Review

E-voting in Jordan: Assessing readiness and developing a system

Emran Aljarrah [a, 1], Hamzah Elrehail [a, *, 2], Bashar Aababneh [b, 3]

[a] Girne American University, North Cyprus, Cyprus
[b] Eradeh Est., Amman, Jordan

A B S T R A C T

The aim of this paper to outline the E-voting system readiness and design in Jordan, the researcher's illustrate the guideline for developing and designing E-voting system in Jordan election. Moreover the paper used TAM model to test the Acceptance of the proposed system from voter's perspective and the readiness of the system to be used.

© 2016 Elsevier Ltd. All rights reserved.

Contents

* Corresponding author.
    E-mail addresses: cshamzah@gmail.com (E. Aljarrah), cs-hamzah@hotmail.com (H. Elrehail), Bashar4real@hotmail.com (B. Aababneh).
[1] He is doing PhD in Management Information System, his research focus on system design and readiness.
[2] He is doing PhD In Business Management. His research area Innovation, Leadership, Knowledge Management and MIS in general.
[3] His Research interests include innovation and entrepreneurship through technological advancements.

1. Introduction

Governments in many countries around the world try to utilize the information and communication technologies to transform traditional government services to electronic government or digital government. In Jordan, The government has started implementing a program of an e-Government in 2002, which aims to improve its

service delivery and increase the involvement of citizens through the penetration of technology. A voting system which is one of the significant services which has been conducted and controlled by a government still very old, which can call legacy systems.

The current traditional "paper-based" voting system which has been used in Jordan is encountering many problems and complications which we will present major of them later. However, the successive governments have tried to conduct the democratic approaches through several practices which have been executed to improve the variety of life aspects (Ilieva, 2011), but with the rapid advances in information technology and information transfer speed, it is still the parliamentary election system in Jordan, which is one of the democratic approaches in Jordan relies on traditional methods of implementation.

In Jordan, it undergoes democratic elections periodically. It holds parliament elections every four years to elect its legislative body. Municipal elections in Jordan also take place once every four years to elect the governing boards for the various Jordanian municipalities.

And often times due to technical limitations, in cases of fraud in some areas because of the influence of politicians on people. In addition, unreliability of the performance of the election because of political money, the results of the voting are not announced until an audit takes place, or where a re-count is placed in order. Introducing irregularities in the final count results.

Consequently, it is should be a significant research work to deal with these problems and complications by building an electronic voting system (e-voting) which should be able to control the entire processes of elections.

2. E-voting system in practice: scanning the landscape

Currently, E-voting systems face a number of obstacles to be overcome before they could be used as a successor to the current paper-based voting system. A new proposed e-voting system should match different requirements; functional and non functional.

According to the recommendation report by election monitoring program and the performance of the elected councils in Jordan (Monitor: December 2015), that said there is a need for a mechanism to vote through the "house of representatives and Senate" meeting is better than the current which requires amendments to the rules of procedure of the Senate so that the adoption of the electronic voting system means more efficient to ensure the accuracy of the vote.

The importance and the requirements of the application of an electronic voting system in elections, whether parliamentary, local municipality, trade union, chambers of commerce and industry elections with a statement of applied procedures of this system and the benefits to be derived by the application of a strategic alternative to traditional systems under which the elections are held (Kohno, Stubblefield, Rubin, & Wallach, 2004), which hovers around some cast doubt on the integrity, accuracy and validity of their procedures, decreasing show transparency procedures, processes and their results in front of the concerned public opinion.

According to (Alomari, Elrehail, & Al Shibly, 2013) the government in Jordan developed SMS gateway that make communication between government and citizen more effective and easier. Abu-Shanab et al. (2010) in his study for E-voting conducted in Jordan, the researcher applied his study in University student voting for their representative in their departments, the study reveals that factors influence the convenience and integrity of election process. Moreover the study tries to emphasize the factors that are adopting the e-voting system in Jordan University's.

Moreover about more scenarios in E-voting Pan, Hou, & Ansari (2013) the researcher focused on three items related to voters and candidates, are privacy, verification and confidentiality which are the most important elements in the e-voting election. In addition Pan et al. (2013) add new security schema which called "RE-NOTE" for continuous research on E-voting system which used the previous schema "E-NOTE", the ring schema allow group of users to sing massages without information provided about the user (Voter). Moreover this schema increased the security of E-voting system using the previous mentioned schema.

According to (Pan, Hou, & Ansari, 2015) "M-NOTE" schema provide more functionality for voters that can cast and audit their votes, "M-NOTE" should provide more security that prevent hacker using clash attacks to access the voters choices, manipulate it.

Kusters, Truderung, & Vogt (2012) in their paper introduce the term of "Verifiability" which means there is an authority for users of E-voting system (i.e. Voters) to check the results of voting process, is their votes counted, affect the voting results and no manipulation to their votes happened. Moreover the effect of clash attack does it affect the results, the ballots changed by new ballots. The tested systems mentioned by Kusters et al. (2012) are the "Wombat Voting system" and a variant of the "Helios voting system".

The Wombat Voting system its an academic project which try to make the voting process clear to voters, which provide a clear process and verifiable to voters, the system developed by "Alon Rosen" which used a method "cryptographically-based system" (Wombat Voting system website).

Adida (2008) "Helios voting system" introduce as the first voting system using web and open-audit system, the most feature is that any one (i.e. users) can run the election in a simple way, the "Helios" is suited for small group of voters, prevent any manipulation of ballots and decrease the authority of open-audit election.

Obviously, through reviewing some of the current electronic voting systems and even studies on this topic, which tended to the technical side in solving information security problems, and through several models to encrypt data to deal with secure information, although it is very possible through the availability of data encryption which is supported by, database servers and Unix servers.

There are a variety of private and public e-voting applications available (MotionVoter, 2011). and (Vote-Now n.d.) Offer a private election service. Source Forge includes a project which promises an open-source electronic voting system for download (Electronic Voting System, 2009). Though when the researcher checked, the project had no files available.

The US Department of Defense's Federal Voting Assistance Program (FVAP) proposed an Internet based voting system for the 2004 primary and general elections named Secure Electronic Registration and Voting Experiment (SERVE) (D. D. Jefferson, Rubin, Simons, & Wagner, 2004). The FVAP assembled a Security Peer Review Group (SPRG) to evaluate SERVE. Their report very strongly recommended against deploying SERVE and SERVE was withdrawn from use (Defense, 2007, p 11).

The SPRG report lists many security concerns regarding electronic voting in general and Internet voting in particular. These areas of interest include:

- PC-centric application versus Server-centric application.
- Security of the intermediate network.
- Voter-verified audit trail.
- Control of the voting environment.
- Spoofing and man in the middle attacks.
- Denial of service attacks.

The ultimate objective of SERVE is to enable voting from any PC