

Challenges Facing E-government Implementation and Adoption in the Era of 5G, 6G

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Abstract

Management- E-government projects are in the early stages in many emerging countries. They are facing several challenges regarding their implementation and adoption in the 5G and 6G environments. This research aims to identify the most prominent challenges facing the e-government project in the 5G and 6G environments, especially in the implementation and adoption phases. At the same time, it contributes to identifying the relationships and gaps through identifying factors that directly affect both the implementation and adoption such as security, privacy, and protection of personal data. In the implementation phase, the institutional theory was adopted as a study model, which was enriched through an analytical study of more than 35 studies. The studies were conducted to identify the most noticeable obstacles hindering the e-government implementation in emerging countries. The challenges were related to organizational, infrastructure, political and social themes. The factors were investigated through a study conducted with officials and influential people in the e-government in the Northern Region of Iraq (case study, ministry of interior). The study findings indicated that the previously mentioned themes pose impact on e-government implementation. Furthermore, the study contributed to identifying new contributions that include capabilities, mentality acceptance, leadership vision, telecommunication, Internet accessibility, employee training, and citizen education. In the adoption phase, UTAUT model was augmented by trusting the system and ethics of the Internet since they were factors used in the study. The results indicated that significant distinctions exist in age differences, level of education, excepting gender, and both effort expectancy and behavioral intention for utilizing e-government services in the 5G and 6G environment. Finally, the study identified a set of factors through which relationships and gaps are identified concerning the implementation and adoption of e-government in the 5G and 6G environments.

Keywords: E-government adoption, E-government implementation, UTAUT theory, 5G, 6G

1 Introduction

Since the appearance of e-government conception, governments have realized the necessity for making public services widely available and useful. The e-government follows and competes with the private sector by providing transparency, efficiency, and accessibility of services by citizens and industry sectors. Obviously, many benefits of E-government have been recorded and proved. With the advent of e-government conception, several research and experiments have studied the main obstacles that hinder the e-government implementing or adopting process [1]. In addition to that, different models and frameworks are being utilized to understand the process. Despite this, none of the studies has attempted to understand the gap that exists between the principles of service provision by the government and their use and adoption by citizens. Since users' expectations of the e-service provider differ regarding key dimensions such as awareness, trust, security and privacy, effectiveness, simplicity, legislation, and ease of access. The procedures and criteria utilized in evaluating and assessing the perception of electronic service users differ from those used in measuring the service provider's perceptions (government agencies). Several research initiatives have tried to develop models so that they could satisfy stakeholders and citizens with e-government services such as [1-2]. However, such models are not related to a systematic process that could be utilized for assessing citizens' approval and expectations of e-government services versus government perceptions in providing these services. Internet has become an important daily life necessity for most people all over the world since its invention by the US Department of Defense. Therefore, internet users have been increasing day by day since its release to the world as a global communications network. Currently, it is estimated that around 4,833,521,806 people use internet services (Internet World Stats, 2020). The number of ICT services has redoubled, leading current generation noticeably depend on internet and modern technology. According to Heeks [3] in developing countries, 35% of e-government implementations have completely failed and 50% have failed partially. For that reason, the main purpose is not attained and there are unexpected results. The motives behind implementing e-government are offering satisfactory services reducing corruption [4],

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efficiency, reducing costs, centralizing government agencies [5], encouraging discussion, voting via internet, and making government more participatory by sharing information [6]. Many studies on e-government have identified several factors impeding the implementation and adoption of the system, such as lack of awareness, e-government portal ease of use, system trust, lack of funding, resistance to change, data protection laws, lack of government support, digital divide, and lack of government plan and strategy [7-9].

In this study, based on the institutional theory, the challenges that impede the e-government implementation were classified into four themes: organizational, political, infrastructure, and social. Additionally, it recommends a preliminary theoretical model for e-government relying on the government's viewpoint of implementation and the related challenges during the process. Moreover, in this study, e-government will be discussed more broadly in terms of technology adoption from the citizen's point of view, behavioral expectations, and use. For this purpose, UTAUT model is enriched with the trust of system and internet ethics as external factors. Lastly, the current study combines the views of implementing and adopting e-government by suggesting a theoretical model that embodies the views of the government and citizens. The author argues that none of the successful studies have tried to bring together all the factors affecting the e-government implementation and adoption or have established relationships among those factors. There is also no integrated global model for implementing and adopting e-government project that can be applied to ensure progress, particularly in emerging countries.

2 Related Works

Although e-government is an effective driver of economic growth, increasing convenience, increasing transparency, and contributing to lower costs; there are still many challenges that hinder exploring and taking advantage of available opportunities [10]. As the multiplicity of dimensions and obstacles facing e-government projects mean that there are several obstacles that hinder management and implementation as well [11]. Furthermore, e-government is expensive. It involves great risks and demands an experienced professional group of human resources (HR), and suitable infrastructure. Therefore, the e-government implementation needs the evaluation of the following risk issues: the appropriate legislation, political stability, trust in the government, economic structure, structure coordination of government (Centralized or decentralized), levels of maturity within government, and citizens' demands [12]. Moreover, issues inherent in e-government include data protection, security and privacy, interoperability, access issues, employees' personal viewpoint, resistance to change, lack of awareness, citizen's trust in e-government, and identity and access management [13].

Several researchers presented practical results on the obstacles facing e-government projects in various aspects. However, few consistencies were observed throughout the various aspects and results of the research could be categorized into four groups: organizational, political, social and infrastructure [14-15]. For example, [16] mentioned the three most

important issues that impede the implementation of e-government, which are lack of information and communication technology infrastructure, and poor design. In addition, there is a weakness in the project management, and it is considered as the prominent problem that crashes the process of e-government application. [17] pointed out that there are many social, political, organizational, and infrastructure issues such as the lack of simplification of services, digital divide, awareness, organizational support, financial support, top management support, lack of organizational structure, organizational strategy, staff training, roles and responsibilities, insufficient information systems/ IT capabilities, and security and privacy that affect e-government implementation. [18] argued that lack of citizen's trust raises many of the concerns that impede e-government. The lack of information access, weak e-government response to the issues demanded by citizens, and the lack of flexible communication channels, government's failure to update its official sites, the lack of public trust in the system, the security issue of e-mail, the adoption of the system to traditional means are leading factors that hinder the process. Generally, those challenges lead to a weak system structure. [19] reports that the first wave of e-government initiatives focused on data interaction between the government and citizens. While the second and third waves of e-government initiatives put emphasis on integration, efficiency, and effectiveness between departments and divisions within the institution. Additionally, providing appropriate services to businesses and citizens is a major obstacle for governments [1]. Consequently, better service is required for the integration of business processes across many governmental organizations, which necessitates major changes in business logic [20]. The online projects cover up all potential aspects and provide tremendous chances for redesigning the government structure and provide better services in the future [21].

3 Conceptual Model and Hypotheses

An overview of models and theories examining the implementation and adoption of information systems is highlighted in the literature. This model depends on two well-established and practical reliable theories for providing basic information in our research model to reach proven and reliable results. It is also noticeable that most studies have relied on it in areas related to institutions' implementation, adoption, and use of technology. They are Institutional Theory and Unified Theory of Acceptance (UTATU).

3.1 E-government Implementation Theory

Burn [22] indicated that the application of e-government guides to organizational shifts from the current administrative situation to the new one that meets the desires. The change implementing needs a solid perception of how the "change" is and how it impacts the organization. Among the most recognized and utilized conceptual models for understanding the organizational change is Kurt Lewin 's theory of change [23]. Moreover, [23] suggest that among other theories relevant to the context of organizational change, systems theory concentrates on complication and interconnection between groups of activities. On the other hand, organizational complexity

theory suggests that change could be influenced by personal aspects, environmental changes, and the behavior itself characteristics [24]. Moreover, Theory of Reason Action (TRA) seeks to describe human actions in terms of attitudes and behaviors relationship [25]. The previously mentioned theories have largely focused on the internal behavioral, organizational, and Individual aspects that influence the acceptance and implementation of change, while change related to e-government in public organizations could be affected by several more complicated external aspects than internal influences. From this perspective, the institutional theory provides useful concepts for studying organizational change in the context of e-government and the public sector [26].

3.1.1 Institutional Theories

Institutional theorists claim that the institutional environment could greatly impact the growth of formal structures in an institution more profound than marketplace demands [27]. Institutional theory is a well-known theory which can be used to study technological innovation. The theory can also be applied to assess the way in which technologies are created, utilized, and applied by institutions. In such prospective, we think of e-government system as an innovative management information system. The theory has been used to investigate e-government projects in several studies. Therefore, we conclude that this theory is appropriate for determining the factors that affect e-government implementation system from its inclusiveness to issues that take the most prominent aspects of the institution's work including political, social, organizational and infrastructure themes in developing countries, especially in Northern Iraq.

3.1.1.1 Organizational Influence

Anagnostopoulos [28] pointed out that institutional theory explores the methods through which organizational structures, standards, practices, and patterns of social relationships are made that relate more broadly to the social environment and culture. From this perspective, the institutional theory is beneficial in explaining the characteristics of organizational behavior.

3.1.1.2 Political Influence

Barley [29] argued that institutional theory refers to the formation of novel regulations, arrangements, formulas, and processes required for the development of a successful organization. Those new rules and procedures can impact the behavior and decisions of decision-makers and leaders in the organization.

3.1.1.3 Technology Influence

Oliveira [30] indicate that institutional theory is a unified theory that attempts to explain phenomena related to technology adoption in the organizations.

3.1.1.4 Social Influence

Ciftci [31] indicated that there are multiple strands of institutional theory: micro-sociology approaches, which concentrate on internal organizational progress, and macro-socio-economic approaches, which is seeking to establish a relationship between the reality of society and the behavior of the organization.

3.2 E-government Adoption (Model and Hypotheses)

Rana [32] state that analyzing the behavioral intent relationships with user behavior, attitudes, and analyzing their

performance is noteworthy in the context of e-government adoption because these variables are fundamentally significant in terms of IT innovation and adoption. This fact is demonstrated by various distinguished models of Information System/ Information Technology adoption including the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Diffusion of Innovation (DOI) (17- Rogers 1995 Cap 6 Plan 5, n.d.). The Unified Theory of Acceptance and Use of Technology (UTAUT), was formed from the mixture of eight theoretical models (ibid). Accordingly, it is characterized as the best theory for investigating the behavior intention of e-government adoption and use through enrichment of external factors (trust of system and the ethics of the Internet).

3.2.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model was designed based on eight theoretical models' combination namely: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TBP), Technology acceptance model and the Theory of planned behavior combining model, PC utilization model (MPCU), theory of Diffusion of Innovation (DOI), and Theory of Social Cognitive Theory (SCT). The UTAUT model combines all above theoretical models, and it consists of four basic intents to use determinants. In addition, the UTAUT model is found preferred over the theoretical models mentioned above since it is able to calculate a higher percentage of the variance (R^2) in the intention to use [10].

Williams et al. (2015) investigated the UTAUT model in four various organizational settings for six months. The study showed significant foretelling's of intention (facilitating conditions, performance expectancy, social influence, and effort expectancy). Whereas, attitude, anxiety, and self-efficacy were insignificant predictions of intention. [33] reviewed 451 articles to analyze UTAUT use. 407 articles simply cited the original theory, and the results of the study showed that the model was essentially used in technology acceptance and adoption research in e-government initiatives. The transition to e-government requires consideration of several factors. The complex relationships that relate the variables and help the government to spread the e-government initiatives must be adopted and considered. Thus, based on what was mentioned above, the UTAUT model utilized as a comprehensive statistical study model that can explain further differences in intentions to examine citizens' adoption of e-government in Northern Iraq.

3.2.1.1 Performance Expectancy

Performance expectation can be explained as how much individuals are confident that using such systems would improve their job performance. However, it has five variables: performance expectation, job suitability, external motivation, comparative expectations and advantage of outcomes [34]. To illustrate the effect of the performance expectancy on the intent to use the e-government services, the author proposes the following hypothesis:

H1: Performance expectancy will have a positive influence on behavioral intentions to use e-government services.

3.2.1.2 Effort Expectancy

Effort expectancy can be defined as the level of simplic-

ity associated with the system use. [10] pointed out that the effort expectancy clarifies whether e-government services are simple or complex. It also clarifies if they are cost-effective. To illustrate the effect of the effort expectancy on the intention to use e-government services, the author recommends the following hypothesis:

H2: Effort expectancy will have a positive influence on behavioral intentions to use e-government services.

3.2.1.3 Social Influence

Social influence is the degree of individual's realization of how significant it would be if they use the novel e-services. It is represented as a direct determinant of behavioral intent as a personal criterion in most of technology adoption and use theories [34]. To illustrate the effect of the social influence on the intention for using e- services, the researcher suggests the following hypothesis:

H3: Social influence will have a positive influence on behavioral intentions for using e-government services.

3.2.1.4 Facilitating Conditions

Lin's [35] facilitating conditions concept represents the level to which extent individual trusts the presence of the organizational and technical infrastructure would support the system. To illustrate the effect of the facilitating conditions on the intention for using the e-government initiative, the researcher suggests the following hypothesis:

H4: Facilitating conditions will have a positive influence on behavioral intentions regarding the use e-government services.

3.2.1.5 Ethics of Internet

Internet ethics can be defined as right or wrong with respect to the benefit of the Internet to humanity. Internet ethics represents as an external factor and its effect on behavior intention will be examined in the UTAUT model. [36] indicated that the lack of understandable and developed rules and models for ethical behavior in e-government is represented by the lack of well-understood and trusted rules, and digital divide. [37] emphasized the importance of taking ethical issues into consideration when implementing an e-government initiative in all stages of the process: implementation, design and operation. Moreover, since trust represents an aspect of ethics [33] claimed that trust in internet has a significant impact on the behavior's intention for using the e-government services. [38] found in their study that trust factors include trust of system and trust in Internet. They have a positive influence on the performance expectation of use e-services. To illustrate the effect of the ethics of internet on the intention for using the e-services, the researcher recommends the next two hypotheses:

H5: Ethics of internet will have positive effect on performance expectancy

H6: Ethics of internet will have a positive influence on behavioral intentions concerning the use e-government services.

3.2.1.6 Trust of System

Trust of system is defined as a degree to which citizens are confident that the system is dependable and could be utilized in obtaining e-services [36]. Trust issues in governments were found to be important factors for researchers [36-37]. They state that to counter conflict of opinions, it is necessary to explain the verities that trust

is a significant issue that affects the behavior intention of citizens toward e-government adoption. [34] found in their study that trust factors include trust of system which has a constructive influence on the performance expectation for using e-government services. To illustrate the effect of the trust of system on the intention regarding the e-government services, the researcher suggests the next two hypotheses:

H7: Trust of system will have a positive effect on performance expectancy.

H8: Trust of system will have a positive influence on behavioral intentions to use e-government services.

3.2.1.7 Age

Venkatesh [34] claimed that old age is associated with allocating interest to job-related information and difficulty in processing complex stimuli which might be essential when using or adopting software systems. Moreover, [10] found evidence explaining the significant and diminishing influence of age on behavioral intent and adoption and use behaviors. Venkatesh [39] showed age as a demographic factor that poses a significant and positive impact of computer self-efficacy on the intention of using e- services. To clarify the effect of age on the intention for using and adopting e-service, and their effect on the effort expectancy, the researcher proposes the following two hypotheses:

H9: There is significant difference between the age and effort expectancy.

H10: There is significant difference between the age and behavioral intentions to use e- government services.

3.2.1.8 Gender

[40] specify that gender is one of four major modification variables that were found to be important in conjunction with UTAUT models. Moreover, [40] indicated that the expected effort would be more prominent for women, especially older women, and with relatively little experience in the IS/IT. Camilleri (2019) found that the expected effort influenced behavioral intention and this association was adjusted for gender and age so that it was more crucial for females and older participants. Empirical studies have shown that gender has a major impact on the behavior intent for using and adopting related-technology applications [34]. While, [41] found that intention of groups to accept automated road transport systems (ARTS): did not differ significantly in terms of gender. To clarify the effect of gender differences on the intent for adopting and using e-service, and their effect on the effort expectancy, the researcher proposes the following two hypotheses:

H11: There is significant difference between the gender and Effort expectancy.

H12: There is significant difference between the gender and behavioral intentions to use e- government services.

3.3 Research Conceptual Model

This form provides the reference framework for this experimental study that will be conducted to examine the most prominent issues affecting the application and adoption of e-government in northern Iraq. In this study, two well-known established models will be combined, namely institutional theory and UTAUT, in order to identify the most prominent relationships and understanding the gap between e-government implementation and adoption after finding the factors

that directly affect both aspects. Figure 1 illustrates the proposed conceptual model.

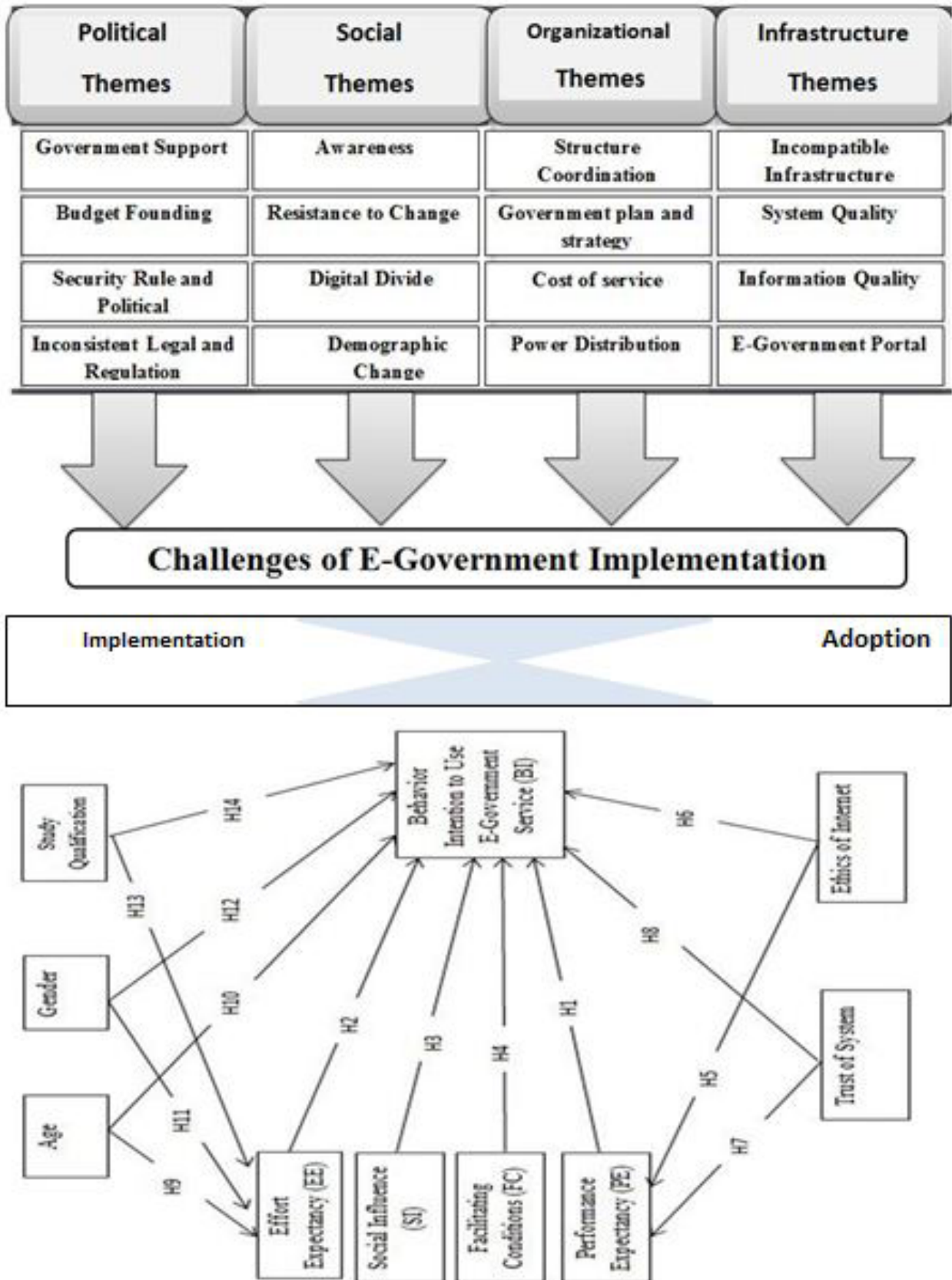


Figure 1. E-government Implementation and adoption proposed research model

4 Methodology

The methodology used in this study includes three steps: model development, instrument development, and data analysis. [42] argues that the multi-method research approach produces better results than using a single approach (quantitative or qualitative) “this might be warranted if multi-method approaches were to consistently generate “better” (that is, more valid) findings than any one method, or if single-method researchers were to offer little that multi-method researchers could not easily duplicate”. This study is based on mixed methodology (qualitative and quantitative). The study seeks to obtain valuable data from the government’s point of view using a qualitative method based on a case study for e-government officials. While, a quantitative method based-survey is used to study the factors that affect the intent of citizens’ behaviour in adopting electronic services. What is unique regarding study being that there have not been any studies exploring the e-government implementation and adoption yet. Especially, from the perspective of the government and citizen for understanding the gaps and relationships between both of implementation (government perspective) and use (citizen perspective) of e-services in Northern Iraq. SPSS 24 is used for analysing the data.

4.1 Qualitative Method: Using the Case Study

The qualitative research approach was adopted through semi-structured informal and in-depth interviews. Interviews were conducted within one case study. The interviews were simplified by an interview guide which was created at the time of data collection process from previous studies. The conceptual model and literature review provide the frame of reference for identifying significant research questions in arranging the semi-structured interview guide. The interview guide was evaluated and reviewed through pilot interviews. Experimental interviews were conducted with researchers and academics in the field of e-government from diverse professional backgrounds. Relying on sessions, the question and interview guide has been modified and revised. The sample size was limited to interviewing eight people, and the duration of the interview ranged between 45-90 minutes. All interviewees offered consent to contribute to this research.

4.2 Quantitative Method: Using the Questionnaire-Based Survey Study

In this study, a questionnaire-based survey was conducted to find out citizens’ opinions and to determine the system acceptability and use. The questionnaire tool contained a detailed, concise, and clear instructions to facilitate responses for respondents. However, the process was done by relying on previous literature especially those focused on the literature related to the acceptance and use of the technology.

5 Analysis and Results

The methodology of the study consisted of two phases (implementation and adoption) of the e-government system. Therefore, the results were obtained from two steps (government perspective) and (citizens’ perspective).

5.1 Case Study Results

The case study showed clearly that the e-government project in Northern Iraq faces many challenges in the implementation phase. Regarding organizational issues, officials and implementers of the project indicated that coordination of the organizational structure, the cost of services, the existence of a clear plan and strategy, and the distribution of the workforce are among the most prominent challenges, as mentioned by E-GOV director about the Organizational Structure Coordination “horizontally, they are disconnected. I don’t see any connection and vertically, we are asserting the connections from the top and that’s why our department has a new mandate by the Prime Minister, so we tried from the top to make sure that we have the right counterparts in each ministry and that they can connect with each other properly”. The majority of those who were interviewed agreed that “the current plan is part of the annual plan of the ministry or department, and there are no long-term strategic plans”. Moreover, implementing a project in the early stages requires a huge budget, which was pointed out by both of P-Director and ID-Director that “implementing the system now requires a high fund, which affects government expenditures because it requires millions of dollars, but it will contribute in the future to providing high revenues for the government since it will effectively contribute to reducing operating expenses”. Regarding the power distribution E-GOV Director indicated that “so definitely I think the power distribution is vital in the challenging e-government”. Lastly, the case study found new contributions related to organizational themes but not present in the recommended theoretical model, for instance, capabilities and training, as MOI G-manager stated that “most of the employees do not have the skills or experience in terms of using the electronic system. Accordingly, training programs for professionals should be prepared”. Moreover, E-GOV director argued that “to develop any system and also to use the system in any country, a certain skill set is required”. Concerning political themes, E-GOV director explained that “there is no law for example about digital signature, there is no law about protecting the privacy of people in the digital era, but we are proposing, we have a draft law that we are sending to parliament”. The unavailability of the budget implementing of the e-government is one of the main challenges that were agreed upon by all the respondents. Regarding government support, they indicated that “there is great support for the project from the Prime Minister, but it gradually decreases as the hierarchical level of authority descends (ministers, senior managers)”. Furthermore, case study found that “there aren’t any obstacles in the security right now, but the current policy doesn’t support the e-government process”, which indicated by ID1-IT. Additionally, about the role of leader’s vision to enhance organizational survival he argued that “In general, leadership vision could be the top challenges in Northern Iraq for digital transformation”. Concerning the infrastructure challenges, S-Director stated that “inefficient technology legacy system in place is one of the challenges. This field is new for us. We can depend on hi-tech and latest applications. We need to keep up with those modern programs”. And to illustrate the portal ease of use and citizens utilize, P-Director stated that “Until now, citizens prefer traditional methods to obtain an Iraqi passport, even though

the form is available electronically without any expenses, and it is designed with ease and requires on general personal information". In addition to research proposed model factors, and through the respondents, new contributions and factors emerged, represented by internet accessibility and telecommunication network structure. Finally, regarding the social themes, ID1-IT mentioned that "lack of awareness is the main problem among citizens. There are no specific training or campaigns to raise social awareness among citizens about the importance of implementing the system and its effective role in reducing costs and time in accessing services". Study case provides evidence that there is resistance to change from executives because they do not realize the importance of the system, as indicated by E-GOV Director "except for the Prime Minister, most government officials are resistant to change and they do not even know that they are resistant to change". Also, concerning the impact of digital divide, MOI G-manager stated that "main barrier is the availability and accessibility to the internet services in the remote and mountain region". The case study showed that there is clarity in the demographic change within the community in Northern Iraq. There are distinct differences in the use of information and communication technology between the elderly and youth of both sexes, as well as in terms of the educated and uneducated citizens. As ID2-IT manager argued that "younger citizens are more likely to be using the system than older ones, educated more than uneducated, but social differences affect the use of the e-government system". Acceptance of mindset is the main contributing factor of the attitudes towards transforming from traditional methods to modern methods. As MOI G-manager indicates that "the mentality of citizens is the most important point challenging the change away from a paperwork system to an electronic government system because it is not clear whether they will accept the new system or not". The case study results revealed that organizational, political, infrastructural, and social issues are considered major challenges for the implementation of the e-government. They should be researched in detail at the initial steps of implementing e-government system. Head of the IT department who represents the high authority of the e-government system demonstrated that Northern Iraqi Region government has recently started embracing digital services more effectively. Moreover, the case study findings that the government will achieve many advantages from implementing e-government by increasing its efficiency, accountability, transparency, and reducing the operational costs.

5.2 Demographic Information

Table 1 shows that 52.6% of the respondents are male. The prevailing age range of respondents is between 18 and 31 covering 67.3%. The respondents' educational level is mostly bachelor and diploma's degree which in total includes 60.6% of the whole respondents. Most people in this study have used electronic government (87.1%) in Duhok Governorate, Northern Iraq. They have used internet daily (83.8%). Additionally, the overall response rate in this study is (92.75%), which is a very good rate in the field of information systems research.

Table 1. Demographic distribution of respondents

Factors	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%

5.3 Reliability Analysis

Reliability analysis was applied to determine the consistency of questionnaire using Cronbach's Alpha (see Table 2. According to the four-cut-off point, there is excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70), and low reliability (0.50 and below), all seven constructs in our model possess high reliability, and all variables together possess excellent reliability. Table 2 illustrates that all constructs have passed the reliability test where all α -values have exceeded the recommended minimum value of Cronbach's alpha [43].

Table 2. Reliability of measurements for all variables

Constructs	N	Number of items	Cronbach's Alpha (a)	Type
Performance Expectancy (PE)	371	5	0.90	Excellent Reliability
Effort Expectancy (EE)	371	5	0.85	High Reliability
Social Influence (SI)	371	5	0.88	High Reliability
Facilitating Conditions (FC)	371	5	0.80	High Reliability
Behavioral Intention to Use (BI)	371	5	0.87	High Reliability
Ethics of Internet (EOI)	371	5	0.88	High Reliability
Trust of System (TOS)	371	5	0.86	High Reliability
All items together	371	35	0.97	Excellent Reliability

5.4 Factor Analysis

For the factor analysis, the extraction method utilized was the Principal Component Analysis (PCA), and for the rotation method, the Varimax with Kaiser was applied. The results of the application of PCA for factor analysis are presented in Table 3. The results provide the analysis of each component as it contributes to the outcomes in the mediators.

The important outcomes are the components that have eigenvalues greater than 1.0. From the results, options 1 and 2 are the ones that meet the standard level for the eigenvalues while the other options were not able to meet the level of eigenvalues. Option 1 explains 42.765% of the variability and option 2 explains 31.177% of the variability. Together, these two options explain 73.942% of the total variability. As options 1 and 2 constitute 73.942% of all data, and remaining options 3, 4, 5, 6 and 7 constitute 100% less 73.942%, which is 26.058%. Following the factor analysis, options 1 and 2 have unobservable data based on the results shown in Table 3 where eigenvalues are greater than one. The unobservable data in these options can also be referred to as having hidden factors. This means that in future situations where options 1 and 2 are included in questionnaires, these should be noted as including hidden factors which need to be considered as there could be bias resulting from the inclusion of these options.

The extent of the impact of options 1 and 2 in terms of unobservable data is indicated in the scree plot of the options. This is seen in exhibit 3. This highlights that there are hidden factors that influence the responses indicated for option 1 and option 2. This is reflected in the declining slope of the scree plot. Future questionnaires presenting similar objectives would need to be adjusted to reduce the impact of the hidden

factors which would lead to a change in the scree plot, where there would be a flatter curve if there are minimal hidden factors influencing the responses given for specific options or components in the questionnaire. When there is no slope or a flat curve is achieved as a scree plot for the factor analysis (see Figure 2), this will indicate the elimination of hidden factors that influence the answer to the questionnaire.

Factor analysis was used in the analysis of the components excluding the mediators to identify the factors impacting the results. The questionnaire contained 7 options and each option had 5 questions. From the components represented by questionnaire options 1 to 7, the scores from the respondents were included in the SPSS program execution to show which responders answered the questions and were responsible for the mediator results. The hidden factors result when responders answer the questions, and some responders might want to answer a question as yes but end up answering no. Furthermore, responders might intend for the reply to be positive but as the choice does not exist or is hidden, the responders choose a negative response. This can be explained further with another example where an Internet router has to work with electricity but if the electricity is cut off, the Internet router does not operate. If the electricity is shut down continuously and someone asks the Internet users how the Internet is, the response could be that the Internet connection is poor, but this is not really the case as there is a hidden factor which is the electricity which is hampering the Internet connection making it look like there is poor connection. This is what is referred to with the finding that options 1 and 2 have hidden factors based on the results of the principal component analysis.

Table 3. Extraction method – Principal component analysis

Component	Initial eigenvalues			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.916	55.947	55.947	2.994	42.765	42.765
2	1.260	17.995	73.942	2.182	31.177	73.942
3	.499	7.132	81.074			
4	.396	5.656	86.729			
5	.376	5.376	92.105			
6	.304	4.339	96.444			
7	.249	3.556	100.000			

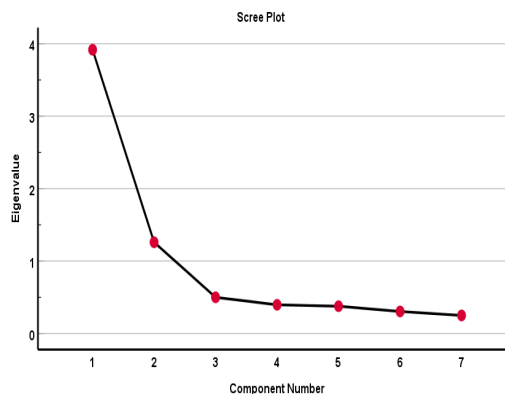


Figure 2. Scree plots showing the slope of curve

5.5 The Final Revised Conceptual Model for Implementing and Adopting e-government

The conceptual model for research will be revised in section 3.3 based on the research results and the conducted analyses. The revised conceptual model will include the new contributions to the research that has been disclosed by

e-government implementers and officials in Northern Iraq. In addition to the results of the hypotheses, the revised model will contribute to identifying relationships and gaps between e-government implementation and adoption, as summarized in Figure 3.

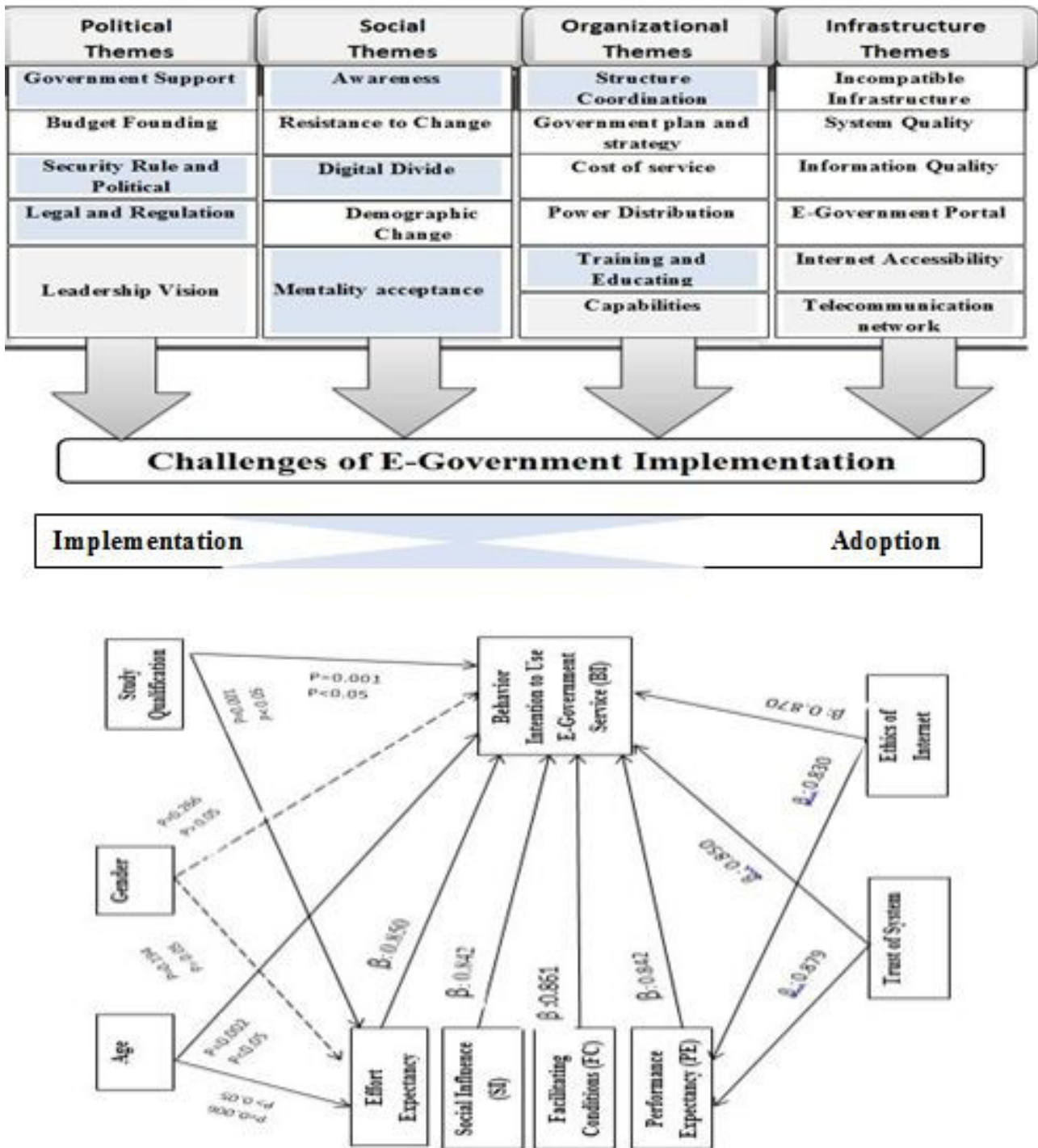


Figure 3. The final revised conceptual model for implementing and adopting e-government

6 Conclusion

The e-government attempts to compete the private sector by providing transparency, efficiency, and accessibility of public services to citizens and businesses. The advantages of e-government are well-documented, and progress has been made in implementing and adopting this concept especially in developing countries. However, the levels of adoption have not met expectations yet and the reasons may include lack of awareness, lack of system trust, the influence of customs, norms, and culture. When the stakeholders, especially citizens, are not aware of the existence and importance of e-services, they will not adopt e-government online services. Therefore, the purpose behind conducting this research was to develop a theoretical model to research and record the relationships between citizens' adoption of e-government services and the government's expectations regarding their adoption. This research aimed to develop a better understanding of the existing gaps between adoption and implementation aspects by analyzing and arranging issues of e-government implementation with adoption. The study methodology has been adapted and developed by justifying, as well as, discussing a selection of qualitative and quantitative study approaches to gather information in the context of e-government. The study also covers issues of implementation based on institutional theory and citizens' adoption of services based UTAUT model where behavioral intent and use constructs combined into a single architecture. Meanwhile, internet ethics and trust of system are presented as new issues. Furthermore, the study investigated the relationship between ethics of internet and trust of and e-government performance expectations in Northern Iraq. Data were collected via direct interviews with officials in e-government and influencers involved in implementation activities. At the same time, a survey-based questionnaire was prepared and distributed for the purpose of determining the intent of citizens' behavior as well as testing and confirming the validity of the recommended conceptual model shown in section 3.3.

The study found that facilitating conditions, effort expectancy, performance expectancy, social influence, trust of system and ethics of internet pose a positive influence on the behavioral intent of using e-government services. In addition, the results indicated that significant distinctions exist in age differences, level of education, excepting gender, and both effort expectancy and behavioral intention for utilizing e-government services. However, the case study results revealed that each challenge mentioned in the study model and novel contributions (capabilities, employee training, leadership vision, Internet accessibility, communication network, and mental acceptance) need to be dealt with as a very significant challenge for the project to succeed and reach the goal of the organization. Finally, it identified the relationship and gaps between the implementation and adoption. The study results presented a clear correlation between the perceptions of the government and citizens concerning the issues that affect both of e-government aspect implementation and adoption. This study hopes to provide a framework within which the executive bodies and decision-makers in the Government of Northern Iraq can rely on, to avoid the most important chal-

lenges that impede the successful implementation of e-government in line with the requirements and desires of citizens. This is done by considering the recommendations and filling the gaps reached by the study, in addition to strengthening common points and relationships.

References

- [1] A. Chiarini, Strategies for improving performance in the Italian local government organizations: Can ISO 9001 really help? *International Journal of Quality & Reliability Management*, Vol. 33, No. 3, pp. 344-360, March, 2016.
- [2] B. Magoutas, K. Schmidt, G. Mentzas, L. Stojanovic, an adaptive e-questionnaire for measuring user perceived portal quality, *International Journal of Human-Computer Interaction*, Vol. 68, No. 10, pp. 729-745, October, 2010.
- [3] R. Heeks, Most eGovernment-for-development projects fail: how can risks be reduced? *SSRN Electronic Journal*, iGovernment Working Paper No. 14, March, 2003
- [4] A. Prasad, S. Shivarajan, Understanding the role of technology in reducing corruption: A transaction cost approach, *Journal of Public Affairs*, Vol. 15, No. 1, pp. 22-39, February, 2015.
- [5] S. Ganapati, C. Reddick, Prospects and challenges of sharing economy for the public sector, *Government Information Quarterly*, Vol. 35, No. 1, pp. 77-87, January, 2018.
- [6] S. Geiller, T. Lee, using government websites to enhance democratic E-governance: A conceptual model for evaluation, *Government Information Quarterly*, Vol. 36, No. 2, pp. 208-225, April, 2019.
- [7] R. Ramli, E-government implementation challenges in malaysia and south korea: A comparative study, *The Electronic Journal of information systems in Developing Countries*, Vol. 80, No. 1, pp. 1-26, May 2017.
- [8] L. Glyptis, M. Christofi, D. Vrontis, M. D. Giudice, S. Dimitriou, P. Michael, E-Government implementation challenges in small countries: The project manager's perspective, *Technological Forecasting and Social Change*, Vol. 152, Article No. 119880, March, 2020.
- [9] M. Zeebaree, M. Aqel, A Weight-Analysis Technique of Existing Research on E-Government Implementation Challenges in Developing Countries, *Journal of Optimization in Industrial Engineering*, Vol. 14, No. Special Issue 29, pp. 135-152, January, 2021.
- [10] V. Venkatesh, J. Y. L. Thong, X. Xu, Unified theory of acceptance and use of technology: A synthesis and the road ahead, *Journal of the Association for Information Systems*, Vol. 17, No. 5, pp. 328-376, May, 2016.
- [11] J. Batlle-Montserrat, J. Blat, E. Abadal, Local e-government benchlearning: Impact analysis and applicability to smart cities benchmarking, *Information Polity*, Vol. 21, No. 1, pp. 43-59, February, 2016.
- [12] I. Palaco, M. Park, S. Kim, J. Rho, Public-private partnerships for e-government in developing countries: an early stage assessment framework, *Evaluation and*

- Program Planning*, Vol. 72. pp. 205-218, February, 2019.
- [13] M. Sarrayrih, B. Sriram, Major challenges in developing a successful e-government: A review on the Sultanate of Oman, *Journal of King Saud University - Computer and Information Sciences*, Vol. 27, No. 2, pp. 230-235, April, 2015.
- [14] J. Dumont, J. Shen, X. Deng, Effects of green HRM practices on employee workplace green behavior: The role of psychological green climate and employee green values, *Human Resource Management*, Vol. 56, No. 4, pp. 613-627, July/August, 2016.
- [15] F. Wamoto, E-government Implementation in Kenya, an evaluation of Factors hindering or promoting e-government successful implementation, *International Journal of Computer Applications Technology and Research*, Vol. 4, No. 12, pp. 906-915, December, 2015.
- [16] L. Alzahrani, W. Al-Karaghoul, V. Weerakkody, Analysing the critical factors influencing trust in e-government adoption from citizens' perspective: A systematic review and a conceptual framework, *International Business Review*, Vol. 26. No. 1, pp. 164-175, February, 2017.
- [17] F. Musau, W. Cheruiyot, J. C. Mushi, Trust and its challenges facing e-government programs in Kenya, *International Conference on Computer and Management (CAMAN)*, 2011, Wuhan, China, pp. 1-4.
- [18] J. Denford, G. Dawson, K. Desouza, Performance impacts of structure and volition in implementing policy through it-enabled government-to-citizen and government-to-employee interactions, *Economic Analysis and Policy*, Vol. 64, pp. 116-129, December, 2019.
- [19] S. Sadiq, G. Governatori, Managing regulatory compliance in business processes, in: J. vom Brocke, M. Rosemann (Eds), *Handbook on Business Process Management 2*, Second Ed., Springer, Berlin, Heidelberg, 2015, pp. 265-288.
- [20] N. A. Siddiquee, E-government and transformation of service delivery in developing countries: The Bangladesh experience and lessons, *Transforming Government: People, Process and Policy*, Vol. 10, No. 3, pp. 368-390, August, 2016.
- [21] J. Burn, G. Robins, moving towards e-government: a case study of organisational change processes, *Logistics Information Management*, Vol. 16, No. 1, pp. 25-35, February, 2003.
- [22] D. L. Reinholz, T. Andrews, Change theory and theory of change: what's the difference anyway? *International Journal of STEM Education*, Vol. 7, No. 1, January, 2020.
- [23] L. Devereux, T. Melewar, K. Dinnie, T. Lange, Corporate identity orientation and disorientation: A complexity theory perspective, *Journal of Business Research*, Vol. 109, pp. 413-424, March, 2020.
- [24] G. Godin, The Theories of Reasoned Action and Planned Behavior, *Journal of Applied Sport psychology*, Vol. 5, No. 2, pp. 141-157, September, 1993.
- [25] T. Liu, X. Yang, Y. Zheng, Understanding the evolution of public-private partnerships in Chinese e-government: four stages of development, *Asia Pacific Journal of Public Administration*, Vol. 42, No. 4, pp. 222-247, 2020.
- [26] J. Meyer, B. Rowan, Institutionalized Organizations: Formal Structure as Myth and Ceremony, *American Journal of Sociology*, Vol. 83, No. 2, pp. 340-363, September, 1977.
- [27] C. Anagnostopoulos, T. Byers, D. Shilbury, Corporate social responsibility in professional team sport organisations: Towards a theory of decision-making, *European Sport Management Quarterly*, Vol. 14, No. 3, pp. 259-281, 2014.
- [28] S. Barley, P. Tolbert, Institutionalization and structuration: Studying the links between action and institution, *Organization Studies*, Vol. 18, No. 1, pp. 93-117, January, 1997.
- [29] T. Oliveira, M. F. Martins, Understanding e-business adoption across industries in European countries, *Industrial Management & Data Systems*, Vol. 110, No. 9, pp. 1337-1354, September, 2010.
- [30] I. Ciftci, E. Tatoglu, G. Wood, M. Demirbag, S. Zaim, Corporate governance and firm performance in emerging markets: Evidence from Turkey, *International Business Review*, Vol. 28, No. 1, pp. 90-103, February, 2019.
- [31] N. Rana, Y. Dwivedi, Citizen's adoption of an e-government system: Validating extended social cognitive theory (SCT), *Government Information Quarterly*, Vol. 32, No. 2, pp. 172-181, April, 2015.
- [32] M. Kurfali, A. Arifoğlu, G. Tokdemir, Y. Paçin, Adoption of e-government services in Turkey, *Computers in Human Behavior*, Vol. 66, pp. 168-178, January, 2017.
- [33] V. Venkatesh, M. Morris, G. Davis, F. Davis, User acceptance of information technology: Toward a unified view, *MIS Quarterly: Management information system*, Vol. 27, No. 3, pp. 425-478, September, 2003.
- [34] V. Peñarroja, J. Sánchez, N. Gamero, V. Orengo, A. M. Zornoza, the influence of organisational facilitating conditions and technology acceptance factors on the effectiveness of virtual communities of practice, *Behavior & Information Technology*, Vol. 38, No. 8, pp. 845-857, August, 2019.
- [35] Q. Hammouri, M. Al-Sebae, E. Abu-Shanab, Justifying the Investment of Information Technology Projects: A Case Study from Jordan, *The 15th Scientific Annual International Conference for Business*, Jordan, Amman, pp. 55-64, 2016.
- [36] P. Zak, S. Knack, Trust and growth, *the Economic Journal*, Vol. 111, No. 470, pp. 295-321, March, 2001.
- [37] F. Al-Sobhi, V. Weerakkody, R. El-Haddadeh, the relative importance of intermediaries in eGovernment adoption: A study of Saudi Arabia, in: M. Janssen, H. J. Scholl, M. A. Wimmer, Yh. Tan (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, Vol. 6846 LNCS, Springer, Berlin, Heidelberg, 2011, pp. 62-74.
- [38] Y. Rahmi, A. Frinaldi, The Effect of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Condition on Management of Communities-

Based Online Report Management in Padang Pariaman District, *Proceedings of the International Conference on Social Studies, Globalization and Technology (ICSSGT 2019)*, Atlantis Press, 2020, pp. 478-485.

- [39] M. Sokiyna, M. Aql. The role of e-business applications software in driving operational excellence: Impact of departments collaboration using sustainable software, *Sustainable Computing: Informatics and Systems*, Vol. 28, Article No. 100445, December, 2020.
- [40] I. Akman, A. Yazici, A. Mishra, A. Arifoglu, E-Government: A global view and an empirical evaluation of some attributes of citizens, *Government Information Quarterly*, Vol. 22, No. 2, pp. 239-257, 2005.
- [41] R. Madigan, T. Louw, M. Wilbrink, A. Schieben, N. Merat, What influences the decision to use automated public transport? Using UTAUT to understand public acceptance of automated road transport systems, *Transportation Research Part F: Traffic Psychology and Behavior*, Vol. 50, pp. 55-64, October, 2017.
- [42] A. Ahmed, R. Sil, when multi-method research subverts methodological pluralism—or, why we still need single-method research, *Perspectives and Politics*, Vol. 10, No. 4, pp. 935-953, December, 2012.
- [43] M. Mohammadi, S. S. Alavi, P. Farokhzad, F. Jannatifard, S. M. Kalhori, G. Sepahbodi, M. B. Reisi, S. Sajedi, M. Farshchi, R. K. Karami, V. H. Kasvae, N. Sepasi, S. S. Alavi, the Validity and Reliability of the Persian Version Test of Mobile Phone Dependency (TMD), *Iranian Journal of Psychiatry*, Vol. 10, No. 4, pp. 265-272, September, 2015.

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