focus	Items
E-Government Implementation Level	Strategy, digital services, infrastructure updates, integration	4
E-Government Adoption Rate	Online availability, citizen use, staff adoption, adoption growth	4
Service Delivery Enhancement	Speed, accuracy, satisfaction, administrative cost	4
Implementation Barriers	Financial, technical, staff skills, citizen digital literacy	4
Economic Modernization Alignment	Vision support, national-plan coordination, business climate, priority alignment	4

The instrument was designed to capture both implementation conditions and perceived outcomes. This distinction is important because a municipality may have digital infrastructure without achieving high adoption or measurable service improvements. Similarly, modernization alignment may depend on how local digital services contribute to broader policy priorities rather than on technological availability alone.

3.3 Sampling Strategy and Sample

A stratified random sampling strategy was used to represent different municipal contexts. The sampling frame considered urban municipalities in large cities, municipalities in governorate centres, and smaller rural municipalities. The study included the municipal contexts of Amman, Irbid, and Zarqa alongside smaller and rural settings. The design sought to incorporate perspectives from individuals involved in municipal service delivery and digital implementation.

Seventy-two questionnaires were distributed and 46 valid responses were received, producing a response rate of 63.89%. The original study reports that the respondents were concentrated in experienced and relatively well-educated professional groups. Middle-level executive staff represented 63.04% of respondents, while top-level executive staff represented 36.96%.

Response category	Frequency	Percentage
Distributed questionnaires	72	100.00%
Valid responses	46	63.89%
Non-responses	26	36.11%

Position level	Frequency	Percentage
Top-level executive staff	17	36.96%
Middle-level executive staff	29	63.04%
Total	46	100.00%

3.4 Data Analysis

The study used SPSS-based statistical analysis. Descriptive statistics were used to summarize response patterns and the characteristics of the sample. Factor analysis was used to examine the underlying structure of the measurement items. Reliability analysis used Cronbach's alpha to assess internal consistency. Diagnostic testing included multicollinearity assessment through tolerance and

variance inflation factor (VIF) statistics. Regression analysis was used to examine the relationships between each principal e-government factor and economic modernization alignment.

The analytical framework distinguishes between the independent constructs and the outcome construct. E-government implementation level, adoption rate, service delivery enhancement, and implementation barriers were treated as explanatory dimensions, while economic modernization alignment represented the principal dependent construct. This approach directly corresponds with the study's hypotheses and research questions.

3.5 Reliability and Measurement Quality

All five constructs achieved Cronbach's alpha values above .70. The coefficients ranged from .712 to .911, indicating acceptable to very strong internal consistency. The highest reliability was obtained for e-government adoption rate ($\alpha = .911$), followed by implementation barriers ($\alpha = .878$) and service delivery enhancement ($\alpha = .841$). E-government implementation level recorded $\alpha = .723$, while economic modernization alignment recorded $\alpha = .712$.

Variable	Cronbach's alpha	Items	Assessment
E-Government Implementation Level	.723	4	Accepted
E-Government Adoption Rate	.911	4	Accepted
Service Delivery Enhancement	.841	4	Accepted
Implementation Barriers	.878	4	Accepted
Economic Modernization Alignment	.712	4	Accepted

The reliability results support the internal consistency of the measurement instrument. Because each construct was represented by four items, the findings suggest that the items operated coherently within their respective conceptual dimensions.

4. Results

4.1 Factor Analysis

Factor analysis was used to assess whether the questionnaire items represented the intended constructs. The factor-loading results reported in the original study showed meaningful loadings for all items. For e-government implementation level, loadings ranged from .707 to .790. For adoption rate, loadings ranged from .613 to .866. Service delivery enhancement produced loadings from .565 to .861. Implementation barriers ranged from .622 to .804, while economic modernization alignment ranged from .643 to .806.

Construct	Item	Factor loading
Implementation Level	Dedicated e-government strategy	.790
Implementation Level	Comprehensive digital services	.741
Implementation Level	Infrastructure updates	.783
Implementation Level	Integrated digital solutions	.707
Adoption Rate	Online services availability	.613
Adoption Rate	Citizen platform usage	.723
Adoption Rate	Staff digital adoption	.866
Adoption Rate	Adoption growth	.629
Service Delivery	Faster service delivery	.801
Service Delivery	Operational error reduction	.806
Service Delivery	Citizen satisfaction	.861
Service Delivery	Lower administrative costs	.565
Implementation Barriers	Financial resources	.804
Implementation Barriers	Technical infrastructure	.746
Implementation Barriers	Staff skill deficiency	.774
Implementation Barriers	Low digital literacy	.622
Economic Modernization	Vision support	.643
Economic Modernization	Economic-plan coordination	.780
Economic Modernization	Business-environment improvement	.806
Economic Modernization	Transformation-policy alignment	.738

4.2 Multicollinearity Diagnostics

The diagnostic analysis indicated that the explanatory constructs did not present problematic multicollinearity. Tolerance values ranged from .342 to .765, while VIF values ranged from 1.308 to 2.924. These values remained within the levels reported in the original analysis as acceptable for proceeding with regression analysis.

Variable	Tolerance	VIF
E-Government Implementation Level	.765	1.308
E-Government Adoption Rate	.390	2.562
Service Delivery Enhancement	.368	2.720
Implementation Barriers	.369	2.713
Economic Modernization Alignment	.342	2.924

4.3 Descriptive Findings

4.3.1 E-Government Implementation Level

The descriptive findings indicate a generally positive perception of e-government implementation. The strongest result concerned the existence of a dedicated e-government strategy: 87% of respondents agreed or strongly agreed, with a mean of 4.20. Infrastructure updating also received a positive assessment, with 71.8% agreement and a mean of 3.80. Integrated digital solutions recorded 65.2% positive responses and a mean of 3.70. The comparatively lower mean for comprehensive digital services, reported at 3.00, suggests that the availability of a strategy does not necessarily mean that all service areas have achieved the same degree of digital completeness.

4.3.2 E-Government Adoption Rate

Adoption was evaluated positively across all four indicators. The availability of online municipal services produced a mean of 4.30. Citizen use of e-government platforms recorded a mean of 4.10, while staff adoption of digital tools recorded a mean of 4.00. Growth in adoption during the previous two years recorded a mean of 4.10. The research draft reports that 84.8% of respondents expressed

favourable views regarding citizen platform usage and approximately 80.4% reported favourable staff adoption.

4.3.3 Service Delivery Enhancement

The results show strong perceived service improvements associated with e-government. Approximately 82.6% of respondents agreed that digital government had reduced service delivery time. The same proportion reported improvements in accuracy and reductions in operational errors, while 82.6% also reported increased citizen satisfaction. Reduction in administrative costs received the strongest positive response at 86.9%. These results position service delivery enhancement as a central pathway through which municipal e-government can contribute to modernization.

4.3.4 Implementation Barriers

Implementation barriers remained substantial despite the positive assessments of digital transformation. Financial-resource limitations were identified by 78.3% of respondents. Technical infrastructure challenges were reported by 82.7%, while 80.4% indicated staff digital-skill deficiencies. Citizen digital literacy was identified as a major barrier by 82.6%. The pattern indicates that positive progress in implementation exists alongside structural constraints that can restrict the depth and sustainability of transformation.

Barrier indicator	Positive agreement
Limited financial resources	78.3%
Technical infrastructure challenges	82.7%
Staff digital-skill deficiency	80.4%
Citizen digital literacy	82.6%

4.3.5 Economic Modernization Alignment

The results indicate a strong perceived alignment between municipal e-government initiatives and Jordan's economic modernization objectives. The statement that e-government initiatives directly support the modernization vision received 89.2% positive responses and the highest mean of 4.24. Coordination with national economic development plans received 80.4% positive responses and a mean of 3.83. Improvement in the municipal business climate recorded 80.5% positive responses and a mean of 3.89. Alignment with national modernization priorities recorded 82.6% positive responses and a mean of 4.07.

Economic modernization indicator	Positive response	Mean
Direct support for modernization vision	89.2%	4.24
Coordination with national development plans	80.4%	3.83
Improved municipal business climate	80.5%	3.89
Guidance by national modernization priorities	82.6%	4.07

4.4 Regression Analysis

Regression analysis was used to examine the statistical relationship between the principal e-government dimensions and economic modernization alignment. The results provide empirical evidence that the relationships proposed in the research framework are statistically meaningful. Because the original analysis reports individual regression models, the findings below are presented separately for each explanatory dimension.

4.4.1 E-Government Implementation Level and Economic Modernization Alignment

Statistic	Result
R	.526
R ²	.277
Adjusted R ²	.186
Standard error	2.908889
F	13.063
p	.020

The model was statistically significant, with $F = 13.063$ and $p = .020$. The R^2 value of .277 indicates that approximately 27.7% of the variation in economic modernization alignment was explained by the implementation-level measure in the reported model. The result supports the proposition that municipalities with stronger e-government implementation are more closely aligned with economic modernization objectives. The finding also indicates that implementation should be

understood as a multidimensional organizational process involving strategy, service availability, infrastructure, and system integration.

4.4.2 E-Government Adoption Rate and Economic Modernization Alignment

Statistic	Result
R	.486
R ²	.237
Adjusted R ²	.162
Standard error	2.952199
F	23.176
p	.023

The adoption model was statistically significant ($F = 23.176$, $p = .023$), with $R^2 = .237$. Thus, 23.7% of the variation in economic modernization alignment was explained by the adoption-rate dimension in the reported model. The result supports the importance of actual use of digital government services. Availability of technology alone is insufficient if citizens and municipal staff do not use the systems. Adoption therefore represents an essential link between digital investment and practical public-sector outcomes.

4.4.3 Service Delivery Enhancement and Economic Modernization Alignment

Statistic	Result
R	.590
R ²	.348
Adjusted R ²	.247
Standard error	2.797742
F	33.466
p	< .001

Service delivery enhancement produced the strongest reported relationship among the explanatory variables. The model recorded $R = .590$ and $R^2 = .348$, with $F = 33.466$ and $p < .001$. The results indicate that 34.8% of the variation in economic modernization alignment was associated with the service-delivery enhancement dimension in the reported model. The finding is consistent with the

central logic of the study: the economic relevance of e-government becomes most visible when digital systems produce practical improvements in the speed, accuracy, cost, and quality of public services.

4.4.4 Implementation Barriers and Economic Modernization Alignment

Statistic	Result
R	.560
R ²	.314
Adjusted R ²	.247
Standard error	2.799250
F	41.683
p	< .001

Implementation barriers were significantly associated with economic modernization alignment, with $R = .560$, $R^2 = .314$, $F = 41.683$, and $p < .001$. The relationship is interpreted as inverse in the original study: higher levels of financial, technical, human-capacity, and digital-literacy barriers correspond to weaker modernization alignment. The result emphasizes that barrier reduction is not a secondary implementation activity; it is an important condition for realizing the benefits of municipal digital transformation.

5. Discussion

5.1 Interpretation of the Main Findings

The findings provide a coherent picture of municipal e-government in Jordan. First, the descriptive results show that respondents perceive substantial progress in implementation and adoption. Second, the results indicate that this progress is accompanied by measurable perceived improvements in service delivery. Third, the regression models show statistically significant relationships between implementation, adoption, service delivery enhancement, and economic modernization alignment. Finally, the strong inverse relationship associated with implementation barriers demonstrates that digital transformation remains constrained by structural conditions.

The strongest relationship was observed for service delivery enhancement. This result is important because it shifts attention from technology deployment to outcomes. A municipality can establish digital infrastructure and still fail to generate modernization benefits if the technology does

not shorten procedures, reduce errors, improve satisfaction, or lower administrative costs. The study's strongest statistical relationship therefore supports an outcome-oriented interpretation of e-government.

The implementation-level relationship was also significant. The presence of a dedicated strategy, comprehensive digital services, infrastructure updates, and integrated digital solutions appear to be associated with stronger modernization alignment. This is consistent with the literature emphasizing that e-government is a process of institutional and technological transformation rather than a collection of isolated applications (Hujran et al., 2023; Madaki et al., 2024).

Adoption was significant as well, reinforcing the importance of citizen and employee use. The finding corresponds with the Technology Acceptance Model, which emphasizes perceived usefulness and ease of use as foundations of technology acceptance (Davis, 1989). In municipal settings, adoption also depends on trust, digital literacy, service experience, and the ability of organizations to support users (Abdulkareem & Mohd Ramli, 2022; AbdulKareem & Oladimeji, 2024).

The barrier model provides a complementary perspective. Financial constraints, infrastructure problems, staff skill deficiencies, and citizen digital literacy were all identified as important obstacles. The inverse relationship suggests that modernization cannot be accelerated merely by increasing the number of digital services. Municipalities must also strengthen the organizational conditions that enable those services to operate and be used effectively.

5.2 Relationship to Previous Research

The findings are broadly consistent with the Jordanian e-government literature reviewed in the original research. Alryalat et al. (2023) emphasize the citizen perspective on e-government adoption, while Ahmad and Dhoon (2024) highlight user experience and satisfaction. The current study extends this perspective by connecting service experience to a wider modernization construct.

The results also correspond with research emphasizing organizational barriers. Saleh et al. (2021) identify organizational barriers to e-government implementation, while Alwaely et al. (2024) examine the challenges of applying digital technologies in Jordanian public administration. The current findings reinforce the conclusion that implementation capacity and organizational readiness are central to digital transformation.

The municipal focus is particularly compatible with Hanandeh et al. (2023), who examined digital transformation and process performance in Greater Amman Municipality. The current study

broadens the discussion by considering municipalities as part of a national economic modernization process and by empirically linking implementation dimensions to modernization alignment.

5.3 Theoretical Implications

From the perspective of New Public Management, the findings support the idea that digital government can strengthen efficiency, performance orientation, responsiveness, and service quality. The service-delivery results are particularly relevant because they show that the practical value of digital transformation is expressed through operational outcomes.

The findings also support the relevance of the Technology Acceptance Model. High adoption levels and the significant relationship between adoption and modernization alignment indicate that successful transformation requires actual use rather than simple technological availability. Perceived usefulness is reflected indirectly through service improvements, while ease of use and accessibility are related to citizen and staff adoption.

Diffusion of Innovations theory provides a further explanation for variation across municipal settings. Digital transformation diffuses through organizations and communities rather than occurring uniformly. Municipalities with stronger capacity, better infrastructure, more supportive leadership, and higher user readiness may progress more quickly. The observed barriers therefore represent conditions that can slow diffusion and limit the realization of innovation benefits.

5.4 Practical and Policy Implications

The findings suggest that municipal digital transformation should be managed as an integrated reform program. First, municipalities need implementation strategies that connect technology projects with measurable service outcomes. Second, digital infrastructure should be treated as a continuing investment requiring maintenance, security, integration, and technical support. Third, employee training should be continuous and connected to actual service processes rather than limited to initial system introduction.

Fourth, citizen digital literacy should be addressed as part of service design. Digital channels should be understandable, accessible, and supported by appropriate communication and assistance. Fifth, national and municipal planning should be more closely coordinated so that local digital initiatives clearly contribute to modernization priorities. Finally, monitoring systems should focus on outcome indicators such as service-processing time, error reduction, citizen satisfaction, and administrative cost rather than only counting the number of services that have been digitized.

5.5 Limitations

The study should be interpreted in light of its methodological limitations. The sample comprised 46 valid responses, which limits the extent to which the findings can be generalized to all municipalities in Jordan. The cross-sectional design captures perceptions at one point in time and therefore does not establish temporal causality. The use of questionnaire responses also means that several measures are perception-based rather than derived exclusively from administrative transaction records.

In addition, the municipal environment is heterogeneous. Differences in municipality size, resources, infrastructure, population characteristics, and administrative arrangements may affect digital transformation outcomes. The stratified approach was intended to capture this variation, but the sample size limits detailed comparisons among individual municipal categories.

6. Conclusion and Recommendations

6.1 Conclusion

This study examined the role of e-government implementation in advancing Jordan's economic modernization vision through municipal service delivery transformation. The results demonstrate that e-government should be understood as a multidimensional process involving implementation capacity, actual adoption, service outcomes, and the management of barriers. The empirical evidence shows statistically significant relationships between the principal e-government dimensions and economic modernization alignment.

The strongest reported relationship was between service delivery enhancement and economic modernization alignment. This finding indicates that the modernization value of e-government is particularly evident when digital transformation improves the speed, accuracy, satisfaction, and cost of municipal services. Implementation level and adoption rate were also significant, demonstrating that strategy, infrastructure, integration, citizen use, and staff adoption all matter. At the same time, the significant inverse relationship associated with implementation barriers confirms that financial, technical, human-capacity, and digital-literacy constraints can substantially weaken modernization outcomes.

Overall, the study concludes that Jordan's municipal digital transformation can support economic modernization when technology is integrated with institutional reform and service improvement. The results therefore support an outcome-focused model in which the success of e-government is assessed

not only by what systems municipalities introduce, but by what those systems achieve for citizens, businesses, municipal organizations, and the broader modernization agenda.

6.2 Recommendations

- Develop municipal e-government implementation plans that connect every major digital initiative to specific service-delivery and modernization outcomes.
- Prioritize integration of digital systems across service areas to reduce duplicated data entry, repeated documentation, and fragmented service processes.
- Maintain continuous investment in technical infrastructure, cybersecurity, system maintenance, and interoperability rather than treating digitization as a one-time project.
- Establish structured and continuous digital-skills development for municipal employees, with training linked directly to operational responsibilities.
- Strengthen citizen digital-literacy and awareness initiatives, particularly where lower levels of digital readiness may limit adoption.
- Use citizen satisfaction, processing time, error rates, and administrative cost as routine performance indicators for digital municipal services.
- Improve coordination between national digital-transformation priorities and municipal implementation plans so that local projects contribute clearly to economic modernization objectives.
- Use phased implementation and continuous evaluation to identify technical, organizational, and financial problems before they become barriers to long-term sustainability.
- Encourage knowledge sharing among municipalities so that successful implementation practices can be transferred to municipalities with lower digital maturity.
- Continue research using larger samples and longitudinal designs to examine how municipal digital transformation affects measurable economic and service outcomes over time.

6.3 Future Research

Future studies can extend the present research by using larger municipal samples, longitudinal data, and objective administrative indicators. Comparative studies can examine differences between large urban municipalities and smaller rural municipalities. Further research can also investigate the separate effects of digital literacy, organizational readiness, leadership, interoperability, trust, and

emerging technologies. Such studies would strengthen understanding of how municipal e-government can move from digital availability to sustained public value and economic impact.

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