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MEASURING THE SUCCESS OF E-GOVERNMENT SYSTEMS: APPLYING THE SUCCESS MODEL OF THE DELONE AND MCLEAN INFORMATION SYSTEM

[11]ZAINAB AMIN AL-SULAMI, [2]HAYDER SALAH HASHIM

[1,2]Basra University, Basra-Iraq

E-mail: [1] rrr_livemoon@yahoo.com , [2] haydersalahm@gmail.com

ABSTRACT

The success model of an information system from an Iraqi citizen's perspective was utilized to examine the e-government system in developing countries, exclusively in Iraq's environment. Partial Least Square path modeling algorithm was applied as a fundamental technique to analyze the collected data using a questionnaire of 160 citizens in Iraq. The proposed model was developed by modifying the updated DeLone and McLean IS success model. The proposed model consisting of the previous six constructs from the updated D&M model was integrated with trust constructs. Results empirically corroborate that ten hypotheses among the seven constructs are supported significantly, whereas the other three are less supported. Model constructs are affirmed to affect the citizen intention and satisfaction positively. The impact gradually decreases from trust as the highest influence constructs, followed by service, system, and information qualities. Trust is confirmed as the main powerful construct that positively influences the Iraqi citizen's usage intentions. The managerial implications of these research results contend that the Iraqi government agencies, along with the system developers, must pay extra attention to the proposed model constructs that influence the citizen's intention to use an e-government system, specifically the construct of citizen trust.

Keywords: *e-government system, success model of DeLone and McLean, citizen trust, Iraqi citizens,*

1. INTRODUCTION

Technology has significantly influenced many essential parts of life through the rapid and easy exchange of communication and information. It allowed the further development of different sectors, such as technological, economic, and social sectors [1].From the government perspective, Information Technology (IT) allowed the emergence of e-governance as an advanced means to enhance the exchange of information between governments and citizens. E-governance is known as the usage of IT to supply any government citizens with the required services, enhance the public agencies' performance, and provide the successful participation of the citizens within the entire process of social and technical development [2].Substantially, e-government reduced service's delivery costs, sped up the service processing time, and enhanced the overall transformation of service and information. However, the importance of e-governance is not restricted on the IT implementations, but its influence permeates many different aspects in the actual life of governments and citizens. E-governance, along with the IT implantations (e.g., the public websites for online transformation and communication services), has utilized the technology aspect in a citizen's life and improved the service's delivery time, cost, and quality; however, it has somehow affected other undisclosed aspects of the communication natural between any citizens and their government (e.g., the trust dimension) [3]. From a holistic view, the success of e-governance relies on many aspects, such as IT implementations, financial aspect, and citizen's perspective. Many researchers studied the ICT implementations and the latter's effect on the success of e-government [4]. Others have further examined the economic and financial effects on e-government success as a significant investment [5].

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Hence, a few studies intensively examined the role of citizen's relationship with their governments and how this relation positively or negatively affected the success of e-government. Recent studies focus on the trust dimension that somehow facilitates the use behavior of citizens [6],[7].Hitherto, little consideration exists on how the e-government system considers successful adoption from the citizens' trust perspective [8].This empirical study aims to measure the success within the e-government system from a citizen's perspective. DeLone and McLean's updated model [9] has been used for this research. Unlike other models, the success model of DeLone and McLean is used to evaluate the effectiveness of ISs by measuring the six constructs of the model. Nevertheless, the D&M model was criticized for excluding trust construct in its conceptualization. The researchers justified their criticism by the importance of this construct in the measurement and evaluation of ISs [10], [11]. The data were collected from 156 citizens in Iraq using a questionnaire and were analyzed thereafter. The citizens were chosen randomly on the basis of their qualification level. The findings from this research could be deployed to measure the success of e-government application from citizens' view as the main users of e-government implementations in real-life activities and transactions.

2. RELATED WORK

2.1 E-Government

The term e-government is described as electronic supplier of data throughout the online interface. E-government allows governments to deploy new technology and adopt modern mechanisms to promote general public services [12]. However, the main purposes of implementing e-government can be justified by reorganizing the government organization's public services, enhancing service capacity, facilitating corporations within the top management, speeding up the communication and coordination between citizens and government, and simplifying the operations of financial transactions and public services [13]. Many researchers argued that governments that implement e-government technology can promote citizens trust, reduce time, save efforts, and respond to citizens' demands efficiently[14].Therefore, many governments are currently expediting the successful implementation of e-government[15].

2.2 E-Government Systems

E-government system is identified as an electronic platform that provides online communications among government, citizens, and organizations [16]. E-government systems are classified into three system types, namely, government to the citizen (G2C), government to government (G2G), and government to business (G2B). However, the implementations of e-government systems require the acquisition and development of professional skills and expertise from government employees [17].The most extensive board of studies affirms that the G2C system is the researcher's huge concern [18]. [19] Argued that the recent increase in the investigated G2C can be justified by many reasons as follows: citizens currently receive the most services through online e-government applications. However, the use of e-government services requires citizens to interact within the government system efficiently and confidently. Therefore, expending the investigations on G2C is critical. Further studies must be conducted to investigate the e-government information system from the citizens' perspective and not merely from the employees' perspective [20].

Many constructs can influence the success within the e-government system, whether incrementing or decrementing on the basis of the citizen's perspective. However, the most powerful construct that can affect the citizen's willingness to participate in e-government application is trust. Trust is a controversial concept. This concept is ambiguous to evaluate and assess [21]. Traditionally, trust demands a high level of certainty in any aspects of life. With reference to e-government success, trust becomes a critical success construct to achieve successful e-government implementations [22]. It provides the capacity to employ the secure and invulnerable system throughout the online electronic environments [23].Thus, many studies emphasize the need for and the value of trust to implement successful e-government implementations [24], [25].

2.3 E-Government System in Iraq

Iraq is recognized as a developing country enriched with powerful natural resources, such as oil and minerals. Tragically, Iraq had been through two wars that devastated the main infrastructure of

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Iraq in all fields. Hitherto, Iraq is suffering from the war's consequences and related drawbacks, such as system chaos [26]. Regarding the IT infrastructure, IT in Iraq is extremely limited. According to the UNESCO survey [26], ICT infrastructure and literacy rates in Iraq are extremely poor; only 12% of the population own personal computers, and 7% of the population have Internet access. Therefore, Internet access is also limited with poor speed. The telecommunication infrastructure is inadequate, along with the power-supply shortage [27]. Owing to the unstable political condition, companies, qualified international experts, and investors fear of coming to Iraq. Realistically, security is the main obstacle preventing Iraq from evolving into a developed country.

In 2004, the Iraqi government started initiating the e-government infrastructure with the support of an Italian company [28].However, owing to poor security and unstable political situations, the project was delayed until 2010. Thereafter, the Iraqi government took the initiative to collaborate with the United Nations Development Program (UNDP) and develop a detailed understanding and strategy work on the successful implementation of this project. Consequently, the Iraqi e-government portal was successfully launched in 2014, with certain services, such as health, e-learning, municipal services, and electronic personal data.

However, hitherto, the services of e-governments are not completely implemented. Only few services are practically operating on the e-government system in Iraq. Therefore, many aspects must change to guarantee the successful implementations of the e-government system. Evidently, the Iraqi government must improve its social environment as well as its policy trends and structures. Moreover, coordination must also happen between governments and citizens [28]. Iraqi citizens have experienced poor participation in the e-government system, which, in turn, contributed to the limited actual activations of the e-government system. The citizen's poor attitude toward e-government occurs for many reasons, such as trust, training, and accountability [29]. For instance, the Iraqi government must improve the decision maker's decisions and performance in a way that helps Iraqi citizens increase their participation in e-government systems. Consequently, government decisions that result in untrusted operations and unorganized processes will not obtain citizens' trust on the e-government system [30].Therefore, huge demands and needs exist for the Iraqi government to exhibit a positive attitude toward the successful implementation of e-government services to help their citizens. Thus, this research is considered one of the studies that measure the success of an e-government system from an Iraqi citizen's perspective as primary users of the system and its services.

2.4Delone and Mclean Information System Success Model

The DeLone and McLean information system (hereafter known as D&M IS success model) was presented in 2003 by the researchers DeLone and McLean. The model is an updated version from the previous D&M model introduced in 1992. The updated D&M model provides the opportunity to demonstrate the autonomous and multidimensional nature of the information system's success. The taxonomy of the updated D&M model consists of the following six interrelated constructs:

(1) Information Quality (IQ)
(2) System Quality (SQ)
(3) Service Quality (SV)
(4) System Use (U)
(5) User Satisfaction (US)
(6) Net Benefits (NBs)

The modified model is considered one of the most IS success models extensively utilized in various IS fields [20], [31]. The model is used to assess and evaluate the effectiveness of ISs throughout the applying measurements of the model's six constructs. Figure 1 illustrates the updated D&MIS success model.

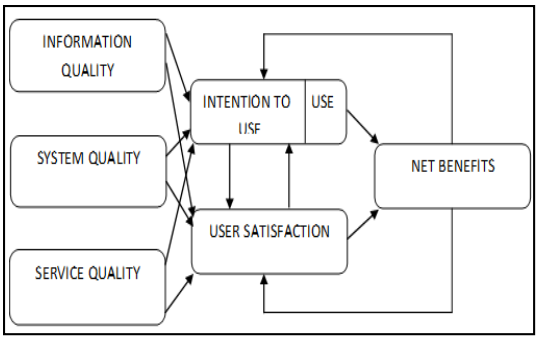

Fig 1: Updated D&M IS Success Model (Delone and Mclean, 2003)

The information system of e-government particularly refers to the citizens' use of the e-

government information system website to deal with various public services, such as license renewal, voting, and election. Through such daily e-government tasks, citizens are able to notice the improvement of the online service by observing time reduction, service's availability, and response to time duration. Therefore, the e-government system can be investigated and studied by using the D&M IS success model[32].In addition, DeLone and McLean also recommended that further field of studies adapt or update their original model. Thus, the D&M model can be adopted as a success assessment model for the e-government system from a citizen's perspective. Nevertheless, the D&M model was criticized for excluding trust in its conceptualization [11]. Accordingly, the constructs of the D&M model were used in this study, along with the trust construct. Trust constructs were added to the D&M model owing to its importance in ensuring effective assessment of e-government systems.

2.5 Proposed Conceptual Model and Hypothesis

The research uses the model and constructs obtained from related studies. The current research mainly aims to provide a model to measure the success of e-government systems from the perspectives of citizens. Apparently, e-government systems are recognized as one type of IS [33]. Therefore, the success of e-government systems could be measured by the updated D&M IS success model. According to the previous studies, such as [9], [32], the initially proposed conceptual model is formulated as shown in Figure 2. The model constructs are explained briefly below:

1. System Quality (SQ): This construct can measure an e-government system's technical success. SQ demonstrates the system performance regarding usability and user friendliness [9], [34].
2. Information Quality (IQ): This construct represents e-government system output quality [35].In addition; IQ can be measured within various semantic attributes [9].
3. Service Quality (SV): This construct represents service quality that system users receive from system staff [35]. Similar to SQ and IQ, SV is also used to measure an e-government system's general quality by measuring the willingness of staff to offer reliable services, trusted connections, and system availability when they are working on an e-government system.
4. Intention to Use (U): This construct represents the attitude and the degree of e-government system capabilities from the users' perspective. Hence, U measures users' attitude toward the system dependency, frequency usage of system, and the willingness to use it in the future.
5. User Satisfaction (US): US represent the users' general method of using an e-government system [34].US can measure whether the tested e-government system is worth using in terms of required expectations and general satisfaction from the users' views.
6. Trust (T): This construct represents the system's capacity to be trustworthy and reliable from the users' perspective. With respect to e-government systems, trust plays an important role in achieving successful e-government implementations [22], [36], [37].
7. Net Benefits (NBs): This construct represents the capacity of an e-government system to increase the success of individual users [35].

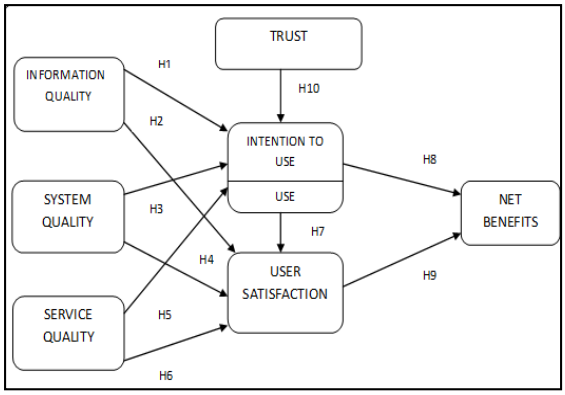

Fig 2: Proposed Conceptual IS Success Model from a Citizen's Perspective.

Figure 2 exhibits that the updated D&M model is integrated with trust construct to formulate the proposed conceptual model that will be used to assess the success of e-government systems. The integrated model is multidimensional and consists of mutually dependent constructs. Thus, analyzing the interrelations among its constructs, indicators, and sources is necessary, as presented in Table 1.

Table 1: Constructs and indicators of the proposed conceptual model

Constructs	Indicators	Sources
System Quality	1. User-friendly 2. Easy to use	[9],[20], [38]

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(SQ)	3. Usability	
Information Quality(IQ)	4. Precise information 5. Up-to-date information 6. Sufficient information 7. Reliable information 8. Useful information	[20], [39]
Service Quality(SV)	9. Readiness for service 10. Safe transactions 11. Availability 12. Individual attention 13. Specific needs for users	[20], [32], [40], [41]
Intention to Use(U)	14. Dependency 15. Frequency of system use 16. Tendency to use 17. Duration of future use	[20], [31]
User Satisfaction (US)	18. Satisfaction with system 19. Perceived utility 20. Expectations	[20], [32], [34].
Trust(T)	21. Trustworthy 22. Has high integrity 23. Keeps my best interests in mind 24. Does the right job 25. Carries out online transactions faithfully 26. Keeps promises and commitments	[37],[42], [43], [44]
Net Benefits (NBs)	27. Makes job easier 28. Time savings 29. Useful	[9],[20]

The following hypotheses regarding the interrelations within the proposed conceptual model are clarified below:

H1: Information quality has a positive impact on intention to use/use e-government systems from the citizens' perspective.

H2: Information quality has a positive impact on user satisfaction in e-government systems from the citizens' perspective.

H3: System quality has a positive impact on intention to use/use e-government systems from the citizens' perspective.

H4: System quality has a positive impact on user satisfaction in e-government systems from the citizens' perspective.

H5: Service quality has a positive impact on intention to use/use e-government systems from the citizens' perspective.

H6: Service quality has a positive impact on user satisfaction in e-government system from the citizens' perspective.

H7: User satisfaction in e-government systems has a positive impact on net benefits.

H8: Intention to use/use has a positive impact on user satisfaction in e-government systems.

H9: Intention to use/use of e-government systems has a positive impact on net benefits.

H10: Trust has a positive impact on intention to use/use e-government systems from the citizens' perspective.

3. RESEARCH METHODOLOGY

3.1 Data Collection Phase

The conceptual model is examined by analyzing data collected from ordinary citizens in Iraqi society. The citizens were chosen randomly on the basis of their qualification level (BSc). Approximately 358 Iraqi citizens participated voluntarily in this study. The responses of roughly 160 were collected throughout the duration of 13 weeks. Non-engaged bias analyses were conducted. Four responses were omitted owing to incomplete answers, whereas the remaining 156 were used for data analysis. [45] Asserted that several responses between 30 and 500 are sufficient for any academic research. All constructs were measured by their 29 indicators using a seven-point Likert scale [46].

3.2 Data Analysis Phase

This research analyzed the collected data by using partial least square (PLS) path modeling approach as a fundamental method for analysis. The current research has chosen this technique owing to its specific advantages as follows: (1) The researchers can measure causal relationships among indicators/items and causal relationships of latent constructs by using the PLS technique [47]; (2) each indicator can differ to show how much it can contribute to the composite score of the latent variable by using the PLS algorithm;(3) PLS can be used to measure two types of models, namely, measurement and structural models [47], [48]; and (4) PLS is used for explorative work and prediction, whereas other statistical techniques, such as SPSS, AMOS, and EQS, are used in explorative works only. Therefore, this study selected the PLS

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technique as a comprehensive formidable statistical tool.

4. RESULTS

4.1 Demographic Data

This research collected answers from 156volunteer respondents. The percentage of male respondents was approximately 78%. The distribution of age was nearly normal between 20 and 29 (25.6%), between 30 and 39 (25%), between 40 and 49 (17.3%), between 50 and 59 (19.9%), and over 60 (12.2%). The respondents were placed as Center (40.6%), South (29.6%), West (17.4%), and East (12.4%). Table 2 presents the demographic data.

Table 2: Demographic data

(N=156)	Characteristics	Frequencies	Percentages
Gender	Male	123	78.2
	Female	33	21.8
Age	20–29	40	25.6
	30–39	39	25
	40–49	27	17.3
	50–59	31	19.9
	>60	19	12.2
Education	Diploma	22	14.1
	Bachelor's	52	33.3
	Master's	70	44.8
	PhD	12	7.6
Place of residence	Center	15	40.6
	South	29	29.6
	West	29	17.4
	East	21	12.4

4.2. Measurement model

4.2.1 Convergent validity

The total reflective construct's loadings are over the minimum of 0.7. The total latent constructs have high levels of internal consistency reliability, and the accepted CR must be more than 0.70[49]. In addition, the reliability test (Cronbach's alpha) must be more than 0.7. Cronbach's alpha is between 0.885 and 0.939, which is an accepted level. The values of variance extracted (AVE) are higher than the minimum level of 0.50. Table 3 shows the values of convergent validity for total constructs.

Table 3: Measurement model values–convergent validity

Construct	Items	Loading	CR	AVE	Cronbach's alpha
SQ	SQ1	0.921	0.835	0.698	0.933
	SQ2	0.933			
	SQ3	0.899			
IQ	IQ1	0.923	0.851	0.718	0.885
	IQ2	0.913			
	IQ3	0.866			
	IQ4	0.797			
	IQ5	0.795			
SV	SV1	0.865	0.799	0.743	0.931
	SV2	0.921			
	SV3	0.844			
	SV4	0.871			
	SV5	0.796			
U	U1	0.877	0.899	0.733	0.939
	U2	0.788			
	U3	0.789			
	U4	0.937			
US	US1	0.911	0.876	0.663	0.919
	US2	0.822			
	US3	0.783			
T	T1	0.914	0.923	0.793	0.923
	T2	0.887			
	T3	0.864			
	T4	0.839			
	T5	0.848			
	T6	0.899			
NBs	NBs1	0.855	0.798	0.765	0.905
	NBs2	0.833			
	NBs3	0.912			

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4.2.2 Discriminate validity

	SQ	IQ	SV	U	US	T	NBs
SQ	**0.873**						
IQ	0.589	**0.844**					
SV	0.611	0.621	**0.899**				
U	0.490	0.533	0.495	**0.940**			
US	0.398	0.477	0.422	0.633	**0.932**		
T	0.599	0.498	0.533	0.566	0.547	**0.917**	
NBs	0.496	0.356	0.531	0.531	0.498	0.633	**0.924**

Discriminate validity is defined as the measurement of distinct concepts by examining the correlations among the measurements of constructs that could be overlapped. Two basic steps should be followed as demonstrated in Table 4 to test discriminate validity. On the basis of the Fornell and Larcker criterion, the correlations that exist among the latent constructs are outlined as off-diagonal values. Subsequently, the diagonal values are depicted as the square values of AVEs [50].

Table 4: Values of discriminate validity–latent construct Correlations

The loadings across are compared with the indicator's loadings. The indicator's loading on its personal construct is affirmed to be higher in all cases compared with all of its cross-loadings with other constructs. Thus, each item value of loadings is more than the required value of 0.5. In addition, the item's loadings on its personal construct are higher than all of its cross-loadings with other constructs.

Table 5: Values of discriminate validity–cross loadings

Items	SQ	IQ	SV	U	US	T	NBs
SQ1	**0.894**	0.594	0.650	0.575	0.574	0.521	0.676
SQ2	**0.944**	0.522	0.596	0.525	0.563	0.452	0.630
SQ3	**0.912**	0.525	0.604	0.539	0.514	0.456	0.640
IQ1	0.515	**0.830**	0.523	0.493	0.524	0.461	0.543
IQ2	0.478	**0.882**	0.471	0.545	0.514	0.412	0.571
IQ3	0.565	**0.890**	0.522	0.631	0.575	0.444	0.579

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IQ4	0.501	**0.850**	0.459	0.647	0.498	0.401	0.555
IQ5	0.559	**0.874**	0.449	0.523	0.430	0.479	0.556
SV1	0.568	0.529	**0.912**	0.544	0.502	0.564	0.532
SV2	0.548	0.560	**0.923**	0.598	0.459	0.607	0.523
SV3	0.551	0.563	**0.883**	0.609	0.505	0.580	0.497
SV4	0.612	0.647	**0.882**	0.510	0.496	0.590	0.709
SV5	0.628	0.639	**0.917**	0.640	0.527	0.626	0.693
U1	0.602	0.634	0.683	**0.833**	0.538	0.641	0.624
U2	0.578	0.639	0.670	**0.737**	0.505	0.532	0.637
U3	0.578	0.597	0.679	**0.922**	0.527	0.725	0.602
U4	0.485	0.579	0.686	**0.928**	0.498	0.694	0.524
US1	0.607	0.759	0.579	0.523	**0.943**	0.612	0.593
US2	0.627	0.684	0.581	0.547	**0.904**	0.520	0.617
US3	0.509	0.486	0.528	0.468	**0.856**	0.472	0.584
T1	0.445	0.530	0.542	0.582	0.568	**0.906**	0.639
T2	0.472	0.579	0.581	0.601	0.591	**0.803**	0.635
T3	0.568	0.523	0.606	0.759	0.579	**0.943**	0.523
T4	0.543	0.561	0.686	0.634	0.603	**0.782**	0.538
T5	0.551	0.562	0.606	0.759	0.579	**0.943**	0.523
T6	0.62	0.68	0.62	0.68	0.58	**0.90**	0.54

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	2	3	5	4	1	**4**	7
NBs 1	0.541	0.575	0.511	0.572	0.516	0.551	**0.952**
NBs 2	0.567	0.576	0.497	0.542	0.475	0.538	**0.929**
NBs 3	0.479	0.535	0.608	0.616	0.577	0.658	**0.794**

4.3 Structural Model

This study developed ten hypotheses to test the interrelations among the constructs. [51] corroborated that the criterion to make the hypothesis acceptable is Sig (P-value) of the relationship among independent constructs; dependent constructs must be less than 0.05 to be considered significant [51]. The proposed hypotheses are examined throughout the bootstrapping results of 5,000 resembling. High path coefficients and T-values support all straight hypotheses. In addition, trust is the highest predictor of U, followed by SV, SQ, and IQ. In addition, US is influenced by SV, SQ, U, and IQ, respectively. Finally, the NBs are influenced by US and U.

Table 6: Path coefficients of proposed hypotheses

H	Path	Path coefficients	B	Std. Error	T-value	P-value	Judgment
H1	IQ → U	0.547	0.239	0.091	2.635	0.009	Supported**
H2	IQ → US	0.468	0.188	0.084	2.250	0.025	Supported*
H3	SQ → U	0.582	0.179	0.059	3.009	0.003	Supported**
H4	SQ → US	0.601	0.150	0.029	5.106	0.010	Supported*
H5	SV → U	0.659	0.143	0.029	2.918	0.014	Supported*
H6	SV → US	0.634	0.211	0.048	4.383	0.002	Supported**
H7	T → U	0.789	0.891	0.037	24.300	0.000	Supported**
H8	U → US	0.584	0.179	0.059	3.009	0.003	Supported**
H9	U → NBs	0.362	0.150	0.029	5.106	0.006	Supported**
H10	US → NBs	0.601	0.211	0.048	4.383	0.009	Supported**

Significant at P less or equal 0.01, P* less or equal 0.05**

Table 7 presents the summary of the endogenous latent variable of the proposed model. The predictive power of the proposed model is represented by R square values. High level refers to R square values that are more than 0.67, moderate level refers to the R square values that occur between 0.33 to 0.67, weak level refers to the R square values that occur between 0.19 to 0.33,and an unacceptable level for the R square values is less than 0.19[52]. Table 7 shows that the four variables (IQ, SQ, SV, and T) that are linked to U are capable of explaining the 39.8% of the variation in the U toward the continuance U the services of e-government. Thereafter, IQ, SQ, SV, and US that are linked to US are capable of explaining the 43.9% of the variation of the US to use the services of e-government. The U and US are capable of clarifying the 67.6% of NB variation.

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Table 7: R-square of the endogenous latent variable

Subsequently, the difference in the R square value when a particular exogenous construct is deleted from the model can be used to assess whether the deleted construct has a substantive effect on the endogenous constructs. This measure is utilized to evaluate the R square values of all endogenous constructs, and it is known as f square effect size [52]. [52] suggested that the values of f square are those values less than 0.02, 0.02 to 0.15, 0.15 to 0.35, and above 0.35,corresponding to no, low, intermediate, and high effects of exogenous latent variable[53]. Table 8 shows the results of f square.

Table 8: f square of the exogenous latent variable

Construct	f square	Result
SQa	0.398	Large
IQa	0.439	Large
SVa	0.676	Large
T	0.754	Large
SQb	0.532	Large
IQb	0.476	Large
SVb	0.199	Medium
Ua	0.265	Medium
Ub	0.233	Medium
US	0.192	Medium

In addition, researchers must test the value of Stone–Geisser's Q square [54], [55] to evaluate the magnitude of the R square values as a criterion of predictive accuracy. PLS used for predicting reasons frequently requires measuring the predictive relevance called the Blindfolding procedure. Regarding the structural model, Q square values more than zero for a certain reflective endogenous latent variable indicate the path model's predictive relevance for this specific construct.

Construct	R square	Result
U	0.398	Moderate
US	0.439	Moderate
NBs	0.676	High

Table 8 shows the result of f square, construct cross-validated redundancy. Table 9 shows that the redundancies of constructs are acceptable.

Table 9: Q square values

Construct	Q square
U	0.247
US	0.291
NBs	0.332

GoF is defined as the global fit measure; it is the geometric mean of average variance (AVE) and the average of R square of the endogenous variable [56]. GoF's purpose is the accounting of research model for two levels, namely, measurement and structural models, with focus on the model's overall performance [57]. The criteria of GoF to determine whether GoF values are less than 0.1, 0.1 to 0.25, 0.25 to 0.36, or greater than 0.36, respectively, represent no fit, small, medium, or huge to be considered as a valid PLS model as given by [58].According to this explanation and on the basis of the formula following the value of GoF (0.618), the GoF model of this research can be concluded to be great in as much as necessary to be considered having sufficient global PLS model validity. According to the finding of structural and measurement models for this research, the proposed model of measuring the success of e-government system from an Iraqi citizen's perspective is illustrated in Figure 3.

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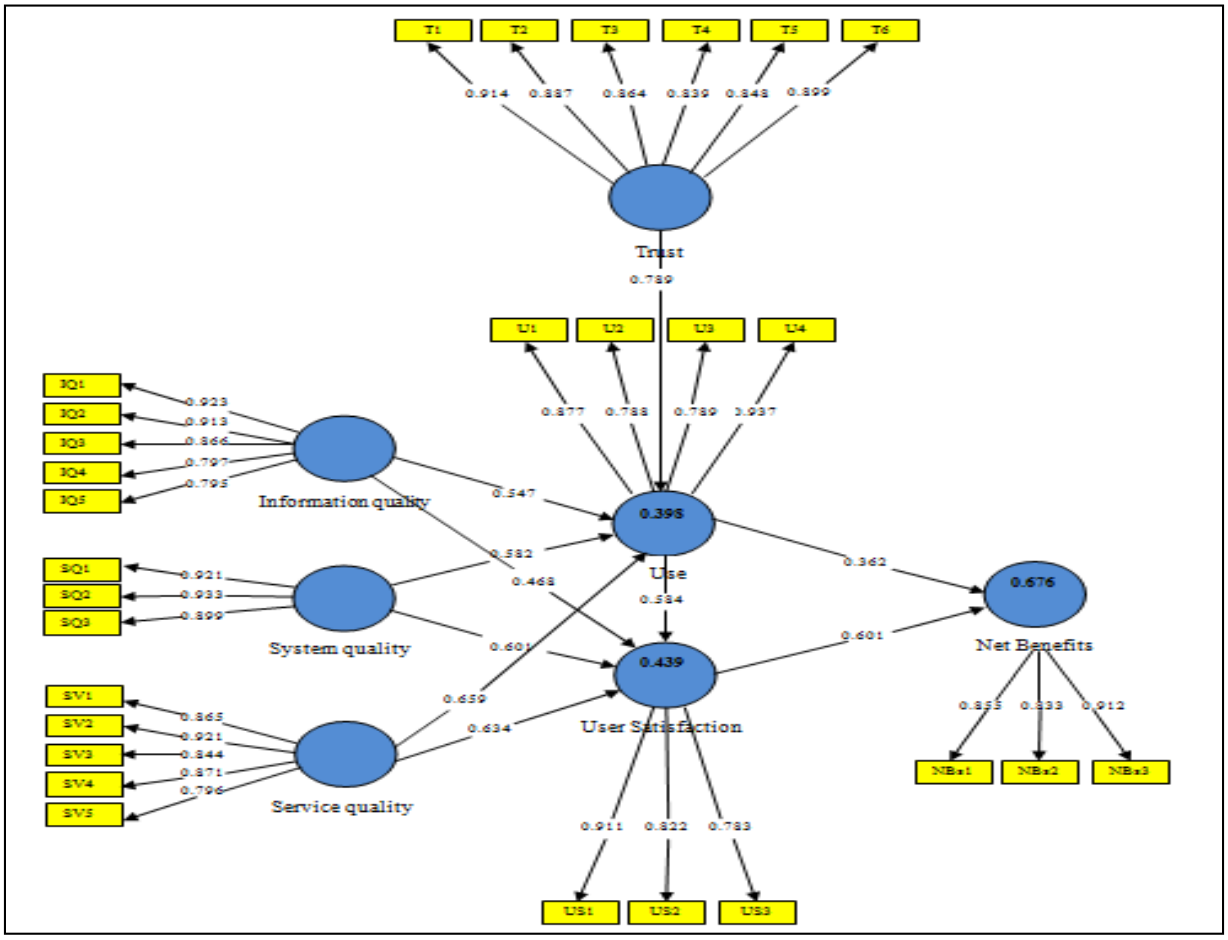

Fig3: Proposed model of measuring e-government system success

5. DISCUSSION

The research discusses the major contributions derived from examining the proposed model and confirming its hypotheses. The results confirm that all proposed hypotheses are supported, as shown in Table 6. The study has tested ten hypotheses using PLS 3 algorithms. The information quality was confirmed to be an effective construct that influences the intention to use e-government systems. This result affirms that the increase in the quality of information for the citizens will guide to the increase in intention to use e-government systems. These systems are useful and beneficial for all Iraqi citizens. In agreement with the present study, previous empirical studies have determined that the information quality has considerable impact on the intention to use. [20] tested the interrelation of information quality and intention to use; he found important association between the two. Similarly, [8] proved that the relationship between both variables is important.

Furthermore, information quality was found to be an effective construct influencing the user satisfactions in e-government systems. This finding led to explain that the increment in the quality of information to citizens will lead to the increment in the satisfaction of the citizen toward e-government services. Previous studies were found to have similar results. [8] Found significant influence between the information quality and user satisfaction to use e-government services and systems. Similar results related to assessing call

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centers' success in information system usefulness were found by [58].

In addition, system quality is stated to have an influence on the intention to use. The citizens in Iraqi government assume that the quality of e-government systems can promote their desire to use these systems frequently. This finding affirms that, the easier the work on the systems, the more likely that the citizens in the Iraqi government will adopt and continue using e-government systems. Similar to the result of the current research, [20] measured the success of e-government systems and tested the impact of system quality on the intention to use. He found an important interconnection between these two constructs. [20] Discovered that the quality of the system is stated as a significant predictor of intention to use. Similar findings were discovered in other earlier research, such as those of [58] and [8].

Furthermore, system quality was confirmed to be an effective construct that impacts user satisfactions in e-government systems. The current result means that the increment in the quality of information to citizens will lead to the increment in the satisfaction of the citizen toward e-government systems. Previous studies have found similar results. [59] Determined the significant influence between system quality and user satisfaction to use an information system. Similar results related to assessing call centers' success in information system usefulness were found by [58].

Service quality affects positively the intention to use e-government systems. This finding highlights the fact that good-quality services can assure high usage intention toward e-government systems among the Iraqi citizen's society. The finding from this study is similar to the findings from the literature. [20] Concluded that service quality is significant for the adoption of e-government systems. Similar findings were found by [58]

Moreover, service quality is hypothesized as an important driver for the satisfaction of users. In addition, good service quality was predicted to have a positive affect toward user satisfaction of e-government systems. The findings validated that Iraqi citizens care for the quality of services that their government introduces to them. This concern might slow down or reduce the adoption process of systems. Thus, they will be hesitant to use the system when the service quality is insufficient from their personal perspective. The results of the current research are similar to those of the previous research, such as those of [60], [58], and [20].

Interestingly, trust is confirmed to be the strongest predictor of intention to use. From the result of data analysis, trust state is the key indicator of the intention to use e-government systems. Trust is recognized to be the highest construct that influences the intention of Iraqi citizens toward e-government systems usage. Consequently, trust can be considered an essential construct for any online transactions. Thus, the lack of it is problematic and might lead to abandonment of the systems services. The government must ensure that the systems are managed by trustworthy personnel and cannot be accessed by a third party. For instance, if the government uses high-security level mechanisms and techniques for their e-government services and system, the users' trust will increase because they know that their data are stored and accessible only by the person allowed by the government. This finding is in agreement with the literature. Previous studies discovered that trust has a major impact to increase citizens' acceptance and usability of e-government systems [2],[8],[61].

Intention to use was proven to be an effective construct that affects the user satisfaction to use e-government systems by Iraqi citizens. This finding contends that citizens' increment in the intention to use systems will result to an increment in the satisfaction of user toward e-government systems. The current research results are similar to the results of the previous literature. Those who examine the effect of intention to use on the users' satisfaction found similar results, such as [20], [58], and [60].

Moreover, intention to use is stated to have a direct influence on net benefits. This result affirms the importance of system usage to utilize the obtained benefits to the citizens. Hence, the citizens' satisfaction in e-government systems will lead to a direct impact on their net benefits. Previous studies have found a similar result.

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Finally, user satisfaction was proven to be an effective construct that has an effect on net benefits by the Iraqi citizens' usage of e-government systems. This finding could be explained as follows: the increase in the satisfaction of a citizen using the systems will lead to an increase in the net benefits received from such systems in Iraq's technology environment.

5.1. Theoretical Contributions from the Research

This research introduces two major contributions for e-government systems. First, this study developed a conceptual model to address the critical constructs that affected the success of implementing e-government system. This research adopted and utilized the updated model of DeLone and McLean as assessing model for the success of information systems. Consequently, e-government system can be considered a standard information system that could be assessed and evaluated using the DeLone and McLean model. In addition, the significant three constructs in DeLone and McLean model, namely, information quality, system quality, and service quality, are closely related to achieving this research objective that is, measuring the success of an e-government system. This primary theoretical contribution explored its significance exclusively by applying the study model in the Iraqi e-government environment as a case study of developing countries. Theoretically, model contribution showed the model importance and confirmed its validity throughout the critical analysis and subsequently deduced results in the previous sections. Second, the updated model of DeLone and McLean only focused on technical constructs to assess the success of information system, whereas the current study adjusts the updated DeLone and McLean model by including trust as another construct that influences e-government success from a multi-dimensional relationship. This study adds trust as an important construct that has a significant influence on the intention to use e-government system mentally. Consequently, the intention to use the e-government system will affect the success of e-government implementation. To illustrate, the trust constructs can explore into which level the citizen can rely upon the government system and services. If the citizens feel that e-government system is a trustworthy and reliable system, then they will frequently be encouraged to use the system. Consequently, the e-government system will be considered a successfully implemented and efficiently used system. Third, previous studies were focusing on measuring the success of e-government system from the employees' perspective. The current research is focusing on the citizen's perspective toward using or not using the e-government system successfully. Depending on Iraqi citizens' concerns, considerations, and satisfaction, the intention to use e-government system will determine which degree the system will perceive benefits and be considered beneficial implementation.

5.2. Managerial Implications from the Research

This research achieved its primary objective of identifying the critical constructs and proposed hypotheses that affected the success of e-government systems. The findings introduce important managerial implications for the decision makers and the e-government system developer who work on developing the system and its related services and information. First, government agencies should enhance the system quality, service quality, and information quality of their e-government system in a way that trigger the citizen's intention to attempt using the system. Information must be accurate and up to date in the system website. System quality must be designed to offer easy usage for the Iraqi citizen. The system should be simple and efficient and not too sophisticated for practical implementation. Service quality must also design and deploy to enable accumulative services. Hence, service should provide all the facilities and requirements for the citizens in the complete design. Thus, an urgent need exists for the Iraqi government agencies to encourage and direct the system developers in redesigning the current system to fulfill all the citizens' needs and demands. In addition, restructuring the current e-government system in a way that aligns with Iraqi citizen's requirements is necessary. This managerial implication is in agreement with the previous theoretical implication as follows: the three-mentioned constructs have a positive impact on intention to use e-government system by Iraqi citizens. Moreover, the positive effects of these three constructs manifest on the citizen's satisfaction.

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Second, government agencies must pay attention to acquire citizens' trust in e-government system. The most powerful construct was confirmed to be trust in the e-government system. Hence, the decision makers must put substantial effort in obtaining the Iraqi citizens' trust and eventually increasing their motivation to use the system. Furthermore, citizens must feel that their e-government systems are reliable and accountable for use. This ideal scenario could be achieved by offering an invulnerable system that can be trustworthy to use for the daily working activities, such as banking, applying a license, and so on. Practically, these managerial implications should advocate the government agencies to take practical actions in improving trust reputation for Iraqi citizens. Didactically, the stakeholders should advertise their e-government system. Citizens must educate and acknowledge on the system usage, polices, and services. Public seminars, online advertisements, and trainings must be conducted by the government agencies to enhance the trust level and increase the overall implantations to use the system. In addition, the feedback of citizens regarding their opinions in e-government websites must be collected and analyzed. The results from the analyzed citizens' feedback will help government agencies rebuild the websites in such a way that increase the usability to the citizens. Consequently, optimizing the main constructs (information quality, system quality, service quality, and trust) will help optimize the construct of intention to use and the construct of user satisfaction. Eventually, these optimizations will bring major benefits to the net and are thus considered the indicators of successful e-government implantations.

6. CONCLUSION AND FUTURE WORK

This study purposely integrated trust construct within the technical constructs to assess e-government system success from an Iraqi citizen perspective in Iraq, as one of the developing countries. The study aims to modify the updated D&M IS success model by adding trust construct and then integrating it with other technical constructs. The conducted model is dedicated to assess the e-government system in Iraq as a type of IS. The model constructs are affirmed to have a positive impact on the Iraqi citizen's usage and satisfaction. The impact of these constructs is gradually decreased from trust as a highest construct, followed by service quality, system quality, and information quality. Basically, citizen trust in an e-government system is the most powerful construct that could positively influence the intention to use e-government system. Thus, trust constructs require extra attention from the government agencies and system developers owing to its significant impact on the citizen's usage intention. In light of the above view, the government agencies and system developer should consider the influence of the model constructs to promote the citizens' low-level participation in the e-government system in Iraq. Consequently, this study can be considered a foundation for additional research regarding the constructs' issues, specifically the trust domain. However, further research should be comprehensively focusing on trust and must study its impact from multi-dimensional views, such as studying the trust influence in technology. This study can be limited to the focus on conceptualized and analyzed trust construct from a general concept, while overlooking on the multidimensional nature of trust as well as its attributes and types.

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