

## **A CONCEPTUAL MODEL FOR E-GOVERNMENT USE: FACTORS, THEORETICAL INTEGRATION, AND HYPOTHESES IN THE SAUDI ARABIAN CONTEXT**

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### **Abstract**

This study presents a comprehensive conceptual model for E-Government use, grounded in an extensive literature review and validated through expert consultation. An initial pool of 48 influencing factors was systematically extracted from peer-reviewed publications between 2018 and the present. These factors were reduced to 23 through frequency analysis and empirical support, and subsequently refined to 12 key variables via expert ranking. The model integrates the Unified Theory of Acceptance and Use of Technology (UTAUT) with the Technology-Organization-Environment (TOE) framework, supplemented by trust as a mediating variable. The factors are categorized into technological, people-related, and environmental dimensions, each hypothesized to influence behavioral intention toward E-Government adoption in Saudi Arabia. The study provides operational definitions and formulates testable hypotheses, offering a theoretically robust and contextually relevant framework to guide empirical validation and policy formulation.

**Keywords:** E-Government, UTAUT, TOE, Saudi Arabia, Trust, Technology Adoption, Conceptual Model

### **1. Introduction**

The rapid digitization of public services has fundamentally transformed the way governments deliver services and engage with citizens. E-Government—defined as the strategic application of information and communication technologies (ICT) in public administration—has emerged as a key driver of transparency, efficiency, and citizen participation in governance processes (United Nations, 2022; Alshehri & Drew, 2010). By integrating digital platforms into administrative operations, governments can streamline service delivery, reduce bureaucratic inefficiencies, and foster stronger relationships with stakeholders (Gil-García et al., 2018).

In Saudi Arabia, the implementation of E-Government is central to the national Vision 2030 agenda, which seeks to diversify the economy and enhance the quality of life through digital transformation (Saudi Vision 2030, 2016). Despite significant investments in technological infrastructure, disparities remain in adoption rates, with user acceptance influenced by complex socio-cultural, technological, and organizational factors (Alfarraj et al., 2013; Aljarallah & Lock, 2020). Existing empirical evidence suggests that while technological capacity is essential, factors such as trust, privacy, social influence, and institutional readiness also play critical roles in shaping adoption behaviors (AlAwadhi & Morris, 2008; Al-Emran & Griffy-Brown, 2023).

Globally, multiple theoretical frameworks have been employed to explain E-Government adoption, including the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT model, developed by Venkatesh et al. (2003), integrates constructs from earlier models and identifies four core determinants of usage intention and behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions. While UTAUT has been validated across various contexts, studies indicate that its predictive power can be enhanced by incorporating context-specific variables such as trust and security, especially in regions with distinct cultural and institutional characteristics (Alshehri et al., 2012; Bin-Nashwan et al., 2023).

In the Saudi Arabian context, E-Government adoption research remains limited compared to global literature, and existing studies often yield mixed findings regarding determinant factors (Alharbi & Drew, 2014; Alzahrani, 2022). This underscores the need for a more comprehensive, context-sensitive conceptual model that not only integrates technological, individual, and environmental dimensions but also addresses mediating variables such as trust, which is pivotal in influencing citizens' willingness to engage with government digital services (Belanger & Hiller, 2006; Santa et al., 2019).

Accordingly, this study proposes a conceptual model for E-Government adoption in Saudi Arabia by synthesizing the UTAUT framework with the Technology-Organization-Environment (TOE) model and incorporating trust as a mediating factor. This integrated approach aims to provide a robust theoretical foundation for examining the multifaceted influences on E-Government use, with implications for policymakers, system designers, and researchers seeking to enhance digital governance outcomes.

## 2. Literature Review

E-Government adoption has been extensively studied across different national contexts, with scholars highlighting its potential to improve transparency, service efficiency, and citizen engagement (Gil-García et al., 2018; United Nations, 2022). In developed countries, research has often emphasized technological readiness, user experience, and system quality as core determinants of adoption (Venkatesh et al., 2012; Li, 2021). In contrast, studies in developing countries underscore socio-cultural factors, infrastructure gaps, and institutional trust as equally important (AlAwadhi & Morris, 2008; Alharbi & Drew, 2014). These contextual differences indicate that a one-size-fits-all model is inadequate, and adoption frameworks must be adapted to specific national environments (Venkatesh et al., 2012).

Saudi Arabia's E-Government initiatives, driven by the Vision 2030 agenda, aim to achieve world-class digital service delivery (Saudi Vision 2030, 2016). While infrastructure investment has been significant, research reveals that adoption rates remain inconsistent, influenced by variables such as cultural attitudes, privacy concerns, and perceptions of government transparency (Alfarraj et al., 2013; Alzahrani, 2022). This has prompted calls for more integrated models that account for both technical and socio-environmental factors in predicting E-Government use.

The Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) have long been applied to technology adoption research, emphasizing perceived usefulness, perceived ease of use, and behavioral intention as key determinants (Davis, 1989; Ajzen, 1991). The Unified Theory of Acceptance and Use

of Technology (UTAUT) synthesizes constructs from TAM, TPB, and other models, identifying performance expectancy, effort expectancy, social influence, and facilitating conditions as primary predictors of behavioral intention and usage behavior (Venkatesh et al., 2003).

UTAUT has been validated in multiple E-Government contexts, including Middle Eastern countries, where it has demonstrated predictive strength (AlAwadhi & Morris, 2008; Alshehri et al., 2012). However, researchers note that additional factors—such as trust, privacy, and security—should be integrated to reflect the socio-political realities of specific regions (Bin-Nashwan et al., 2023; Belanger & Hiller, 2006).

The TOE framework, developed by Tornatzky and Fleischer (1990), extends the analysis beyond individual perceptions by incorporating organizational and environmental readiness. In E-Government adoption, technological factors refer to infrastructure and system quality; organizational factors include leadership support and change management; and environmental factors encompass regulatory frameworks, competitive pressure, and societal readiness (Baker, 2012; Ifinedo, 2011). TOE has been applied to public sector technology adoption, providing a macro-level view that complements UTAUT's micro-level behavioral focus.

Technological determinants such as performance expectancy, effort expectancy, and security are consistently identified as critical predictors of adoption (Venkatesh et al., 2003; Alshehri et al., 2012). Performance expectancy reflects users' beliefs about the system's ability to improve task performance, while effort expectancy captures perceptions of ease of use (Davis, 1989; Wu et al., 2024). Security, often underexamined in adoption studies, plays a pivotal role in contexts where data protection and privacy are primary citizen concerns (Chhanabhai & Holt, 2007; Aleisa, 2024).

Individual-level determinants include privacy, self-efficacy, and social influence. Privacy concerns—particularly regarding the handling of personal data—can significantly deter adoption (Belanger & Hiller, 2006; Hooda et al., 2022). Self-efficacy, defined as users' confidence in their ability to use technology, directly affects their willingness to engage with E-Government services (Bandura, 1986; Al-Jabri & Sohail, 2012). Social influence, especially in collectivist societies, can either facilitate or hinder adoption depending on the prevailing community perceptions (Gao et al., 2012; Hakeem & Sulphrey, 2024).

Environmental readiness encompasses cloud computing facilities, facilitating conditions, and change management. Cloud infrastructure enables scalability and accessibility, while facilitating conditions refer to the availability of resources and technical support (Venkatesh et al., 2003; Ramirez-Madrid et al., 2024). Change management ensures smooth transitions from legacy systems to digital platforms, reducing resistance and promoting user acceptance (Nah & Delgado, 2006; Acquah, 2024).

Trust has emerged as a critical mediator in technology adoption models, particularly in public sector contexts where citizen confidence in institutional integrity is essential (Li, 2021; Santa et al., 2019). In E-Government adoption, trust influences the relationship between behavioral intention and actual use by reducing perceived risk and uncertainty (Kurfalı et al., 2017). This is particularly relevant in Saudi Arabia, where cultural and institutional norms place a premium on reliability and transparency in government interactions.

While UTAUT and TOE provide valuable insights into E-Government adoption, their isolated application often overlooks the interplay between individual, technological,

and environmental factors in specific national contexts. In Saudi Arabia, prior studies have not fully integrated these dimensions nor adequately accounted for the role of trust as a mediator. This study addresses these gaps by developing a hybrid conceptual model that synthesizes UTAUT and TOE constructs, enriched with trust as a mediating variable, to explain E-Government adoption in a culturally and institutionally relevant framework.

### 3.2 Model Development and Hypotheses Formulation

The development of the conceptual model began with a systematic extraction of factors influencing E-Government use from peer-reviewed literature published between 2018 and the present. Using targeted keywords such as "*E-Government adoption*", "*digital government success factors*", and "*determinants of E-Government use*", a total of 48 factors were identified from multiple academic databases including PubMed, IEEE Xplore, JSTOR, ScienceDirect, and Google Scholar. These factors were organized into five dimensions—technology, organization, environment, people, and dependent variables—following content analysis and thematic grouping (Alshehri et al., 2012; Venkatesh et al., 2003).

Subsequent frequency analysis reduced the list to 23 high-relevance factors. These were then subjected to expert evaluation, involving 10 professionals with PhDs and over nine years of relevant experience in E-Government or related ICT domains, drawn from Saudi Arabia, the UAE, Kuwait, and Malaysia. Experts ranked each factor's influence on behavioral intention to use E-Government, resulting in a final selection of 12 key determinants.

#### 3.2.1 Model Development

The proposed conceptual model was developed through a two-stage process. First, a **systematic literature review** identified 48 factors influencing E-Government use, categorized into five dimensions: technology, organization, environment, people, and dependent variables. This pool was narrowed to 23 factors through frequency analysis and empirical validation. Second, **expert evaluation**—involving 10 PhD-level professionals with extensive E-Government and ICT experience from Saudi Arabia, UAE, Kuwait, and Malaysia—resulted in the selection of 12 key determinants of E-Government adoption.

The model integrates two theoretical frameworks:

- **Unified Theory of Acceptance and Use of Technology (UTAUT)** (Venkatesh et al., 2003), which captures micro-level determinants such as performance expectancy, effort expectancy, social influence, and facilitating conditions.
- **Technology-Organization-Environment (TOE)** framework (Tornatzky & Fleischer, 1990), which addresses macro-level determinants such as infrastructure readiness, environmental support, and organizational change capacity.

**Trust** is introduced as a **mediating variable** between behavioral intention and actual use (e-participation), recognizing its critical role in influencing adoption in the Saudi context (Santa et al., 2019; Kurfah et al., 2017).

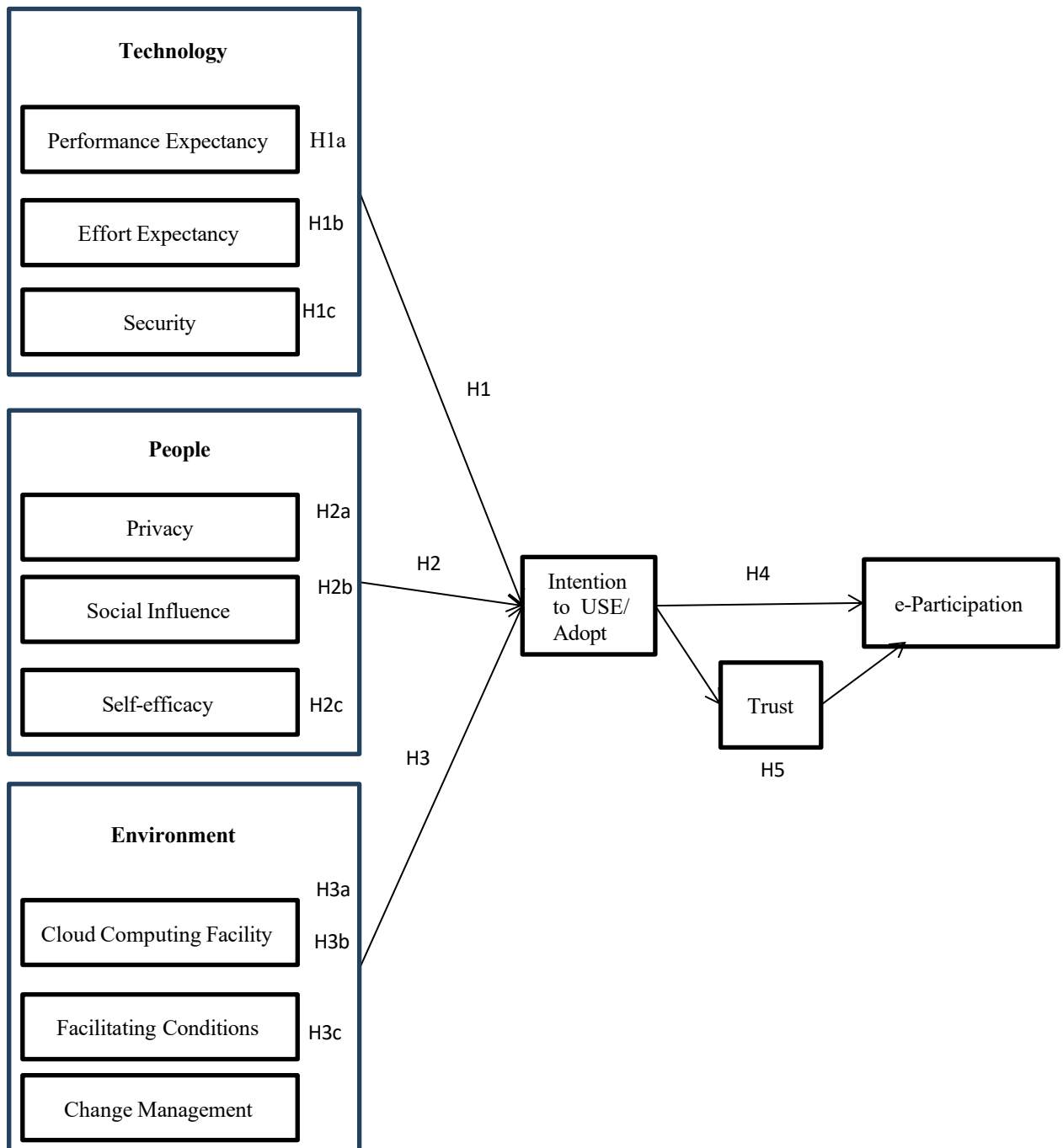
#### 3.2.2 Model Structure

The final model groups the 12 determinants into three primary categories:

1. **Technological Factors** – performance expectancy, effort expectancy, security.
2. **People Factors** – privacy, self-efficacy, social influence.

3. **Environmental Factors** – cloud computing facility, facilitating conditions, change management.

These categories are hypothesized to influence **behavioral intention to use**, which subsequently predicts **actual use/e-participation**. **Trust** is positioned as a mediator between intention and use.



**Figure 1. Proposed Conceptual Model for E-Government Use in Saudi Arabia**

The conceptual model illustrates the hypothesized relationships among the constructs,

showing technological, people, and environmental factors as exogenous variables influencing behavioral intention, which in turn predicts actual e-participation. Trust serves as a mediating variable between intention and use, capturing the importance of confidence in service reliability and institutional transparency.

#### 4. Hypotheses Formulation

The hypotheses of this study are derived from the integration of the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990), supplemented by the inclusion of **trust** as a mediating variable. This hybrid approach reflects the multifaceted nature of E-Government adoption in Saudi Arabia, where technological, individual, and environmental determinants interact within a socio-cultural context that places high value on data security, institutional transparency, and service reliability (Santa et al., 2019; Alzahrani, 2022).

##### 4.1 Technological Factors and Behavioral Intention

Technological characteristics—specifically performance expectancy, effort expectancy, and security—directly influence citizens' willingness to adopt E-Government services.

- **Performance expectancy** reflects the degree to which individuals believe E-Government will enhance their service efficiency (Venkatesh et al., 2003; Wu et al., 2024).
- **Effort expectancy** denotes perceived ease of use, which has been shown to increase acceptance when systems are intuitive (Davis, 1989).
- **Security** addresses protection from unauthorized access, which is a prerequisite for trust and adoption (Chhanabhai & Holt, 2007).

**H1:** Technological factors have a significant positive relationship with behavioral intention to use E-Government in Saudi Arabia.

**H1a:** Performance expectancy positively influences behavioral intention.

**H1b:** Effort expectancy positively influences behavioral intention.

**H1c:** Security positively influences behavioral intention.

##### 4.2 People Factors and Behavioral Intention

Individual-level determinants—privacy, self-efficacy, and social influence—are equally important in shaping adoption decisions.

- **Privacy** concerns can either encourage or deter adoption depending on users' perceptions of data protection (Belanger & Hiller, 2006; Hooda et al., 2022).
- **Self-efficacy** reflects confidence in using technology, which is crucial in contexts with varied digital literacy levels (Bandura, 1986).
- **Social influence** captures the impact of peers, family, and societal expectations, which can be particularly strong in collectivist cultures (Gao et al., 2012).

**H2:** People factors have a significant positive relationship with behavioral intention to use E-Government in Saudi Arabia.

**H2a:** Privacy positively influences behavioral intention.

**H2b:** Self-efficacy positively influences behavioral intention.

**H2c:** Social influence positively influences behavioral intention.

##### 4.3 Environmental Factors and Behavioral Intention

The external environment, including infrastructure readiness, support resources, and organizational change capacity, can significantly facilitate or hinder E-Government adoption.

- **Cloud computing facilities** ensure scalability and service reliability (Medvedeva et al., 2017).



- **Facilitating conditions** represent the availability of necessary tools, resources, and connectivity (Venkatesh et al., 2003).
- **Change management** ensures smooth transitions and minimizes resistance during digital transformation initiatives (Nah & Delgado, 2006).

**H3:** Environmental factors have a significant positive relationship with behavioral intention to use E-Government in Saudi Arabia.

**H3a:** Cloud computing facility positively influences behavioral intention.

**H3b:** Facilitating conditions positively influence behavioral intention.

**H3c:** Change management positively influences behavioral intention.

#### 4.4 Behavioral Intention and Actual Use

Behavioral intention is widely recognized as a strong predictor of actual technology use (Ajzen, 1991; Venkatesh et al., 2003). In the E-Government context, this reflects citizens' willingness to engage in online transactions and participate in digital governance processes.

**H4:** Behavioral intention positively influences actual use (e-participation) of E-Government services in Saudi Arabia.

#### 4.5 Mediating Role of Trust

Trust in government institutions and digital service platforms mediates the relationship between intention and use by reducing perceived risks and reinforcing confidence in service delivery (Kurfali et al., 2017; Li, 2021). In the Saudi context, where institutional trust is a critical determinant of citizen engagement, this mediation is particularly relevant.

### 5. H5: Trust mediates the relationship between behavioral intention and actual e-participation in E-Government services in Saudi Arabia Theoretical Integration

The conceptual model proposed in this study integrates two complementary theoretical frameworks—the **Unified Theory of Acceptance and Use of Technology (UTAUT)** (Venkatesh et al., 2003) and the **Technology-Organization-Environment (TOE)** framework (Tornatzky & Fleischer, 1990)—while incorporating **trust** as a mediating variable to address the socio-cultural and institutional dynamics of E-Government adoption in Saudi Arabia.

#### 5.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT consolidates constructs from eight prominent technology acceptance models, including the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Diffusion of Innovation (DOI) theory. It identifies four primary determinants of behavioral intention and usage behavior:

1. **Performance Expectancy** – the degree to which a technology is perceived as beneficial in enhancing job performance.
2. **Effort Expectancy** – the perceived ease of using the technology.
3. **Social Influence** – the extent to which important others influence technology use decisions.
4. **Facilitating Conditions** – the degree to which the infrastructure supports use (Venkatesh et al., 2003).

UTAUT has been validated across multiple domains, including E-Government adoption in developing countries (AlAwadhi & Morris, 2008; Alshehri et al., 2012), and has shown adaptability to different cultural and infrastructural contexts. In Saudi Arabia, studies confirm that these constructs—particularly performance expectancy and social influence—are significant drivers of adoption, though the model's explanatory power increases when factors such as security and trust are included (Al-Emran &

Griffy-Brown, 2023; Bin-Nashwan et al., 2023).

## 5.2 Technology-Organization-Environment (TOE) Framework

The TOE framework provides a macro-level perspective on technology adoption, considering three domains:

- **Technological Context:** Internal and external technologies relevant to the organization, including infrastructure, capabilities, and system quality.
- **Organizational Context:** Internal resources, management structures, and processes that support or hinder adoption.
- **Environmental Context:** External factors such as industry trends, regulation, and competitive pressures (Baker, 2012; Ifinedo, 2011).

Applied to E-Government, TOE highlights the role of environmental readiness—such as cloud computing infrastructure, regulatory policies, and change management—in facilitating adoption. This is particularly relevant for Saudi Arabia, where large-scale government investment in ICT is coupled with institutional reforms under Vision 2030 (Saudi Vision 2030, 2016).

## 5.3 Integrating UTAUT and TOE

While UTAUT effectively captures individual-level behavioral determinants, it is less equipped to address broader environmental and infrastructural influences. Conversely, TOE emphasizes organizational and contextual readiness but lacks granularity in explaining individual behavioral intentions. By integrating the two frameworks, this study provides a more comprehensive understanding of E-Government adoption, capturing both micro-level (user perceptions and intentions) and macro-level (environmental and organizational enablers) determinants.

In the proposed model:

- **Technological factors** (performance expectancy, effort expectancy, security) are informed by both UTAUT and TOE.
- **People factors** (privacy, self-efficacy, social influence) are drawn primarily from UTAUT's emphasis on individual attitudes and perceptions.
- **Environmental factors** (cloud computing facility, facilitating conditions, change management) align closely with TOE's environmental readiness dimension.

## 5.4 Trust as a Mediating Variable

The inclusion of **trust** responds to evidence that citizens' willingness to engage with E-Government is strongly influenced by their confidence in the government's ability to safeguard personal information, deliver reliable services, and operate transparently (Belanger & Hiller, 2006; Santa et al., 2019). Trust mediates the relationship between behavioral intention and actual use by reducing perceived risks and fostering sustained engagement (Kurfalı et al., 2017; Li, 2021).

In the Saudi context, where cultural norms and institutional credibility significantly shape public perceptions, trust is not merely an antecedent but a critical link that translates intention into active participation. This positioning enhances the model's contextual validity and aligns with calls for culturally adapted E-Government adoption frameworks (Alharbi & Drew, 2014).

## 5.5 Conceptual Model Positioning

By merging UTAUT and TOE and embedding trust as a mediator, the model addresses both **behavioral** and **contextual** dimensions of E-Government adoption. It enables a nuanced analysis of how technological, individual, and environmental variables converge to influence citizens' engagement with digital public services in Saudi Arabia.



This theoretical integration not only strengthens the explanatory power of the model but also ensures its practical relevance for policymakers and system designers working toward the digital transformation objectives of Vision 2030.

### Implications

The proposed conceptual model offers valuable implications for policy, practice, and future research in the field of E-Government adoption, particularly in the Saudi Arabian context. By integrating UTAUT and TOE with trust as a mediating variable, the model provides a holistic framework that addresses both the micro-level determinants of user behavior and the macro-level enablers of technological adoption. For policymakers, the model highlights the need to design E-Government strategies that go beyond infrastructure provision and address user-centric concerns such as security, privacy, and trust. While Saudi Arabia has invested heavily in ICT infrastructure under Vision 2030, achieving sustained adoption requires policy frameworks that institutionalize data protection standards, transparent governance practices, and robust cybersecurity measures (Alzahrani, 2022; Santa et al., 2019). The inclusion of environmental factors such as change management further underscores the importance of government-led initiatives to prepare citizens and employees for digital transformation through training programs and awareness campaigns.

From an operational perspective, system designers and public service managers can use the model to prioritize features that directly influence behavioral intention—particularly ease of use, performance efficiency, and security protocols. The model's emphasis on people factors suggests the need for user-friendly interfaces, digital literacy support, and community engagement programs that leverage social influence to promote adoption. Furthermore, environmental readiness elements, such as cloud computing facilities and facilitating conditions, should be optimized to ensure service reliability and scalability, especially for high-demand public services.

The mediating role of trust offers a critical insight: even when citizens recognize the utility and usability of E-Government services, adoption may stall without confidence in the integrity and transparency of these systems (Belanger & Hiller, 2006; Kurfalı et al., 2017). Trust-building measures—such as clear communication about data usage policies, visible security certifications, and responsive customer service—can bridge the gap between intention and actual use. This finding is particularly relevant in the Saudi context, where trust in institutions is closely tied to perceptions of cultural alignment and respect for privacy norms.

The model provides a testable framework for future empirical studies that aim to quantify the relative influence of technological, people, and environmental factors on E-Government adoption. By operationalizing these constructs and validating the model in the Saudi context, researchers can contribute to a body of knowledge that informs cross-cultural comparisons and longitudinal analyses. The integration of UTAUT and TOE also opens avenues for exploring sector-specific adaptations, such as healthcare, education, and municipal services, where adoption barriers and facilitators may differ. Finally, the model aligns with Saudi Arabia's Vision 2030 digital transformation objectives by identifying actionable leverage points for increasing citizen engagement in digital governance. By focusing simultaneously on technological performance, user empowerment, environmental readiness, and institutional trust, the framework provides a roadmap for ensuring that E-Government initiatives translate into measurable improvements in service uptake, citizen satisfaction, and public sector efficiency.

## 6 Conclusion

This study developed a comprehensive conceptual model for E-Government adoption in the Saudi Arabian context by integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) with the Technology-Organization-Environment (TOE) framework and incorporating trust as a mediating variable. Through a rigorous, multi-stage process—comprising a systematic literature review, empirical factor validation, and expert evaluation—the model identifies 12 key determinants of adoption, categorized into technological, people, and environmental factors.

The proposed model advances existing E-Government research in three significant ways. First, it bridges the gap between individual-level behavioral predictors and macro-level infrastructural enablers, ensuring a more holistic understanding of adoption drivers. Second, it addresses context-specific considerations in Saudi Arabia, where cultural norms, institutional trust, and governmental reform initiatives play pivotal roles in shaping adoption behaviors. Third, it positions trust as a central mediator, recognizing its critical influence in translating intention into actual use and e-participation.

The model's theoretical integration and contextual relevance make it a valuable tool for policymakers, system designers, and researchers aiming to enhance the design, implementation, and uptake of E-Government services. By targeting improvements in system usability, data security, user empowerment, and infrastructural readiness, decision-makers can better align digital governance initiatives with the objectives of Saudi Vision 2030.

Future research should focus on empirically testing this model using structural equation modeling (SEM) to validate its predictive power and refine its constructs. Additionally, cross-sectoral and longitudinal studies could explore how these determinants evolve over time and differ across public service domains. Such empirical validation will ensure that the model not only contributes to academic discourse but also serves as a practical roadmap for advancing digital transformation in the Saudi public sector.

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