Feasibility Study of Electronic Voting in Developing Countries: An Indonesia Context

Julius Jillbert
Universitas Hasanuddin, Makassar, Indonesia
julius.jillbert@gmail.com

DOI: 10.20470/jsi.v9i3.346

Abstract: Electronic voting may play important role on enhancing security and cutbacks of burden human and financial resources allocation to election processes. In the emerging democracies, like developing countries, exhibit other factors that might be weighted before any electronic voting systems are deployed. This feasibility study begins by addressing the historical aspects of democratic system in Indonesia context, and then describes theoretical issues of online voting and characterizes issues to account for in case of electronic voting implementation in Indonesia. The findings suggest that government may enhance countries’ growth by developing better strategic plans for electronic voting.

Key words: Electronic Voting; Indonesia, feasibility

1. Introduction

Traditionally, the first step of election is started by the voter registration, which is accomplished through “hard card”, or paper. Voter's completed documentation returned to an election office for inclusion in the voter registration list. According to Dictson and Ray (2000, p.2) the forms allow voters to provide information about their qualification as well as a physical signature. The signature becomes important since it is used to prove that the voter has filled in the form truthfully and performs as positive identification. However, this registration sometimes are not followed with further investigation since the registration system is largely known as an honor system (Elliot, 1999). The second steps is the development of the ballot. This activity is aimed to estimate the quantity of voter who will participate to vote on Election Day. Unfortunately, sometimes the formula, which has been used to estimate the number of ballots to print, is unscientific which leads to many waste either in unused ballots, or in expensive emergency printing if a poll runs of ballots too soon (Hanshaw, 1999). After the ballots are printed, they still need to be inspected individually before they enter the ballots register. The next step is putting the ballots in the storage until the Election Day. To avoid the tampering, the ballot is required to be inspected again. Those activities above obviously involve a lot of labor and processes that tend to be inefficient (Lin, 2003).

For citizens who prefer the absentee voting, the government also provides this voting system that either via letter or over the telephone. The voters can fill out their ballot and seal it inside security envelope. The voters then still need to sign the ballot then return it to the election office or send it via postal service. The voter’s signature is required to be checked individually in the election office. Elliot (1999) stated that “on Election Day, all the security envelopes are opened and the ballots are processed and counted. Referring those activities above, the traditional voting system seems to be complicated and inefficient since this system requires many orderly processes and need a lot of labors. Meanwhile, electronic voting has been considered as the reliable way to replace the older election systems. This system could be divided into 3 categories: “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 to 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 compared to use 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 types 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 reached. 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 using 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 deliver the ballots 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 fewer 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 electronic 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. Regarding 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 could be burned into a CD as backup (Kantor, 1999).

These papers begins by addressing the historical aspects of democratic system in Indonesia context, and then gives details of theoretical issues surrounding online voting. Requirements for online voting will be discussed briefly before an analysis of issues of online voting to account or against for in case of electronic voting implementation in Indonesia. Finally possibility to apply online voting in Indonesia with summary and recommendation based from the analysis will be presented.

2. Background of Election in Indonesia

The Republic of Indonesia was born on August 17, 1945. Soekarno and Hatta announced the declaration of independence as revolutionary leaders in Jakarta. The 1945 Constitution was introduced on the next day. It consists of 37 short and vague articles. The 1945 Constitution provides for powerful president and a very weak legislature. Indonesians struggle against colonialism did not end with the declaration of independence in 1945. In the subsequent years of 1945 to 1949 revolution continued against Dutch colonial power’s efforts to restore power in Indonesia. On December 27, 1949, the Dutch formally transferred sovereignty over Indonesia. A new constitution was introduced - the 1950 constitution - that mandated a parliamentary system with a largely ceremonial president.

With the new constitution, an unicameral parliament of 232 members was formed (DPR or Dewan Perwakilan Rakyat, People's Representative Council). The parliament consisted of members from political parties and the number of representatives from each party was based on their presumed strength at that time. The period of 1950 to 1957 was tumultuous with administrative and social-economic problems, outbreak of dissents and violence in several parts of Indonesia. The cabinet changed six times during this period. Nevertheless there was a general consensus that democracy was desirable and that Indonesia is striving toward a creation of a democratic state. The date for the first parliamentary election was set for September 1955 and another election to select a Constituent Assembly (a body to draft a permanent constitution) was fixed for December 1955.

Indonesia had its first democratic election in September 1955. It was a multiparty election with a high turnover of 91.5 percent of registered voters or about 39 million voters. There were a total of 28 political parties that gained seats but only 4 that shared (roughly equal) 75 percent of the vote (Ricklefs, 2001). In November 1969 parliament passed an election law. The parliament (DPR) would have 360 elected members and 100 appointed members. A People's Consultative Assembly (MPR) will incorporate the whole members of DPR plus 207 military and functional group members appointed by the president and 131 members elected by provincial government and 10 members appointed from
the less successful parties. Overall, the government directly appointed 22 percent of the parliament and 33 percent of the assembly (Ricklefs, 2001).

In 1971 the New Order had its first election. Ten political parties contested; nine parties from the Soekarno era and a new government “political party,” GOLKAR. Starting in the election 1977, only three political parties (PDI, PPP, and GOLKAR) competed in all elections during the New Order. Elections were conducted simultaneously for the DPR, and the first and second levels of regional DPRs. Each voter received three different ballots: one for DPR, one for the first level of regional DPR, and one for the second level of regional DPR. Each ballot contained only the symbols of parties. Since the 1977, there were only three symbols in the ballot: PPP, PDI, and GOLKAR. Each ballot was differentiated by its color. According to Ricklefs (2001), Voter turnouts were usually high in about 80 to 70 percent of the population eligible to vote. In 1999, three political bills were passed. The main and significant difference from the previous electoral rules was that the restrictions on forming political parties were abolished and the government is not allowed to interfere into the parties’ internal affairs.

3. Why Must Electronic Voting?

Recently some people believe that electronic 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:

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. Electronic 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 electronic 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 maybe is the efficient way to encourage people's participation on Election Day.

Convenience

Some proponents believe that Internet system will be able to provide the convenience way for people to vote. Dicston and Ray (2000, p.5) argued, “Perhaps the most compelling argument in favor of electronic 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 could reduce absentee ballots especially when people are going away from home (Dicston and Ray, 2000).

Knowledge

Another crucial point regarding election process is that sometimes person just pick up the names that they are familiar with, or simply think sounds nice and voting because of party affiliation rather than candidate’s qualification. This probably because they have a minimum level of information about the candidates and the party which have to be chosen. To solve this problem the electronic 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 (Dicston and Ray, 2000) said that “for potential voters, the Internet is an opportunity to gain access to anything they need to know about voting, 24 hours a day, instantly”. The electronic voting can broader their knowledge to deal with this problem because information is always provided on the web will help 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 person has become more fully informed voter.

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, electronic 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 safe 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. Base on those arguments, online voting might be considered less cost and timesaving.

**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. To expect the security system, online systems has equipped with some encryption systems to ensure that the ballots cannot 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 logs into the web site to conduct voting. This method would 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**

Electronic 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-parent families, perpetual traffic jams, extreme professional and personal demands on one's time. Electronic voting is able to simplify 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, Dilcson and Ray (2000, p.12) believe that electronic 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 form 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 could have an opportunity to vote as easily as the high-income people can without missing their works.

4. **Electronic Voting System Requirements**

The term “Electronic Voting” is used to describe a voting process via the Internet where voters could use the Internet to cast ballots. In other word, they would be able to vote electronically from a remote location like a public electronic voting kiosk or the voter’s home or office, where authentication of the voter would rely on some procedures, but must include some form of identity verification that is at least as secure as conventional voting procedures (in the conventional voting system, at the polling places, the election officials verify the authentication of voters before casting ballots).

However, the 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 that 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 electronic 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 several 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 securely to define authentication and control ballots.

Technology Independent: The system must allow ballots and their control to be used in off-line, dial-up 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 codes to be publicly known and verified.

5. Analysis of Issues

Even though electronic 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

To cope with this potential problem electronic voting has been equipped with technology, which has ability to verify the eligibility of the voter, which is 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 could 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.

Ensuring a person only votes once

Regarding to ensuring a person only vote once, some developed technology has been plug in the electronic 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 use 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 workers, then it would not be easy for Indonesia to conduct this system, as many Indonesian people still have not been fully technological literate.

**Alternative access for people without Internet access**

There is no barrier for people who cannot 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 gain access to 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.

**Keeping the system safe from viruses and hackers**

Viruses and hackers can be identified as one potential weaknesses of electronic 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 hosting 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 electronic 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 electronic 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 expect such attacks. Personal Identification Number (PIN) could be considered to keep the system away and secure from the hackers and viruses. For Indonesia, most of the Anti-Virus program can be acquired with little 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.

6. **Possibility to Apply Electronic 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 small islands is bad as it is only available in certain bigger islands. The government stills has to spend a lot of money to develop communication infrastructure, while providing qualified human resources to manage that.

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. In UK, the government has proposed several possible methods for re-engaging the electorate in the democratic process. One of them is to modernize the way in which the UK conducts elections. Recent changes enabled by the Representation of the People Act 2000 include: universal postal voting, an extension of the polling hours and more modern methods of casting votes, including the use of telephone and Internet based voting (Crown, 2002).

The UK government has also signaled its desire to be able to use electronic voting at general election level by the next election after 2006; and the Spending Review has allocated substantial funds to pilots at local government level in the next three years. Indonesian government could follow this step if they desired to implement electronic voting. However they must first study the feasibility of doing so by:

- Providing the accreditation of government computer systems. The government needs to determine the most appropriate method of accrediting any national voting system.
• 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.

7. Concluding Remarks

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 beings considered to replace traditional voting system which is, tend less reliable (Stratford, 2001). Electronic 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 workers 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. Electronic 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 electronic voting in the world's developing countries tends to be overshadowed by the nation's deficiencies in physical infrastructure. Consequently electronic 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.

References

Adler, J., 2000: Electronic Voting Primer, Available at:


Crown, (2002), E-Voting Security Study, Available at:

[Accessed 6 October 2017]


**JEL Classification:** O33, O38