

## Article

# Sustainable Adoption of E-Government from the UTAUT Perspective

Mosleh Zeebaree <sup>1,\*</sup>, Mary Agoyi <sup>1</sup> and Musbah Aqel <sup>2</sup>

<sup>1</sup> Management Information Systems Department, Cyprus International University, Via Mersin 10, Haspolat-Lefkosa 99258, Turkey; magoyi@ciu.edu.tr

<sup>2</sup> College of Technology, Amman Arab University, Amman 11953, Jordan; musbahaqel@auct.edu.jo

\* Correspondence: 21807157@student.ciu.edu.tr

**Abstract:** This paper attempts to study the sustainable adoption of e-government services in northern Iraq. The well-known unified theory of acceptance and use of technology (UTAUT) is applied and extended to study citizens' behavior regarding e-government services. A quantitative technique was utilized to gauge the efficiency of the model. Overall, 371 replies were received through distributing samples. SPSS software was used for the data evaluation. Two extra constructs were introduced in the study, i.e., "Trust of system (TOS)" and "Ethics of Internet (EOI)", into the original UTAUT as the theoretical extension. The findings indicate that all constructs have a significant influence on the intention to use e-government services. Moreover, the EOI moderates the effects of TOS on social impacts (SI), performance expectancy (PE), and behavior intention (BI). The results also indicated that there were statistically significant differences in the demographic characteristics of age, educational level excluding gender, and behavioral intention to use e-government services. The study's results support most of the hypotheses. The results contribute to a better knowledge of the factors affecting the sustainable adoption of e-government in northern Iraq.

**Keywords:** e-government; UTAUT; adoption; sustainability



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## 1. Introduction

The adoption and utilization of information communication technology (ICT), business practices, the global spread of the internet, and familiarity with technology in many contexts have provided great comfort for citizens and stakeholders. The term "sustainability" loosely is used to define the efficiency that a government can achieve in terms of time, cost, and effort to implement e-government services while being able to accommodate the interests of different partners (i.e., government agencies, employees, businesses, and citizens) [1]. Good governance considerably modernizes public administration, improves public service delivery, and deals with more complex development imperatives. It could contribute to achieving the 2030 Sustainable Development Goals (SDGs) set by the UN [2]. The sustainability of e-government projects in developing countries is constantly evolving.

Sustainable e-government is defined as "the ability of government organizations to continuously operate and use e-government systems over a long lifecycle to provide continuous benefit values for both government organizations and stakeholders" [3]. Sustainable e-government necessitates more citizen-centric and simplified government services [4]. Users are discouraged from adopting the services provided by the different e-government systems and individual databases since they lead to insufficient adoption and may need additional activities, such as visiting government offices to satisfy service requests [5]. Individual and diversified e-government systems are also becoming less financially viable for poorer nations, as their upkeep necessitates large expenditures and duplication of government functions [6]. Government personnel must process service requests manually unless these systems are centralized or networked, which leads to inefficiencies and poor

productivity [7]. As a result, a long-term e-government model must be able to deliver streamlined services by integrating government systems. Nonetheless, they encounter constant challenges in terms of lack of trust in the system, ICT literacy, awareness, political instability, and inconsistent systems [8]. The Iraqi e-government is similar to that of other Arab and Asian countries. The early stages of adopting ICT are to enhance communication and citizenship, as well as acting as a catalyst to enable citizens' interaction with the government, and, furthermore, in order to simplify service delivery while also improving financial management and reporting [9]. Firstly, the Iraqi e-government project was a small project for an electronic traffic system. Then, in 2010, the Iraqi government decided to connect the most critical ministers with the Prime Minister's office [10]. According to the UN reports, the e-government development index of Iraq ranks 143 out of 193, and E-participation is 158 out of 193 (UN, 2020).

Despite governments' provision of online services, citizens are still using traditional means rather than electronic channels in interacting with the government [11]. Most users are reluctant to accept e-government services due to the lack of government regulations, low e-government platform trust, absence of protection laws, political instability, and lack of regulations [12]. Confidence in the electronic transaction system significantly impacts the citizens' intent to use e-government [13]. The Iraqi e-government faces numerous obstacles to building its foundations suitably because of the country's current security and corruption issues. Additionally, it is necessary to change the public administration's mentality and action plan. Moreover, it is necessary to change the way they communicate with citizens and stakeholders with integrity and impartiality to increase the citizens' morals and confidence in the system [14].

The political situation limits citizens' participation in e-government projects. However, it is important to note that trust in e-government cannot be measured in terms of technological innovation, but rather in terms of websites. Generally, citizens' trust in public institutions and their representatives is critical in shaping their positions [15]. Jameel [16] pointed out a positive correlation between the confidence of the system and the intention of using e-services in Iraq. Some researchers discovered a direct relationship between ethical behavior and judgment (Cronan and Al-Rafee [17], Pan and Sparks [18], Yoon [19]). However, Chen et al. (2008) [20] discovered that the ethical score had no significant influence on the behavioral intent to download unauthorized music files. These findings suggest that ethical beliefs toward online piracy may play a moderating role in the impact of perceived value on online content purchase intentions. Thus, the relationship between perceived value, purchase intent, and hacking ethics still needs to be addressed in the context of online services. To this end, research on the effect of system trust and internet ethics on citizens' attitudes and behavior toward adopting e-government can find some possible solutions to the problem. Technology adoption scholars analyzed the behavioral intent relationships with user behavior and attitudes. It can be noted that analyzing their performance is noteworthy in e-government adoption because these variables are fundamentally significant in terms of IT innovation and adoption models [21]. Various distinct theories of IS/IT adoption, such as the Theory of Reasoned Action (TRA), Technology Acceptance Model [22], Theory of Planned Behavior [23], and Diffusion of Innovation (DOI) [24], demonstrate this. According to Venkatesh et al. [25], using the UTAUT model over the above theoretical models is recommended for studying user intent.

Furthermore, research on technology studies and ethical issues by Al-Sebae and Abu-Shanab [26]; Kurfal et al. [27]; and Carter, [28] found that ethical issues directly influence the intention of using e-services. They are also observed as an influential and significant indicator of technological use. Kurfal et al. [27] found in their study that trust factors, including trust in the system and internet, positively impact the performance expectation of using e-government services. Research on e-government adoption has focused mainly on the impact of certain elements. Depending on the study's context and participants, these variables vary widely.

Consequently, extending UTAUT by trusting in the system and ethics of the internet would be considered the most appropriate theory for investigating the behavioral intention of e-government use and adoption. By relying on the most prevalent e-research findings, the model can be more adaptable to a wide range of e-government systems. Designing and testing a model is the main goal behind this study. Firstly, a comprehensive evaluation of e-government using the UTAUT model as a framework is performed. Secondly, an extended UTAUT model is proposed that incorporates all of the given factors.

To make up for these research gaps, the objective of this study is to examine how system trust and internet ethics affect citizens' sustainable adoption of e-government and investigate the moderating effect of internet ethics on system trust and SI, BI, and FC.

Taking northern Iraq's e-government services as an application area, a quantitative method of study is applied through a survey in Duhok Governorate to analyze their behavior and attitudes concerning the adoption of e-government. Al-Ababneh [29] claims that quantitative research produces knowledge by examining things that can be measured in some manner. The abovementioned context provides the motives and rationale for this study. Therefore, the author recommends that adopting e-government will benefit through research in the previous studies and literature on innovation technology adoption. That is essential since there is limited theoretical knowledge and awareness of the most prominent complications and challenges facing the citizens' acceptance of e-government services, especially in northern Iraq. Considering this context, the current study plans to answer the two main research questions:

RQ1. What constructs have the most impact on the behavioral intention of e-government in northern Iraq?

RQ2. Does the Internet ethics construct moderate the relationship between the TOS construct and the SI, FC, and BI constructs?

To understand and achieve the study's objectives better, this study is organized as follows: an overview of the theoretical background is presented in Section 2. Section 3 highlights research and design hypotheses. Section 4 describes the materials, research model, and methods, followed by Section 5, which highlights the statistical analysis of the data and results. Finally, the discussion, theoretical and practical implications of this study, conclusion, and limitations and future studies will be explained in Sections 6–9, respectively.

## 2. Theory Background

Sustainable e-government services should help governments achieve their goals and be cost-effective in service quality, acceptance and adoption, and operational efficiency [1]. It has long-term benefits and adaptability to changing technology. Sustainable e-government service can be defined as: "All users can participate in e-government services that are cost-efficient, flexible and effective, and that encourage participation and satisfaction". Technology adoption research shows many factors that influence people's behavioral intentions when using different technologies. The UTAUT model is designed based on a set of eight theoretical models, namely: Reasonable Action Theory (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TBP), the combination of technology acceptance and planned behavior models, and the UTAUT model, as well as computer use (MPCU), diffusion theory of innovation (DOI), and social cognitive theory (SCT). The Unified Theory of Technology Acceptance and Use (UTAUT) is a well-established model for explaining user intent to use information systems and usage behavior [30]. The UTAUT aims to explain user intentions to use an information system and subsequent usage behavior. Venkatesh et al. [25] created the Unified Theory of Acceptance and Usage of Technology model in 2003, eliminating the drawbacks of the TAM model, and it incorporates social factors and human behaviors. It also identifies the critical factors for ICT acceptance with behavioral intention to use the technology and the actual usage [31]. It was found that TAM and its extensions can only predict up to 40%, while UTAUT can predict 70% of technology acceptance [32]. In addition, Venkatesh et al. [25] claim that the UTAUT model is preferred to other theoretical models since it calculates a higher variance

in the use intention ( $R^2$ ). The theory is formulated with four primary determinants of intent and use, namely: performance expectation, effort expectation, social impact, and facilitation of conditions.

- Performance expectation (PE)—the individual believes that system will help them to improve their job performance;
- Effort expectancy—how easy an individual believes the system will be to help them to do their jobs;
- Social influence (SI)—whether the individual is concerned about the opinion of external parties;
- Facilitating Conditions (FC)—whether the individual has personal knowledge and institutional resources.

Lee et al. [33] in their study found that perceived enjoyment might be an antecedent variable for effort expectancy and performance expectancy. Cyber-loafing is a dependent variable for social influences, effort expectancy, and performance expectancy that may affect user behavior. According to Williams et al. [34], the analysis of 174 research papers was mainly used to research the acceptance and adoption of technology in e-government, e-commerce, e-learning, and e-banking. TAM has been the most debated, with UTAUT among the eight contributing theories and models. Gupta et al. [35] utilized UTAUT to study the factors influencing adoption of payments banks by Indian customers. According to the findings, the UTAUT model is able to explain 67.5 percent of the variance in behavioral intention. The results show that the most important factors explaining the intention to adopt the services of payment banks are perceived credibility and facilitating conditions, followed by effort expectancy, social influence, and performance expectancy. Al-Shafi and Weerakkody [36] investigated the constructs influencing the adoption of e-government in Qatar. They discovered that EE and SI affect citizens' intentions to utilize e-government services. Furthermore, a modified UTAUT model was applied by Al-Awadhi and Morris [37] to identify the factors that influence e-government adoption in Kuwait. The research provides useful insights into the motivations behind the intent to use e-government services in developing countries such as Kuwait. They noted that the adoption of e-government services can be affected by many factors, including awareness, trust, and technical issues. Carter et al. [38] proposed the Extended Theory Reason Action (TRA) model as a conceptual basis by adding trust in the Internet, government trust, and risk perception. According to the findings, and with regard to trust, the results of the study indicated that citizens' perceptions of Internet safety and security are an integral part of e-government adoption. Therefore, the government needs to use trust-building strategies to increase citizens' trust in e-services, as trust in the Internet positively and directly affects the adoption of e-government.

Lněnička et al. [39] extended UTAUT with extra variables: voluntariness of use, system quality, information quality, data quality, and trust. The study results indicate that all constructs except effort expectancy, voluntary use, and information quality have a significant relationship with behavioral intention to use. The extended UTAUT model includes perceived risk and system trust. The study revealed that citizens' trust in government (TOG) and trust in the Internet (TOI) positively impact e-government adoption. Moreover, there is a negative correlation between perceived risk and citizens' adoption of e-government. According to Thomas and Streib, [40] ethical issues and education are significant predictors for explaining the utilization of government websites among internet users. Kurfal et al. [27] said that the UTAUT model was found to have a beneficial effect on behavioral intention to use when combined with the internet and government trust. Both trust elements were found to benefit E-government service users' performance expectations. Through the results of the study, it was revealed that citizens' trust in the Internet is a prerequisite for using e-government services in Turkey.

Consequently, Voutinioti [41] identified government trust, Internet trust, and social influence as significant drivers that directly or indirectly affect user intent. Mensah and Adams [42] extended the UTAUT model by adding political trust. The finding indicated that

political trust influences both international and Chinese students' social effects and performance expectations. However, through applying the extended UTAUT model, Saparudin et al. [43] found a substantial link between social influence, performance expectations, effort expectations, and system trust in behavioral intentions. Additionally, Kuo and Hsu [44] claim that system trust determines performance, effort, and social influence expectations. Moreover, self-efficacy is an essential individual variable that has received increasing attention in software piracy ethics research. Wang et al. [45] found that online ethical self-hacking can enhance the positive (moderate) relationship between perceived value and purchase intent. Alder et al. [46] pointed out that the relationship between adverse outcomes and violating privacy with trust in the organization is moderated by ethical formalism. This study deals with the adoption of e-government in the developing region of northern Iraq through understanding the practice and identifying the main issues that can affect the adoption of the system. The authors argue that the most important factor affecting the adoption and diffusion of online public services in developing countries is trust in the system and Internet ethics, especially in Iraq. Due to the spread of administrative corruption in the state, exploitation of personal information, the inadequate relationship between the citizen and the government, and political instability resulting from sectarian and ethnic conflicts, such realities are appropriate and timely matters.

### 3. Research Hypotheses and Design

#### 3.1. System Trust, Internet Ethics, UTAUT, and E-Government Adoption

A system's trustworthiness is measured by the degree to which citizens believe the system is a dependable means of obtaining e-government services. Researchers Kurfali et al. [27] and Al-Sobhi et al. [47] discovered that government trust and distrust concerns are significant contributors. According to the authors, it is vital to clarify that trust is a crucial issue that impacts citizens' behavioral intentions toward e-government adoption to fight conflict of opinion. Almaiah and Nasereddin [48] extended UTAUT with government trust, internet trust, and website quality. The results indicate that all combinations of UTAUT except social influence positively affect the behavioral intention to use e-government services. However, trust in government, online trust, and quality also positively impact the intent of behavior to use e-government. The findings of Al Mansoori et al. [49] show that trust in the internet and expectations about how well e-government services will work are the best predictors of whether people will use them. Moreover, expected efforts, facilitating conditions, and system trust, except for social influence, positively affect behavioral intention. According to Morgeson et al. [50], e-government users have no higher expectations for their interactions with government agencies or a stronger sense of satisfaction. The use of e-government may boost public confidence in the institutions with which they interact [47]. Khasawneh et al. [51] state that system trust is the most important aspect in determining citizens' use and adoption of the e-government system. Lin [52] claims that internet ethics is the study of whether the internet benefits humanity. The internet is used by humans for various purposes, including information exchange, search, and storage. According to Ramadhan et al. [53], the ethics of the internet are a collection of principles that demonstrate the protection of freedom of expression, privacy, and intellectual property in cyberspace while defining the immorality and morality of the latter environment. The ethics of e-government can be described as using the e-government system, updating or entering content into the system, and obtaining information [53]. According to Gajendra and Wang [54], e-government ethics are an ethical guide for using electronic signatures and electronic records in government and public institutions. This improves service delivery, provides better management, and increases transparency. Mullen and Horner [55] indicated that there are obstacles to ethical behavior in e-government, represented in the lack of understandable and reliable rules, and a digital divide which are the same problems that beset e-business. In developing the e-government project, Al-Sebae and Abu-Shanab [26] highlighted the necessity of addressing ethical concerns at all phases of the process: design, implementation, and operation. Moreover, trust represents an aspect of ethics [56]. There-



fore, this study proposes the following four hypotheses to explain the positive relationship between system trust and behavioral intentions, performance expectations, and social effects, as well as internet ethics and behavioral intention to use e-government services:

**Hypothesis 1 (H1).** *Trust in the system can positively impact behavioral intentions.*

**Hypothesis 2 (H2).** *Trust in the system can positively affect the SI.*

**Hypothesis 3 (H3).** *Trust in the system can positively impact performance expectancy.*

**Hypothesis 4 (H4).** *Internet ethics can positively impact behavioral Intention.*

### 3.2. Moderating Effect of Internet Ethics

This research investigates the moderating impact of ethics on the relationship between system trust and performance anticipation, social influence, and behavior intention. Citizens are more inclined to use e-government if they have enough confidence in the project. However, cyber-ethical challenges erode trust in e-government services. As a result, we aim to determine whether cyber ethics moderate the relationship between system confidence and citizens' expectations of using e-government. Citizens are more encouraged to adopt e-government services if they have the same confidence level in the government or the internet. Self-efficacy is also an essential individual variable that has received considerable attention in researching software piracy ethics [18,44]. Ramadhan et al. [53] defined the ethics of the internet as a collection of principles that demonstrate the protection of freedom of expression, privacy, and intellectual property in cyberspace. According to Social Cognitive Theory (SCT), individuals with high self-efficacy believe they can perform well and have a tendency to see hardships as something that can be mastered rather than something to be avoided. Findings by Wang et al. [45] indicate that the perceived pleasure, benefit, fee, and moral self-efficacy of online hacking have a significant effect on perceived value. Ethical self-efficacy can also make the moderate relationship between perceived value and purchase intent even stronger. Moreover, Akbar [57] explained that implementing electronic procurement and internal government controls significantly prevents fraud. Furthermore, there is a moderate positive role of organizational ethical culture in the relationship between the implementation of electronic procurement and fraud prevention. Fuad et al. [58] extended the UTAUT model to study the fund management system through the moderating role of Islamic business ethics. The study found that all constructs except effort expectancy affected the citizens' behavior. At the same time, only work expectations can be modified (moderated) by the Islamic work ethic. Through an empirical study of a simulated shopping website, Yang et al. [59] found that consumers trust the site when they feel that it maintains good ethical performance for e-commerce. It is important to note that moral issues are closely related to social accountability and morality. Generally, religions require people not to engage in immoral activities [60]. For that reason, ethical issues are fundamental determinants of an individual's intent to adopt a new system, especially in a diverse religious country such as Iraq. This study needed to analyze the moderating effect of ethics on the constructs that determine the intent to use e-government. In this context, the present paper aims to advance knowledge of the potential moderating effect of the ethics of the internet on the trust of the system on the PE, SI, and intention to use e-government (BI). In light of the scant literature on this moderating influence, it was included through the following propositions:

**Hypothesis 5 (H5).** *Internet ethics have a positive moderating effect on the relationship between TOS and BI.*

**Hypothesis 6 (H6).** *Internet ethics have a positive moderating effect on the relationship between TOS and SI.*

**Hypothesis 7 (H7).** *Internet ethics have a positive moderating effect on the relationship between TOS and PE.*

### 3.3. UTAUT and E-Government Adoption

In information technology adoption and acceptance, UTAUT is commonly used as the classic information technology and information system acceptance model. Maznorbalia and Awalluddin [61] studied the main factors that influence the behavior of Malaysian citizens in approving e-government services based on the UTAUT model. The findings indicate that UTAUT's original constructs known as "performance expectancy", "effort expectancy", "facilitating conditions", and "social influence" have a positive and significant impact on the behavior intention to use. Consequently, the study by Alabbodi and Shaban [62] applied the UTAUT model to investigate the factors that affect e-government adoption in the ministry of higher education in Iraq. The findings indicate that all UTAUT original constructs influence behavioral intention. Moreover, facilitating conditions and behavior intent considerably impact behavior use. Additionally, Gupta [35] found that UTAUT constructs directly determine the behavioral intention to adopt a payments bank by an Indian customer. Al-Shafi studied e-government adoption in Qatar and Weerakkody [36]. People's intention to use e-government services is influenced by both EE and SI. It can be said that those intentions affect the actual use of services. A more knowledgeable user's short-term impact on performance expectations and usage intention is boosted by their more significant online expertise. The researchers mentioned above noted that the original UTAUT constructs significantly impact the intention to use and adopt e-government services, especially in developing countries. Therefore, the four hypotheses listed below were suggested.

**Hypothesis 8 (H8).** *Facilitating conditions positively influence the behavioral intention to use e-government services.*

**Hypothesis 9 (H9).** *Effort expectancy positively influences the behavioral intention to use e-government services.*

**Hypothesis 10 (H10).** *Performance expectancy positively influences behavioral intention to use e-government services.*

**Hypothesis 11 (H11).** *Social influence positively influences behavioral intention to use e-government services.*

### 3.4. Demographic Variables

#### 3.4.1. Age

Venkatesh et al. [25] reported that increased lifespan is associated with the allocation of attention to job-related information and difficulty in processing complex stimuli that may be necessary when using software systems. Furthermore, the results demonstrated the moderate and significant influence of age on behavioral intention, adoption, and use behaviors. Al-Jamal and Abu-Shanab [63] indicated that age, which represented demographic factors, usefulness, and simplicity play a major role in electronic government service's expecting intent. Empirical studies show that age considerably influences the behavioral intention for adopting and using technology-related applications (see Camilleri [64], Mensah and Mi [65]). Furthermore, Mensah and Mi [66] showed in their study that age as a demographic factor had a positive and significant effect of computer self-efficacy on intent

for using e-government services. However, age does not directly influence the behavior intention for using the e-government system.

To clarify the effect of age on the intention of behavior in adopting and using e-government, the researchers propose the following hypothesis:

**Hypothesis 12 (H12).** *The age difference would have a significant impact on the behavioral intentions for using e-government services.*

#### 3.4.2. Gender

Khasawneh et al. [51] indicated in their study that demographic variables have a significant impact on confidence factors. The gender factor significantly affected perceived confidence and individual use of the Internet. Empirical studies show that gender significantly influences the behavioral intention to adopt and use technology-related applications (see Rodrigues et al. [67], Camilleri [64]). The results of (Mansoori et al. [49], Mensah and Mi [65]) studies indicated that gender poses less impact on the intention and behavior of technology use and adoption in both regulatory and e-government contexts.

To clarify the effect of gender differences on the intention of behavior in using and adopting e-government, the researchers propose the following hypothesis:

**Hypothesis 13 (H13).** *Gender differences would have significant impact on behavioral intentions for using e-government services.*

#### 3.4.3. Study Qualification

Weerakkody et al. [68] revealed that the level of adoption varies from country to country due to the demographic gap, levels of education, and experiences of using technology (the Internet), while some scholars researched the role of study qualification in the adopting and using of ICTs (see Sharma, [69], Venkatesh et al. [70]). The results of these studies indicated that study qualification (educational level) plays a substantial role in the intention and behavior of technology use and adoption of e-government portals. To clarify the influence of study qualification differences on the intention of behavior in adopting and using e-government, the researchers propose the following hypothesis:

**Hypothesis 14 (H14).** *Study qualification differences would have a significant impact on behavioral intentions for using e-government services.*

#### 3.5. The Proposed Conceptual Research Model

The model for analyzing the role of system trust and Internet ethics in extending the UTAUT model and e-government adoption is proposed based on the literature mentioned above (Figure 1).



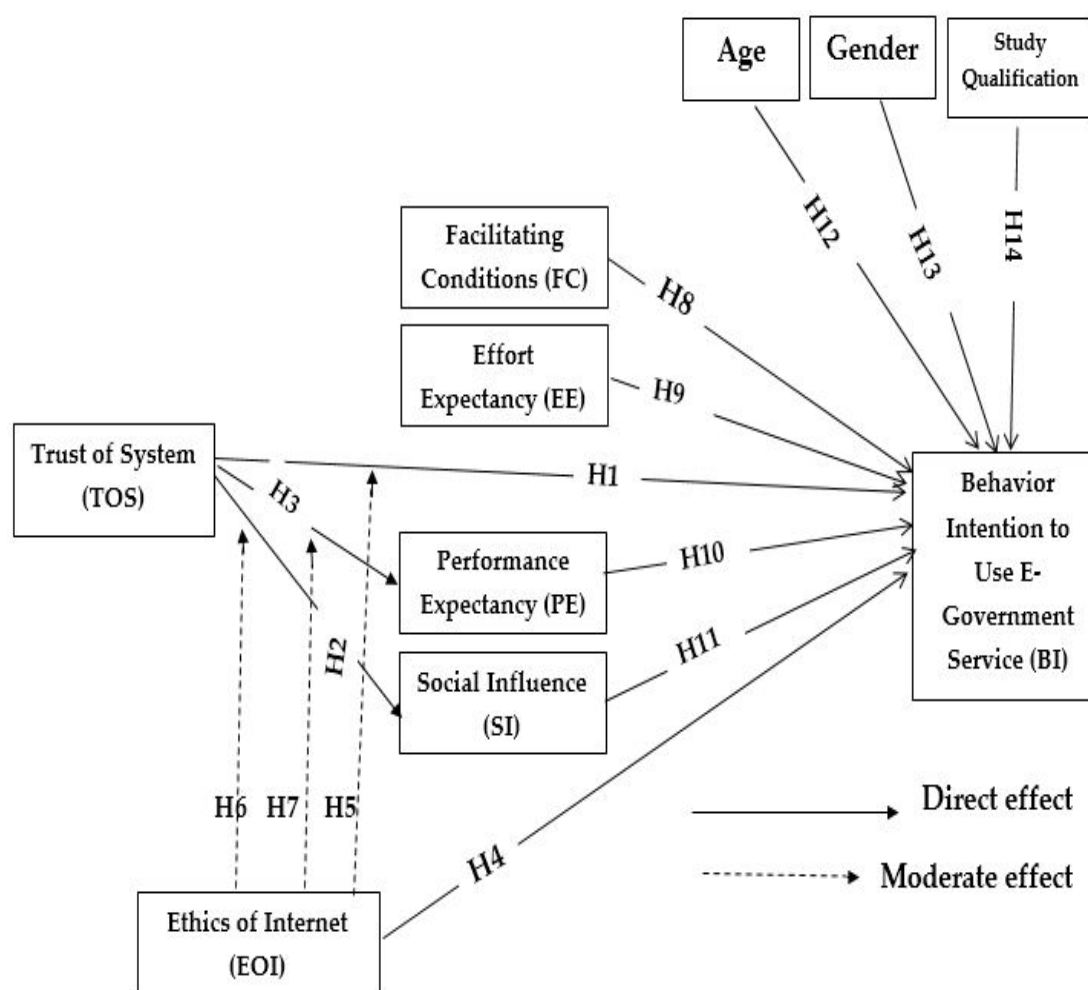


Figure 1. Research Model.

#### 4. Materials and Methods

Quantitative research methods were used to measure the factors affecting citizens' behavior in adopting the e-government system. The study was applied through a survey in the governorate of Duhok to analyze their behavior and attitudes regarding the adoption of the system. Questionnaire methodology is the most widely used research method in quantitative studies. Questionnaires were performed on the entire study population. Participants were asked to answer questions that best reflect their views and opinions on different topics, such as the issues at hand [71]. This technique is frequently used for primary data collection due to its simplicity. In contrast to structured questions, unstructured questions are either open-ended questions or feature multiple-choice alternatives within a range [72]. In addition, it is easy to administer questionnaires to a large number of individuals. A total of 371 citizens from Duhok Governorate, northern Iraq, participated in the study. Using a 5-point Likert scale, participants were asked to rate each item on a scale of one to five, with one being the most strongly disagreeing, three being neutral, and five being the most strongly agreeing.

##### 4.1. Study Sample and Procedure

The study sample consisted of citizens of Duhok Governorate, northern Iraq. According to the Central Bureau of Statistics in Iraq for the year 2020, the population over the age of 18 was estimated at (800,000) citizens. The questionnaire was distributed to various government agencies, employees of private IT companies, teachers, students, university professors, and specialists in information technology. The study sample size consisted of

(400) citizens in Duhok governance, based on Yamane's minimum sample size calculator (Yamane, 1976; p. 886) at 95% confidence. In addition, demographic considerations influenced citizens' adoption of e-government. This study identified several demographic characteristics of participants. The questionnaire was divided into two sections; the first contained multiple-choice questions about the respondent's personal information. The second section contained questions using a 5-point Likert scale (i.e., strongly disagree to agree strongly). Since English is not the first language spoken in northern Iraq, the questionnaire was written in Kurdish. Then, it was translated from English to Kurdish and then from Kurdish to English. After designing and developing the questionnaire, a pilot study was conducted with management information systems and IT researchers. According to Taherdoost [73], instructions for completing a survey should be straightforward, polite, exact, and explicit. Piloting a questionnaire (testing a small number of people representative of the sample) is critical since it can reveal ambiguities and other potential difficulties. In addition to the demographic information, the final questionnaire contained seven measures.

#### 4.2. Respondents' Profiles and Response Rates

The survey questionnaire was distributed to 400 citizens. Out of 400 questionnaires, 100 were distributed manually in hard copies, while 300 were distributed via Microsoft and Google Forms using WhatsApp, Viber, and Facebook, and 400 responses were received. Out of 400 completed questionnaires, 29 were ignored because many respondents left questions unanswered or provided two answers to the same question. This indicated that 371 viable responses were obtained from 400 distributed questionnaires and were used for future analyses. In this study, the overall response rate was 92.75%. Table 1 shows the demographic profile of the 371 usable responses, and the results show that 52.6% of the respondents were male. The age range of respondents was 18–31 years (67.3%). The education level of 60.6% of respondents mainly was a bachelor's degree. Most people in this study have used e-government (87.1%) in the Duhok Governorate, northern Iraq. They used the internet daily (83.8%). The overall response rate is 92.75%, which is very high in information systems research.

**Table 1.** Descriptive Statistics for Demographic Questionnaire.

Demographic Distribution of Respondents		F	Percent (%)
Education	PhD	37	10%
	Master	78	21%
	Bachelor	131	35.3%
	Diploma	94	25.3%
	High school	31	8.4%
Age	from 18–24	117	31.5%
	from 25–31	133	35.8%
	from 32–38	64	17.3%
	from 39–45	40	10.8%
	more than 45	17	4.6%
Gender	Male	195	52.6%
	Female	176	47.4%
Internet usage	Daily	311	83.8%
	Weekly	60	16.2%
	Monthly	0	0
	Yearly	0	0
Use Of E-GOV	YES	323	87.1%
	NO	48	12.9%

#### 4.3. Measurements Items

Consequently, a representative sample of citizens was surveyed using a quantitative research method to determine their views on e-government. SPSS 24 was used to evaluate the data in a statistically based manner. The research paradigm proposed in this study was tested by conducting a questionnaire survey. Many previous studies served as a foundation for the current research, including Khasawneh et al. [51], Venkatesh et al. [25], Alomari et al. [74], and Al-Shafi and Weerakkody [36]. The model contained seven variables. The five items collected from those studies were used to calculate the PE, SI, EE, FC, and BI. Furthermore, EOI and TOS items were collected from Khasawneh et al. [51], Alomari et al. [74], Alammar [75], Alsultanny [76], Hashim and Hassan [77]. Appendix A shows all the items with references.

### 5. Results and Findings

#### 5.1. Model Measurement

Cronbach's alpha was used to determine the consistency of the questionnaire using reliability analysis (see Table 2). Excellent (0.90 and above), high (0.70–0.90), moderate (0.50–0.70), and low (0.50 and below) are the four cut-off reliability points [78]. The performance expectancy (PE) has excellent reliability. The other six combinations in our model have high reliability, and all variables together have excellent reliability. Construct validity was created using Principal Component Analysis (PCA) with the varimax rotation method. Communalities are the variance of the original variables that are computed by solving the factors. The factor solution should explain at least half of the variance of each original variable. Therefore, the communality value needs to be 0.50 or higher for each variable [79]. This proves that the types of construct validity exist in the survey tool. The convergent validity achieving ensures that the construct must be related, as shown in Table 2:

**Table 2.** Results of Reliability and Validity.

Con.	Item	Loading Factor	Cronbach's Alpha (a)	Con.	Item	Loading Factor	Cronbach's Alpha (a)
PE	PE3	0.928	0.90	BI	BI5	0.843	0.87
	PE4	0.910			BI2	0.824	
	PE5	0.823			BI1	0.816	
	PE2	0.791			BI4	0.6805	
	PE1	0.782			BI3	0.788	
EE	EE5	0.860	0.85	EOI	EOI4	0.868	0.88
	EE3	0.807			EOI5	0.858	
	EE2	0.805			EOI3	0.827	
	EE4	0.803			EOI1	0.808	
	EE1	0.681			EOI2	0.800	
SI	SI1	0.863	0.88	TOS	TOS5	0.842	0.88
	SI2	0.847			TOS3	0.822	
	SI3	0.838			TOS1	0.798	
	SI4	0.828			TOS2	0.794	
	SI5	0.727			TOS4	0.790	
FC	FC5	0.829	0.80				
	FC4	0.780					
	FC2	0.724					
	FC1	0.706					
	FC3	0.666					

### 5.2. Correlation, Mean, and Standard Deviation

The means and standard deviations of the items are shown (Table 3) in descriptive analysis for all study combinations in the research. The average score for Performance Expectancy in the study is 4.39 (PE). Effort Expectancy (EE) is 4.35, and Social Influence is 4.30. (SI); 4.32 for Behavioral Intention to Use (BI) and 4.33 for Facilitating Conditions (FC); 4.31 for Internet Ethics (EOI), and 4.26 for System Trust (TOS). For all items (PE, EE, SI, FC, BI, EOI, and TOS), all responders' responses are close to "agree", and the mean is close to 4, which is a reasonably high value.

**Table 3.** Correlation matrix between independent variables.

	PE	EE	SI	FC	EOI	TOS	BI
PE	1						
EE	0.863 **	1					
SI	0.823 **	0.849 **	1				
FC	0.823 **	0.826 **	0.814 **	1			
EOI	0.837 **	0.865 **	0.853 **	0.861 **	1		
TOS	0.879 **	0.863 **	0.827 **	0.832 **	0.886 **	1	
BI	0.842 **	0.853 **	0.842 **	0.861 **	0.887 **	0.852 **	1
Mean	4.39	4.35	4.30	4.33	4.31	4.26	4.32
S.D.	0.75	0.65	0.54	0.66	0.50	0.57	0.54

\*\* Correlation is significant at the 0.01 level (2-tailed).

### 5.3. Demographic Differences

Independent sample one-way ANOVA and the *t*-test were applied for analyzing the relationship between the dependent variables such as (BI), and independent variables such as gender, age, and education level. The independent sample *t*-test compares the mean between two variables, while one-way ANOVA compares the mean between more than two variables [79].

Table 4 shows no significant statistical difference between the mean of male and female for BI because their *p*-value (0.266) is higher than  $\alpha = 0.05$ . Based on the results, H13 is not supported.

**Table 4.** Independent Sample *T*-Test between gender and dependent variable BI.

	Gender	N	Mean	Std. Deviation	T	<i>p</i> -Value
BI	Male	195	4.36	0.55	1.113	0.266
	Female	176	4.28	0.71		

Table 5 shows a considerable difference between age group for BI because the *p*-value (0.002) is less than  $\alpha = 0.05$ . Based on the results, H12 was supported.

**Table 5.** Independent Sample *T*-Test between age and dependent variable BI.

		N	Mean	Std. Deviation	F	<i>p</i> -Value
BI	18–24 years	120	4.4598	0.41710	4.217	0.002
	25–31 years	144	4.3278	0.63501		
	32–38 years	51	4.2563	0.59678		
	39–45	39	4.0100	0.99326		
	More than 45 years	17	4.4235	0.71022		
	Total	371	4.3272	0.63449		

Table 6 shows a significant difference between level of education with BI because their *p*-value (0.001) is less than  $\alpha = 0.05$ . Based on the results, H14 was supported.

**Table 6.** Independent Sample *T*-Test between level of education and dependent variable BI.

		N	Mean	Std. Deviation	F	<i>p</i> -Value
BI	PhD	37	4.5514	0.29592	7.118	0.001
	Master	78	4.3667	0.28177		
	Bachelor	131	4.4519	0.27354		
	Diploma	94	4.0660	1.02292		
	High school	31	4.2258	0.85439		
	Total	371	4.3272	0.63449		

#### 5.4. Regression and Hypotheses Tests

To verify the validity and reliability of the measurement model, it was necessary to examine the relationships between the various components. SEM (structural equation modeling) was used to analyze all hypothesized correlations between components, as shown in this section. H1 was tested using simple regression analysis. Table 7 shows a positive correlation between the independent variable TOS and dependent variable BI. Based on Pearson's correlation analysis, the positive relationship between TOS and BI is (0.85), and it supports H1. So, the model is appropriate based on:  $F = 974.16$  and  $p$ -value = 0.001. Given the results ( $B = 0.780$ ) and ( $R^2 = 0.72$ ), 72% of the BI variation is determined by independent variable TOS.

**Table 7.** Simple Regression Analysis between TOS and BI.

	B	t	<i>p</i> -Value	$R^2$	Correlation	F	<i>p</i> -Value	Result
Constant	1.005	9.322	0.001	0.72	0.85	974.16	0.001	Supported
TOS	0.780	31.211	0.001					

The second hypothesis examined the effect of TOS on SI. Table 8 shows the positive relationship between TOS and BI, which is 0.83, which supports H2. Therefore, the model is suitable based on:  $F = 799.49$  and  $p$ -value = 0.001, where  $B = 0.85$  and  $R^2 = 0.68$ , reflecting that 68% of the PE variance is determined by the independent variable TOS.



**Table 8.** The relationship between TOS and SI.

	B	t	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	0.67	5.22	0.001	0.68	0.83	799.49	0.001	Supported
TOS	0.85	28.28	0.001					

As shown in Table 9, the third hypothesis tested the effect of TOS as an independent variable on dependent variable PE. TOS had a direct positive influence on PE (0.88) that supports H3. So, the model is appropriate based on:  $F = 1258.21$  and  $p\text{-value} = 0.001$ , where  $B = 0.90$  and  $R^2 = 0.77$ , which reflects that 77% of the PE variation is determined by independent variable TOS.

**Table 9.** Simple Regression Analysis between TOS and PE.

	B	t	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	0.558	5.083	0.001	0.77	0.88	1258.21	0.001	Supported
TOS	0.90	35.47	0.001					

Table 10 shows that a positive correlation between the independent variable EOI and the dependent variable BI is 0.87 supporting H4. Therefore, the model is appropriate based on:  $F = 1357.82$  and  $p\text{-value} = 0.001$ , where  $B = 0.80$  and  $R^2 = 0.78$ , which reflects that 78% of the BI variation is determined by independent variable EOI.

**Table 10.** The relationship between EOI and BI.

	B	T	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	0.879	9.268	0.001	0.78	0.87	1357.82	0.001	Supported
EOI	0.80	36.84	0.001					

In Table 11, it can be seen the test of H8. From the correlation analysis, the positive relationship between FC and BI is 0.86 which supports H8. So, the model is appropriate based on:  $F = 1057.43$  and  $p\text{-value} = 0.001$ , where  $B = 1.01$  and  $R^2 = 0.74$ , which reflects that 74% of the variation of BI is determined by independent variable FC.

**Table 11.** Simple Regression Analysis between FC and BI.

	B	T	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	−0.051	16.15	0.705	0.74	0.86	1057.43	0.001	Supported
FC	1.010	17.02	0.001					

The positive relationship between EE and BI is 0.85 which supports H9, as shown in Table 12. Accordingly, the model is appropriate based on:  $F = 989.2$  and  $p\text{-value} = 0.001$ , where  $B = 0.830$  and  $R^2 = 0.73$ , which reflects that 73% of the variation of BI is determined by independent variable EE.

**Table 12.** The connection between EE and BI.

	B	T	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	0.717	6.180	0.001	0.73	0.85	989.2	0.001	Supported
EE	0.830	31.45	0.001					

H10 and H11 examine the relationships between PE, SI, and BI. As shown in Tables 13 and 14, PE and SI had a favorable direct effect on behavioral intention ( $B = 0.84$ ,  $p$ -value = 0.001). Thus, H10 and H11 were accepted.

**Table 13.** The connection between PE and BI.

	B	T	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	1.018	9.123	0.001	0.71	0.842	902.43	0.001	Supported
PE	0.752	30.04	0.001					

**Table 14.** Simple Regression Analysis between SI and BI.

	B	t	p-Value	R <sup>2</sup>	Correlation	F	p-Value	Result
Constant	1.112	10.23	0.001	0.71	0.84	900.82	0.001	Supported
SI	0.747	30.01	0.001					

### 5.5. Moderation Analysis

Two conditions must be met to support moderation [80]. The causal predictor variable must first predict the dependent variable (Step 1). Second, compared to the non-interaction model, the interaction model (Step 3) must explain more variance in the dependent variable (Step 2). Moderation is recommended if either of these conditions is met. An alpha of 0.05 was used to assess the regression. The TOS predicted PE with a significant level of accuracy ( $B = 0.90$ ,  $t(369) = 35.47$ ,  $p = 0.001$ ). As a result, the first criterion was satisfied, and the second condition was verified. A partial F-test was used to determine whether the interaction model explained more variance in PE than the non-interaction model. Based on an alpha of 0.05, the partial F-test revealed that the interaction model explained considerably more variation than the non-interaction model ( $F(1,367) = 104.94$ ,  $p = 0.001$ ).

As a result, the second criterion was fulfilled. Because TOS significantly predicted PE in the simple effects model (condition 1), and the interaction model explained significantly more variance in PE than the non-interaction model (condition 2), moderation is supported, which supports H7 that EOI significantly moderates the effect of TOS on PE. Tables 15 and 16 show that EOI was dichotomized into high and low categories using a median split to visualize the moderation analysis. An alpha of 0.05 was used to analyze the regressions. The TOS predicted SI with a significant level of accuracy ( $B = 0.85$ ,  $t(369) = 28.28$ ,  $p = 0.001$ ). Consequently, the first criterion was satisfied, and the second condition was verified. Based on an alpha of 0.05, the partial F-test revealed that the interaction model explained considerably more variation than the non-interaction model ( $F(1,367) = 52.31$ ,  $p = 0.001$ ).

Accordingly, the second criterion was fulfilled. Because the TOS predicted SI in the basic effects model (condition 1), and the interaction model explained much more SI variation than the non-interaction model (condition 2), moderation is supported, which supports H6. Table 17 shows the results of the simple, non-interaction, and interaction models. The non-interaction and interaction models are compared in Table 18. Based on an alpha 0.05,  $B = -0.23$ , and  $t(367) = -7.23$ ,  $p = 0.001$ , EOI reduced the effect of TOS on SI considerably. This means that a one-unit increase in EOI causes an average decrease of 0.23. Furthermore, TOS predicted BI with a significant level of accuracy,  $B = 0.78$ ,  $t(369) = 31.21$ ,  $p = 0.001$ . Consequently, the first criterion was satisfied, and the second condition was verified. Based on an alpha of 0.05, the partial F-test,  $F(1,367) = 100.67$ ,  $p = 0.001$ , the interaction model explained considerably more variance than the non-interaction model.

**Table 15.** Moderation Analysis Table with PE Predicted by TOS Moderated by EOI.

Predictor	B	SE	$\beta$	t	p
Step 1: Simple Effects Model					
(Intercept)	0.56	0.11		5.08	<0.001
TOS	0.90	0.03	0.88	35.47	<0.001
Step 2: Non-Interaction Model					
(Intercept)	0.43	0.11		3.93	<0.001
TOS	0.66	0.05	0.64	12.38	<0.001
EOI	0.27	0.05	0.27	5.20	<0.001
Step 3: Interaction Model					
(Intercept)	4.52	0.02		235.90	<0.001
TOS	0.38	0.05	0.37	7.12	<0.001
EOI	−0.12	0.06	−0.12	−1.98	0.049
TOS:EOI	−0.28	0.03	−0.67	−10.24	<0.001

**Table 16.** Linear Model Comparison Table between the Non-Interaction and Interaction Model.

Model	R <sup>2</sup>	F	df	p
Non-Interaction	0.79			
Interaction	0.84	104.94	1	<0.001

**Table 17.** Moderation Analysis Table with SI Predicted by TOS Moderated by EOI.

Predictor	B	SE	$\beta$	t	p
Step 1: Simple Effects Model					
(Intercept)	0.67	0.13		5.11	<0.001
TOS	0.85	0.03	0.83	28.28	<0.001
Step 2: Non-Interaction Model					
(Intercept)	0.39	0.12		3.31	0.001
TOS	0.34	0.06	0.33	5.88	<0.001
EOI	0.57	0.06	0.56	9.98	<0.001
Step 3: Interaction Model					
(Intercept)	4.40	0.02		198.38	<0.001
TOS	0.12	0.06	0.11	1.88	0.061
EOI	0.25	0.07	0.25	3.62	<0.001
TOS:EOI	−0.23	0.03	−0.54	−7.23	<0.001

**Table 18.** Linear Model Comparison Table between the Non-Interaction and Interaction Model.

Model	R <sup>2</sup>	F	df	p
Non-Interaction	0.75			
Interaction	0.78	52.31	1	<0.001

As a result, the second criterion was fulfilled. Because TOS predicted BI in the basic effects model (condition 1), and the interaction model explained much more variance in BI

than the non-interaction model (condition 2), moderation is supported, which supports H5. Table 19 shows the results of the simple, non-interaction, and interaction models. The non-interaction and interaction models are listed in Table 20. Based on an alpha of 0.05,  $B = -0.24$ , and  $t(367) = -10.03$ ,  $p = 0.001$ , EOI considerably reduced the effect TOS had on BI. It means that a one-unit increase in EOI causes an average decrease of 0.24. EOI was dichotomized into high and low categories using a median split to visualize the moderation analysis. All EOI observations above the median were classified as high, and all observations below the median were classified as low.

**Table 19.** Moderation Analysis Table with BI Predicted by TOS Moderated by EOI.

Predictor	B	SE	$\beta$	t	p
Step 1: Simple Effects Model					
(Intercept)	1.01	0.11		9.32	<0.001
TOS	0.78	0.02	0.85	31.21	<0.001
Step 2: Non-Interaction Model					
(Intercept)	0.74	0.09		7.95	<0.001
TOS	0.28	0.05	0.31	6.18	<0.001
EOI	0.55	0.04	0.62	12.42	<0.001
Step 3: Interaction Model					
(Intercept)	4.43	0.02		269.16	<0.001
TOS	0.05	0.05	0.06	1.09	0.275
EOI	0.23	0.05	0.25	4.42	<0.001
TOS:EOI	−0.24	0.02	−0.63	−10.03	<0.001

**Table 20.** Linear Model Comparison Table between the Non-Interaction and Interaction Model.

Model	R <sup>2</sup>	F	df	p
Non-Interaction	0.81			
Interaction	0.85	100.67	1	<0.001

## 6. Discussion

This study provides valuable insights into the factors that influence the adoption of e-government processes for sustainable development. The results predicting the performance of the original UTAUT model indicate that facilitating conditions, performance expectancy, social influence, and effort expectancy are the determining factors that affect citizens' intention of using e-government, supporting the findings of [35,61,62]. According to the findings, UTAUT appears to be a suitable model for studying the acceptance and successful use of ICT in developing countries' governmental institutions. Furthermore, the findings show that the factor on which the UTAUT is extended, namely the trust system, positively influences citizens' behavioral intentions, social influence, and performance expectations regarding the sustainability of e-government, as supported by previous research [16,27,42–44], who found a substantial link between system trust and social influence, performance expectations, and behavioral intentions. The results provide evidence that internet ethics have a significant effect on citizens' behavioral intentions regarding the sustainability of e-government services. Moreover, the findings indicate that internet ethics affect the behavioral intentions of citizens regarding the sustainability of e-government services, which is consistent with the findings of [27,28,55], who found that ethical issues directly influence the intention of using e-services.

Furthermore, the moderating role of Internet ethics in the relationships between system trust and BI, SI, and PE was drawn from [80], who argues in support of the moderation. The

causal variable must first significantly predict the variable affiliate. The findings provide evidence that the ethics of the internet noticeably moderate the relationship between TOS and SI, FC, and BI, supporting the findings of [20,45,46,57]. Additionally, the results indicate that significant differences exist in age, level of education except gender, and behavioral intention in utilizing e-government services, as supported by the theoretical results of [64,65,69,70]. Regarding the non-influence of gender on behavior intention and effort expectancy, this may have resulted from similar educational backgrounds, degrees, training, and professions in information technology, as supported by the theoretical results of [49,65]. Concerning the hypotheses presented for the UTAUT model, the findings supported most of the hypotheses (H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, and H14) except H13, as shown in Table 21. The results support the model's predictive significance concerning latent variables. By summarizing all the results, we can deduce the main factors that affect the citizens' intention to adopt e-government services in northern Iraq. The results showed that the extended UTAUT constructs directly and positively impact the intention to use. The moderating role of Internet ethics in the relationship between TOS and SI, FC, and BI constructs was investigated, considering the answers to RQ1 and RQ2.

**Table 21.** Summary of Findings.

Hypothesis Number	Dependent Variables	Independent Variables	Moderators	Explanations
H1	behavioral intentions	Trust of system	None	Significant effect
H2	Social influences	Trust of system	None	Significant effect
H3	performance expectancy	Trust of system	None	Significant effect
H4	behavioral intentions	Ethics of Internet	None	Significant effect
H5	behavioral intentions	Trust of system	Ethics of Internet	EOI significantly moderates the effect of TOS on BI
H6	Social influences	Trust of system	Ethics of Internet	EOI significantly moderates the effect of TOS on SI
H7	performance expectancy	Trust of system	Ethics of Internet	EOI significantly moderates the effect of TOS on PE
H8	behavioral intentions	Facilitating conditions	None	Significant effect
H9	behavioral intentions	Effort expectancy	None	Significant effect
H10	behavioral intentions	Performance expectancy	None	Significant effect
H11	behavioral intentions	Social influence	None	Significant effect
H12	behavioral intentions	Age	None	Significant effect
H13	behavioral intentions	Gender	None	No Significant effect
H14	behavioral intentions	Study Qualification	None	Significant effect

## 7. Implications to Theory and Practice

This study presents empirical evidence for novel contributions to the practical and theoretical ramifications. In terms of theoretical implications, the UTAUT model was effectively developed and implemented in a new environment and context, namely, e-government in northern Iraq. Furthermore, the UTAUT was updated to include the most common characteristics that have yielded substantial outcomes in existing e-government research (i.e., trust in the system and ethical internet). Generally, the empirical results suggest that the conceptual model is more effective in understanding behavioral intention, especially in e-government adoption. To the best of our knowledge, this is the first study



to examine the factors that influence sustainable e-government adoption in northern Iraq. These issues would help top officials and decision-makers better understand how they shape the e-government infrastructure in the north of Iraq, and they would be more aware of how important they are. Furthermore, considering these aspects while building digital transformations, the insights presented here will expand the expertise of e-government applications. To maintain a positive intention towards using e-government systems, developers should develop applications that can work on various types of communication devices. On the other hand, internet accessibility, improved system performance of transactions, portal user-friendliness, system ease of use, and social sound play a considerable role in using e-services. Moreover, bank decision-makers should organize awareness campaigns to educate e-government users about the dangers of misusing e-government services. Finally, executive authorities should pay attention to ethical issues in cyberspace, such as maintaining the privacy and security of citizens' information. They should also try to avoid information piracy, block porn sites, and improve the security of their system to stop inappropriate ads from being shown.

## 8. Conclusions

The objective of the present study is to propose an extended UTAUT model by extending it to determine the factors. Moreover, this study builds a theoretical model that can be used to investigate and document the linkages between citizens' acceptance of e-government services and their expectations of their adoption and sustainability. The study methodology was adapted and developed by justifying and discussing a selection of quantitative study approaches to gather information in the context of e-government. After analyzing and assessing the factors that influence the intent to use e-government services (RQ1) in northern Iraq, we focused on the relevant constructs that have the most significant impact on behavioral intention. Additionally, two additional formulations, "Trust the System (TOS)" and "Ethics of the Internet (EOI)", in the original UTAUT formulations were adopted to identify the moderating role of Internet ethics in the relationship between the system trust construct and the SI, FC, and BI constructs (RQ2).

Furthermore, the study investigated the relationship between trust in the system and e-government performance expectations, as well as trust in the system and social influences in northern Iraq. Moreover, internet ethics have a moderating role in the relationship between trust in the system and performance expectancy, social impact, and behavioral intention. Data were collected via a survey-based questionnaire that was prepared and distributed to determine the intent of citizens' behavior and test and confirm the validity of the recommended research model. The study found that facilitating conditions, performance expectancy, effort expectancy, social influence, trust in the system, and internet ethics positively influenced the behavioral intent to use e-government services. Furthermore, the findings pointed out that EOI significantly moderated the effect TOS had on PE, SI, and BI. In addition, the results indicated significant differences in age, education level (except for gender), and behavioral intention towards e-government service use. The results of the study show that factors related to citizens' trust (system trust and internet ethics) are a prerequisite for the use and sustainability of e-government services. Therefore, policy makers must convince citizens that the system and internet technology are safe and reliable and that all security measures have been taken. Trust in the government affects the behavior of intent directly; therefore, the government should do anything to achieve and maintain its reputation in the eyes of the citizens. Finally, it was proven that citizens are more inclined to use e-government services when their social environment is encouraged; conditions are facilitated; and the system is user-friendly. If the primary priorities of citizens are revealed through the current study, which can be adequately fulfilled, the adoption and sustainability of e-government services are likely to increase significantly in northern Iraq. This study hopes to provide a framework through which the executive bodies and decision-makers in the government of northern Iraq can rely on, avoiding the most important obstacles that prevent the adoption of e-government in line with the requirements and desires of

citizens. Moreover, the study indicated that the best indicator of e-government users' intent to use the e-government system is the facilitation of conditions, followed by expected effort, internet ethics, design confidence, performance expectation, and social impact. Given these results, this study can provide adequate support to decision-makers in northern Iraq to deploy e-government.

## 9. Limitations and Future Studies

This study presents new experimentally supported theoretical and practical contributions, in addition to the effect of the moderation of internet ethics on the relationship between system trust and performance expectation, social influences, and behavioral intention to use an e-government service. The limitation of this study is that it did not take into account how the relationships between internet ethics, effort expectancy, and social impact operate. Future studies could consider other factors such as religious beliefs and norms and the moderation role of internet ethics in predicting efforts and their impact on the adoption of electronic services in developing countries. Furthermore, gender differences can also be evaluated in future studies.

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## Appendix A

**Table A1.** Items and Constructs.

Constructs	Items	Item Sources
Performance Expectancy	PE1 The online e-government system will be useful, once effective information and services are available on the portal	[25,36,51,74,75]
	PE2 With e-government, there is no need for government employees to be on call at all times.	[25,36,51,74,75]
	PE3 I will be able to complete duties more rapidly if I use the e-government system.	[25,36,51,74,75]
	PE4 E-government leads to reducing time of service and simplification of processes	[25,36,51,74,75]
	PE5 E-government allows citizens to quickly and easily obtain the information they need.	[25,36,51,74,75]
Effort Expectancy	EE1 Training in how to use the e-government system would make it much easier for me to use.	[25,36,51,74,75]
	EE2 Learning how to use the e-government system is simple for me, as long as the right techniques are taken into consideration.	[25,36,51,74,75]
	EE3 The e-government system is simple for me to learn how to use.	[25,36,75]
	EE4 I believe that I will have knowledge to access and use the system easily	[25,36,75]
	EE5 I would find the system easy to use, when i have clear guidelines	[25,75]

Table A1. Cont.

Constructs		Items	Item Sources
Social Influence	SI1	In the minds of those who have an impact on my actions, I should take advantage of the system	[25,51,75]
	SI2	I'm encouraged to use the system by those who have an impact on my life.	[25,36,51]
	SI3	A higher level of social standing is accorded people who use e-government to acquire their services.	[25,51]
	SI4	Senior government officials have been a great assistance in learning how to use the system.	[25,36,51]
	SI5	I find a shortage in the information and awareness campaigns (television, radio, newspapers, banners on government agencies' websites, and in commercial complexes) that we are obtaining from the stakeholders who are in charge of e-government.	[25,36,51]
Facilitate Condition	FC1	I have the resources necessary to use the online government system.	[25,74,75]
	FC2	I have enough Internet experience to use the e-government services.	[25,36,51]
	FC3	There is no doubt of the high government support towards the e-government project.	[25,36,51,74]
	FC4	I doubt the security and privacy measures provided with the e-government system.	[25,36,51]
	FC5	The system is compatible with other systems I use.	[25,51,75]
Behavioral Intention	BI1	I plan to use e-government services soon.	[25,36]
	BI2	I predict to use e-government services in a short time	[25,36]
	BI3	I intend to use e-government websites in a short time	[25,51,74]
	BI4	I like to interact with my government using the Internet through Iraqi Kurdistan region e-government portal	[25,36,51]
	BI5	I like to use online government services	[25,51]
Ethics of Internet	EOI1	I have a confidence on e-government and its services through the Internet	[51,74–76]
	EOI2	Religious beliefs and restrictions could discourage (prohibit) the use of some websites due to a number of ethical issues.	[76,77]
	EOI3	Internet abuse, such as spam ads, fraud, and nonsense articles that seriously interfere with other people's chances of obtaining useful information.	[74,76,77]
	EOI4	Privacy, security, electronic monitoring, collection, and use of personal information about consumers, identity theft, and many other issues related to cyberspace ethics discourage me to use online systems, as results from absent digital transformation law.	[76,77]
	EOI5	In general, I Confidence in e-government when it offers its services online in an ethical manner.	[74,76]
Trust in System	TOS1	I trust government's institutions and departments.	[51,74]
	TOS2	I trust government departments' abilities to provide e-services effectively and securely.	[51,74]
	TOS3	I trust the personal information that enters in e-government system will be handled securely	[51,74,75]
	TOS4	Reliable information contributes to the adoption of the use of e-government service.	[51,74]
	TOS5	I trust that citizen and their benefits that have the highest priorities at government's institutions and departments.	[51,74]

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