Digital Divide Impact on E-voting Adoption in Middle Eastern Country

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Abstract — **To ensure a high level of participation by voters and their trust in the election process when using an e-voting system, the voters who are on the other side of the digital divide must be considered. Although the Jordanian government runs a campaign promoting voting in parliamentary elections, the voters' turnout to elections is not high. This research paper therefore introduces the concept of the digital divide and its impact on e-voting system adoption. A framework for e-voting digital divide factors is proposed which presents the main factors that would influence voters' intentions to use an online voting (e-voting) system. These factors comprise: age, education, income, and internet use. With the impact of these factors articulated, this research paper is significant in helping the Jordanian government to develop a strategy to ensure higher participation by voters in selecting their candidates. This research paper also provides a foundation for future empirical research on the influence of the digital divide on e-voting adoption.**

Keywords – e-voting; digital divide; democracy; innovation; e-government

I. INTRODUCTION

Worldwide, governments have recognized the importance of e-voting as citizens turn to the internet as the medium through which to communicate with government, especially through e-government [1][2][3][4][5]. The government of Jordan is one of the governments that have realized the necessity of the involvement of information and communications technology (ICT), including the internet, in the political and governance process through what is called e-voting to move towards e-democracy [1]. The government of Jordan has viewed this initiative as an approach to improve the democratic process by ensuring more participation by voters in selecting their representatives and leaders. Previous research has indicated that "voter turnout is vital to the health of all democracies" [6]. People (voters) are presented as a core component in e-voting definitions, with e-voting defined as a mechanism that uses information technology (IT) to enable people to vote [4][7][8].

Low voter turnout at elections has been identified as one of the main social problems facing different governments in both developed and developing countries [1][8]. This issue has prompted researchers and practitioners to investigate the issue of the digital divide and its effect on the implementation and adoption of e-voting technology. Therefore, the current research paper contributes by investigating the influence of the digital divide on e-voting adoption in a developing country, Jordan. In a study which introduced a model for the adoption of e-voting in Jordan, the digital divide was one of the main issues investigated in relation to citizens' trust in e-voting. The study stated that it was important to consider the digital divide to ensure citizens' trust in the e-voting system [7]. By focusing on a citizen-centric approach, the current research paper articulates the impact of the digital divide on citizens' intentions to use an e-voting system in Jordan.

An e-voting system would represent an important initiative for the government of Jordan as it would help to automate the election process and would eliminate errors and election issues [1]. The issues include those related to paper-based elections such as errors in counting ballot papers and manipulation of electoral process to suit the desires of particular candidates [9]. It has been stated that "e-voting systems not only save time for voters, but also, by elevating the convenience in election, raise the percentage of people voting" [10]. This current paper presents e-voting as an approach to help the government of Jordan to resolve the issue of voter turnout and to increase voters' participation.

This study introduced a framework for e-voting digital divide factors to investigate the impact of the digital divide on e-voting adoption in Jordan. The framework consisted of four factors, namely, age, education, income, and internet use. These factors were addressed based on socially-based perspectives as the digital divide has been investigated in relation to e-voting among voters in the social community. By addressing these factors, the current research paper would help the government of Jordan to build an applicable strategy to ensure high voter turnout at elections and, to be specific, the parliamentary election. In Jordan, the 130 parliamentary representatives are elected by the public.

This paper comprises four sections, the first being the introduction in Section I. This is followed in Section II by the presentation of an established model in e-government and e-voting adoption, and the related literature. Section III outlines the e-voting digital divide framework. Section IV identifies main contribution of the research paper and introduces the main digital divide factors that need to be articulated to

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improve the voting process through e-voting system. Section V presents the conclusion.

II. Digital Divide Factors and E-voting Adoption

It has been stated by Bélanger and Carter that "as governments worldwide begin to implement more technology-based voting systems, in particular Internet voting, concerns about the potential impacts of the digital divide continue to grow" [6]. Successful attempts to identify the digital divide have been made by different researchers: one such definition describes the digital divide as referring "… to the distinction between the information haves and have-nots; the gap between the computer literate and the computer illiterate" [11].

Different definitions of the digital divide have prompted researchers to identify its main components and barriers. The digital divide consists of two major components, namely, access to technology and comfort with technology [11][12]. These two main components are considered to represent the barriers that would limit the use of internet voting (I-voting) [8]. Researchers have investigated the influence of digital divide barriers on technology, in general, and on e-voting, in particular, based on different streams, including that of individuals, by exploring socio-demographic characteristics and IT skills' characteristics [11][13]. This research paper focuses on exploring the influence of the digital divide on individuals' (voters') intentions to use e-voting systems. The following paragraphs present prior studies that have investigated the influence of digital divide components on e-voting adoption.

The 'access to technology' component of the digital divide has been explored in previous research by focusing on different demographic factors that would limit the use of technology, in general, and e-voting, in particular, with these factors including age, income, and education [6][11]. On the other hand, the 'comfort with technology' component has been assessed in terms of the skill divide which refers to the difference in the level of skills required to interact with an online system in an effective and efficient manner [11][14]. In a study conducted in a developed country, the United States of America (USA) [11], researchers developed a model to test the influence of the digital divide on I-voting utilization. The different factors in the model included access components (age, income, and education) and internet use (skill divide components). These factors had a direct association with the dependent variable, I-voting adoption. Through a survey of 372 people from varied backgrounds, the model was verified. The analysis results showed that age, income, and internet use had a significant influence on I-voting. However, the education factor was not found to be significant. The current research paper has extended other studies by exploring the effect of these constructs on e-voting adoption in a developing and Middle Eastern country, Jordan. Prior research has shown the importance of examining these factors in relation to technology adoption, including e-government and e-voting, in developed as well as developing countries [15][16][17].

In addition, previous e-government studies have explored the digital divide's impact on citizens' intentions to use e-government [18]. In a study conducted in the United Kingdom (UK) which sought to compare e-government adoption in the UK with e-government adoption in the USA [18], researchers investigated the influence of the digital divide on citizens' intentions to use e-government services. In their model, they proposed a direct association between the two major factors of digital divide (internet accessibility and internet skills) and intention to use. They found that these two digital divide factors were not significant determinants of e-government adoption in the UK whereas, in the USA, these two factors were significant [19]. This variation in the findings was identified as referring to cultural differences between the two countries, the UK and the USA [18]. The current study therefore attempted to explore the effect of the digital divide on e-voting adoption in a developing Middle Eastern country, Jordan, which has a different culture to these two Westernized countries, the UK and the USA.

In another e-government study conducted in the USA [20] which used the Technology Acceptance Model (TAM) as a theoretical framework [21], researchers proposed an e-government model through which to explore the digital divide and transformational government (t-government). The t-government model focuses on the significant role of ICTs in improving the relationship between citizens and different government services [20][22]. In their model of e-government adoption, these researchers followed a different method to that used in previous studies in examining the influence of the digital divide on e-government. They proposed that several factors, namely, age, education level, employment status, and household income would have a direct association with the access barriers construct which, in turn, would have a direct relationship with the dependent variable, e-government usage. Access barriers were measured as "… a belief that the Internet is expensive to use and difficult to access". On the other hand, internet experience influence on e-government usage was tested by linking it in direct relationships with two TAM constructs, perceived ease of use (PEOU) and perceived usefulness (PU). The constructs, PEOU and PU, were found to have a direct association with e-government usage. In testing and analyzing the model, the researchers found that educational level, employment status, and household income had a significant influence on e-government usage through access barriers; however, no significant impact was found for age and internet experience. The current study has explored the direct influence of digital divide constructs on e-voting usage. Furthermore, this paper represents a valuable resource for future research work that focuses on t-government studies. E-voting is one of the e-government applications and services that use ICTs to enhance the democratic process by having better communication between citizens and the government through the election process [23].

In summary, this section has outlined the literature that identifies the main digital divide factors that assist in predicting the adoption of an e-voting system. The current study has focused on different factors comprising age, education, income, and internet use. A review of the literature has shown the necessity of conducting research to further explore the influence of the digital divide on the adoption of e-voting systems by voters, especially in developing countries. The next

section introduces the current study's framework for e-voting digital divide factors.

III. E-VOTING DIGITAL DIVIDE FRAMEWORK

Based on the reviewed literature, this paper introduces the following framework to investigate the impact of digital divide factors on voters' intentions to use an e-voting system (Fig 1). The literature review identified a lack of research testing the direct influence of digital divide factors specifically on e-voting adoption, and especially in developing countries and the Middle Eastern region. The current research has conceptualized the direct association between four constructs of the digital divide and voters' intentions to use an e-voting system. These constructs are age, education, income, and internet use.

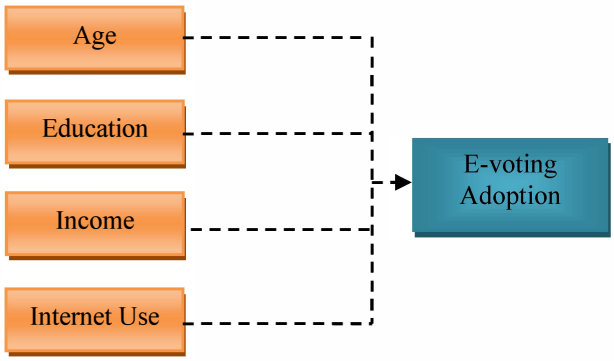

Figure 1. E-voting Digital Divide Factors Model

The next sections discuss the digital divide factors and e-voting adoption, the current research paper's implications, and conclude the paper.

IV. DISCUSSION AND IMPLICATIONS

This paper presents a study that explored the impact of digital divide factors on voters' intentions to use a technological innovation, namely, e-voting. Previous research, conducted has indicated that "e-voting, as with some other technological innovations, has been implemented and designed by developed and Western countries. It has been implemented to suit the social cohesion of these communities" [1]. This research study has demonstrated the necessity of examining the impact of digital divide factors on the adoption of an e-voting system in a developing country, Jordan. The paper introduces different digital divide factors that explain voters' acceptance of an e-voting system as a new approach for selecting their parliamentary representatives. Examples of these factors are age, income, internet use, and education.

This research paper fulfills three main functions: it acts as a research facilitator in articulating the factors and obstacles requiring further exploration in relation to e-voting adoption. It also prompts the government of Jordan on the necessity of increasing voter turnout at elections by implementing an e-voting system. In addition, the paper invites the government of Jordan to consider digital divide issues through the different development and implementation phases of e-voting systems.

The study has highlighted that e-voting is one of the main initiatives that would enable the Jordanian government to ensure a high voter turnout at elections, in particular, the parliamentary election, therefore enhancing the democratic process. This research paper assists the government of Jordan by presenting preliminary ideas about what would deter Jordanian voters from participating in the election process to choose their representatives in parliament. With the impact of these digital divide factors articulated in relation to e-voting, the government of Jordan would be in a position to consider the centricity of citizens in the implementation stage of an e-voting system.

As an e-government application, e-voting has a definite impact on government-to-citizen interaction [23][24]. Therefore, the government of Jordan should take advantage of an e-voting system as an approach to enhance its interaction and communication with Jordanian citizens, sustaining their trust, not only in e-government and e-voting systems, but also in the government itself. The government of Jordan should find appropriate methods to resolve the issues which would influence the intentions of citizens to vote through an e-voting system, including the digital divide issues, the main focus of the current research paper. These methods could include providing inexpensive access to technology and increasing older people's awareness about technology.

The current research paper is a valuable resource for researchers and practitioners who are interested in studying the impact of the digital divide on the adoption of e-government, and specifically e-voting, as well as other technological innovations in general, such as e-health systems. It is also a valuable resource in the cyber security research context. The digital divide has been presented as one of the major concerns that need to be addressed when discussing the topic of cyber security across different nations in both developed and developing countries [25].

V. CONCLUSION

In conclusion, this research paper introduces a proposed framework for e-voting digital divide factors. The framework aims to explore the impact of digital divide factors on voters' willingness to use e-voting systems, with these factors being age, education, income, and internet use. The study presented here has taken an important step in examining the influence of the digital divide on e-voting adoption in Jordan by establishing a framework for in-depth exploration of specific factors. This research paper introduces a conceptual study. In future, more studies will be carried out to empirically test the direct association between digital divide factors discussed above and the adoption of e-voting by voters. The current study has focused primarily on the Jordanian parliamentary election: future research should take in consideration other types of elections, for example municipal elections.

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