

ONLINE VOTING FOR E-DEMOCRACY IN DEVELOPING COUNTRIES: IS IT POSSIBLE?

Julius Jillbert
Hasanuddin University (UNHAS)
Indonesia

Mustarum Musaruddin
Haluoleo University (UNHALU)
Indonesia

ABSTRACT

Issues such as reliability, security and affordability of voting procedures might be seen as factors that can stimulate enthusiasm upon democracy system among potential voters and increase participation. This paper argue that online voting may play important role on enhancing security and cutbacks of burden human and financial resources allocation to election processes. However, in the emerging democracies, like some of Asian countries, in this case Indonesia, exhibit other factors, such as political, cultural, educational, economic sensibilities, that might be weighted before any online voting system is deployed.

INTRODUCTION

The major features of modern democracy include individual freedom, which entitles citizens to the liberty and responsibility of shaping their own careers and conducting their own affairs; equality before the law; and universal suffrage and education. One of the most crucial functions in democracy is the implementing of general election. This function can represent either citizen's trust and confidence in government or facilitate for the orderly transfer of power. The general election itself consists of several activities such as the process of registering citizens to vote, preparing ballots, conducting elections and tabulating results.

Online voting has become one of the new systems that are considered as an appropriate way to make the voting more convenient and, it is expected to increase citizen's participation on the election. This system has been referred to as a more challenging than other electronic commerce or electronic government application with regard to network security and data encryption.

LITERATURE REVIEW

Online voting has been considered as the reliable way to replace the older election

systems. This system can be divided into 3 categories namely: "voting from home via email; voting from home via a web link to the ballot; and voting from regional polling center which is equipped with an internet connection" (Dictson and Ray, 2000).

The first type of electronic voting systems is slightly similar with current absentee voting process. The different would be on the way the voter sends the ballot. This system allows the voter to send the ballot via secure email to election office. This method has several advantages compare to using the web such as it would be less voter's intimidation for voter with little or no internet experience and avoid transmission bottlenecks during high internet traffic times (Elliot, 1999)

The second type would be accomplished using the web site. Dictson and Ray (2000, p.3) stated that this method allows the voter to log in through secure means, verify their identities, and vote on electronic ballots. This system seems to be more convenient since the voters can vote through internet access from home, office, library, school or any place where the internet possible to be accessed. This method also has some advantages in which the transaction can be occurred in real-time, beside that the web site will support the

voters with online help and information that is needed to fill out their ballots.

In terms of conservative administrator, traditional polling sites can be enhanced by utilizing the website technology. The internet system can link the regional voting center and the voters. The poll workers then identify the voters to ensure voters have sent the correct ballots. Once the workers believe that the ballots have been filled out correctly they will delivery over the internet directly to the polling station. Dictson and Ray (2000, p.4) believe that this method provide security and convenience for the voter and make the system more efficient as it needs less workers than traditional method and safe money and time. One of the weaknesses is that the method does not allow the voter to vote at more than one polling station, as the entire election would be linked to central database (Dictson and Ray, 2000).

The other systems will associate with the innovation of the previous online voting systems. At the beginning of the process, the voter should visit the designated web and make a print out a form declaring that he or she will vote online. The form then should be signed and mailed to the local election authority. The next step the authorities would check the voter's registration by matching their signatures on the original registration and will record the digital identity of the computer. The voter then will receive a PIN (Personal Identification Number) that only can be used from that computer. When The Election Day occurred, the voter will log into the website using his or her PIN and sign his or her choices on the web. With regard to security consideration, the ballots will be encrypted so that it cannot be read or changed during the transmission. Once the ballots arrived in central computer, the record then would be created. The record has to be separated so that the election officials are able to verify without seeing how they vote. The record finally can be burned into a CD as backup (Kantor, 1999).

However, both polling place system and remote system would require numerous technical and procedural innovations to ensure the accuracy of voter authentication, ballot secrecy and security. Those two types of system can be distinguished by the

infrastructure, communication protocol, software and hardware platform that they use (Bouras, 2003).

Remote system is different from conventional pooling place system in term of cost allocation. In remote system, it does not require election equipments, poll workers, printing cost and mailing absentee ballots, but needs software to deal with multiple platforms of the voter and high-volume help desk and other service to the voters who have trouble voting. Moreover, this system requires cost of authentication devices such as PINs, smartcards, etc. In contrast, pooling place system requires election officials and a lot of infrastructures.

Another important key is that online voting systems should be designed to satisfy various requirements as follow:

- *Fail-safe voter privacy:* No link between a voter and a vote. Voter privacy must be fail-safe and presented even after election accomplished.
- *Collusion-free voter secrecy:* No access to know what vote is. Voter secrecy must be assured and it must not rely on communication protocol and cryptographic assumption.
- *Verifiable election integrity:* The system must provide for verifiability of election integrity that denies influence of a number of parties in the outcome of election except properly voting.
- *Fail-safe privacy in verification:* The voter's name of each ballot must not be revealed.
- *Physical recounting and auditing:* The system must provide for reliability in auditing and recounting with error rates as low as possible or better than conventional voting system.
- *Prevent over votes:* The system must provide over votes detection system
- *Provide for null ballots:* The system may allow voters to null ballots
- *Represent blank votes:* The system must allow voter to change the choices from 'vote' to 'blank vote' or otherwise, before casting the ballot.

- *Manifold of links*: The system must use a manifold of redundant link and keys to securely define authenticate and control ballots.
- *Technology Independent*: The system must allow ballots and their control to be used in off-line and /or dial-up and /or network with standard PC or hand held.
- *Authenticated user-defined presentation*: The system must support multiple language, font sizes, and layout for voters.
- *Open, review, open code*: The system allows all source code to be publicly known and verified.

ARGUMENT TOWARD ONLINE VOTING

Recently some people believe that online voting become the appropriate election system. There is a growing interest among public officials and interest group on utilizing the online voting. Their argument sometimes will be based some consideration such as:

Efficiency and economics

Cost benefit is also the important factor to be considered in election process. Traditional systems will cost a lot of money since they need more honor workers to be involved in entirely process including the paper ballots and poll site equipments.

The Internet based voting system according to Dictson and Ray (2000) would free location that is known as an absolute requirement. Beside that, online voting will be useful to answer thousands of redundant questions that are posed to officials during the election session. This probably becomes the significant way to reduce telephone cost and save more election budget.

Traditional system sometimes requires double counting of ballots and double-checking to avoid the human errors. Online voting can minimize all the voting processes, while it can reduce the human errors since it is known as reliable system with a better accuracy. Based on those arguments, online voting might be considered less cost and time saving.

Convenience

Some proponents believe that Internet system will be able to provide the convenience way for people to vote. Dictson and Ray (2000, p.5) argued, "Perhaps the most compelling argument in favor of online voting is the convenience factor. Convenience will obviously encourage participation." Internet system will give much easiness ways for voter such as saving their valuable time and simple procedure. People do not have to stand in line for long hours to vote because voting can be done from their homes. This system probably can reduce absentee ballots especially when people are going away from home (Dictson and Ray, 2000).

Participation

People sometimes are unwilling to participate on election because of the system of election. Traditional system requires people to stand in line for hours to get the chance to vote, while they also have a lot of routine activities to do (Bonetti, 2000). It seems that the traditional one become less efficient regarding its longer waiting time. Online voting, on the other hand gives a large opportunity to vote from any point where Internet access is available such as home, school, office or even shopping mall. Using online voting can reduce the time people need to vote. This means that citizen can vote without loss their time and avoid a long queuing of voter which identified as the biggest problem of every election. Citizens can vote without going to the polls and may be this is the efficient way to encourage people's participation on Election Day.

Knowledge

Another crucial point regarding election process is that sometimes people just pick up the names that they are familiar with or simply think sound nice and voting on the basis of party affiliation rather than candidate's qualification. This probably due to the fact that they have a minimum level of information about the candidates and the party which have to be chosen. In order to solve this problem the online voting has been able to provide the voter with more information about the candidates or related issues that are on the ballots. John Allison, director of communication for the Ohio Secretary of

State's office (Dictson and Ray, 2000) said that "for potential voters, the internet is an opportunity to access anything they need to know about voting, 24 hours a day, instantly". The online voting can broaden their knowledge to deal with this problem because information is always provided on the web will assist them to meet the best choice correctly. Maney (1999) stated that voter would no longer depend on faulty memory, advertising propaganda or word association in voting our political representative. By this means that people has become more fully informed voter.

Security and accuracy

One of the biggest problems regarding with online voting is dealing with security system. The most important step of assuring the security system is the verification of individual voters (Dictson and Ray, 2000). This includes matching the original signature to ensure that the voters are actual voters. In order to anticipate the security system, online systems has equipped with some encryption systems to ensure that the ballots can not be changed or read during the transmission. The other thing that in one of the internet system type the voter will receive a PIN (Personal Identification Number), that only can be used from that device. The PIN then will be used to log into the web site to conduct voting. This method will significantly ensure that only the actual voter will vote on Election Day. The only problem that faced today is the use of digital signature for voter's authorization. However, the use of Personal Identification Number (PIN) probably will answer that problem.

Accessibility

Online voting might be the better solution to increase in access to the democratic process. The systems can actually eliminate current barriers to voting such as: era of two-career or single-parents families, perpetual traffic jams, extreme professional and personal demands on one's time. Online voting is able to facilitate to make everyone easier for everyone to vote, to remedy the current disparity, which in fact, results in higher voting participation rate (Strassman, 2000). Furthermore, Dictson and Ray (2000, 12) believe that online voting system "would make easier for some people to vote (especially the handicapped, people living abroad and frequent travelers) without

inconveniencing anyone else." For one who do not have private access from home, officials can provide more public Internet terminals such as libraries, schools, shopping mall, bus and train stations, gas stations and ATM as well. By this means the poor can get chance to vote as easily as the high-income people can without missing their works.

ANALYSIS & DISCUSSION

Relevant issues of online voting in Indonesia

Even though online voting could be the best optional alternative during the election process, some problems are believed need a further evaluation in future, especially in Indonesia such as:

Verifying the eligibility of the voter while maintain a secret ballots

In order to cope with this potential problem online voting has been equipped with technology, which has ability to verify the eligibility of the voter namely digital signature. The system will require each voter to have a digital certificate, an advanced type of account number that is capable of digitally signing any document generated by computer, including an Internet ballots (Dictson and Ray, 2000). This would be useful for officials to recognize that the ballot has been send by the person who signed it. The problem is, most Indonesian government officials who involved do not know how to use the Internet.

Besides that regarding to maintaining a secret ballots the systems has been supported with advanced technology which enable the ballots to be encrypted so that it can be read (or altered) during the transmission process to the virtual polling place (Dictson and Ray, 2000). This method can ensure the ballot could not be tampered with since the voters signed it. Indonesia with its less-developed technology infrastructure will surely not capable of supporting such systems.

However the digital signature and encryption technology are not considered inexpensive. The question would be how these advanced technologies would be funded. For some developed countries such as United States, Japan or United Kingdom, this would not be the big issue, but for developing country such as Indonesia with minimum national budget, it

would be difficult for the government to provide these advanced technologies.

Alternative access for people without Internet access

There is no barrier for people who can not afford private Internet assets to vote during the Election Day, because the officials can facilitate them with public internet access such as schools and libraries, business center and community center. This method will be expected to help other disadvantaged people in society to participate (Dictson and Ray, 2000). However, there is still problem with ability to access the Internet system especially for developing country e.g. Indonesia since most of people are still undereducated and less internet knowledge. Furthermore, the government still cannot afford to provide many public internet accesses since its national budget are very limited.

Ensuring a person only votes once

Regarding to ensuring a person only vote once some developed technology has been plug in the online voting systems. This technology namely encryption code will allow the voter to vote once during the process. During the election process, once the voter marked his or her choice then the ballots will be encrypted so that it cannot be changed or choosing twice while it transfers to the polling sites then will be counted and tabulated. Secondly the voter will be send a PIN (Personal Identification Number) so when the Election Day occurred, the voter will log into the website using his or her PIN and sign his or her choices on the web.

Once again using this new technology consequently the government should allocate a great number of funds to generate with this new system. Indonesia as a part of developing countries that still has less economic performance will be difficult to utilize this new technology since most of the national budgets are focusing on the development of social welfare and infrastructure developments. Besides that since this system require many skilled worker, then it would not be easy for Indonesia to conduct this system, as many Indonesian people still have not been fully technological literate.

Keeping the system safe from viruses and hackers

Viruses and hackers can be identified as one potential weaknesses of online voting (Gritzalis, 2002). This problem is significantly related to security system that is used through the whole systems. System must be developed and designed to avoid the viruses and hacker's attacks. The internet is already host to hackers of all manners from all over the world. The further disadvantage is that some hacking would result in deliberately manipulated election outcomes. Viruses can also worseness the situation. One of the most popular viruses, which are possible attacker to any kind of online voting, is "Trojan Horse" and "Love Bug", (Phillip and Jefferson, 1999). Those potential problems can be prevented when all parts of the voting infrastructure are under the control of election officials. Any remote online voting systems must be completed a large variety of platforms, for which the protocols and standards change with each election system. Beside that the vendor must be supported with software, online assistance to anticipate such attacks. Personal Identification Number (PIN) could be considered to keep the system away and secure from the hackers and viruses.

In the case of Indonesia, most of the Anti-Virus program can be acquired almost free (unauthorized copies), so there's no cost involved in installing the software. However, most Indonesian user don't know the real capability of this program and how long will it extend until it expire date. With the advent of viruses almost everyday, the need for new and updated antivirus program is a must.

It is possible to apply online voting in Indonesia?

It is true that the application of the Internet based voting system requires many resources such as qualified computer network infrastructure and computer machines, knowledge in computer systems and Internet technology, good human resources to manage online system, and 'culture' to use computer in society.

In Indonesia, the quality of data communication infrastructure amongst islands is not quite good and only available in certain

islands. The government still has to spend a lot of money to develop communication infrastructure, while providing qualified human resources to manage that. Besides, the level of education in society is not quite high. Many people do not know what computer is, and how to operate it. In other word, most of them are not familiar with computer. Due to limited budget, a lack of qualified human resources and computer knowledge, Internet based voting system is not a good choice to be applied in the public election at the moment.

However, Indonesian government can follow this step if they desired to implement online voting:

- Providing the accreditation of government computer systems. The government needs to determine the most appropriate method of accrediting any national voting system(s).
- The Government should consider with the Electoral Commission the rules to govern precedence where multiple voting is used.
- The Government should consider and ensure that the issues associated with coercion and multiple voting is studied.
- The government should ensure that the use of vote acknowledgements and the risks of vote selling/vote fraud are studied.
- The government should consult the public, academic community, and suppliers to establish whether these proposals can command broad support.

SUMMARY & RECOMMENDATIONS

In summary, over the last year, there has been strong interest in voting over the Internet as a way to make voting more convenient and, it is expected, to increase participation in election process. In the beginning of 2000 election which was conducted in The United States, Internet Systems are among those being considered to replace traditional voting system which is tend less reliable (Stratford, 2001). Online voting may become the quickest, cheapest, and the most efficient way to administer election and count vote since it only consists of simple process or procedure

and require a few worker within the process. This would give a higher cost-benefit in the future. However, the internet system still has some weaknesses to be prevented such as hackers and virus attacks, the relative expensive infrastructures, and developing the better security system.

Online voting will be easier to be implemented in developed countries than in developing countries and under developed countries such as Indonesia because it will takes a large portion of fund to be invested and need more educated people to get involved through it. On the other hand, those developing countries usually have limited national budget to run the new system and most of their people are still live under poverty and undereducated.

The need for online voting in the world's developing countries tends to be overshadowed by the nation's deficiencies in physical infrastructure. Consequently online voting may be inadequately addressed by governments and supporting agencies in their plans for stimulating democracy. The example from developed countries in developing national, electronic information infrastructures, suggests that better strategic plan policy in information technology infrastructure may enable us to develop at a particularly advanced rate.

Therefore, we recommend that before applying internet-based voting system, Indonesian government should consider to fulfill the requirements mentioned above and tested many times before this system is released. In addition, it is necessary to be aware to the contributors to election failures, such as over-reliance on equipment manufacturers and suppliers for ensuring election integrity that possibly lead to disastrous results.

APPENDIX. DATA DEFINITIONS AND SOURCES

The idea of this feasibility study comes from the Indonesian's vision on information society ("NUSANTARA 21"). Indonesian's national policies on election are obtained from Indonesian Ministry of State (2001). This study enriched by the results of research in the area of telematics in Indonesia within the focus research schemes in society and

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