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E-Voting Systems to Prevent Conflicts caused by False Results in Elections in Indonesia

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This article discusses a system to prevent fraud in voting activities in Indonesia by utilising information technology called e-voting. Data collection in the preparation of this article uses literature review, observation, and interviews. The results of this study indicate that the e-voting system that was built reduces the problem of the voting process that was previously obtained in paper form. The use of databases in the e-voting system as data storage facilitates the processing of citizen data, so each vote is accurately counted. The e-voting system can produce appropriate and fast voting so as to minimise fraud that can lead to conflict.

Key words: *E-Voting, Direct Recording Electronics, Fraud, Conflict*

Introduction

Elections in Indonesia are unique and the most complicated voting process in the world. The broad geographical conditions of Indonesia are a separate problem related to the distribution of ballots, and all related to the implementation of democratic parties. There are even regions that have not yet instituted the voting process, while other regions have been manually counted. This state of affairs calls for quick consideration as to how the implementation of the vote for democratic parties can be carried out in real time online, with no reason for time and space constraints. In addition, another consideration is that technological advances and the availability of the Internet can be the main reasons for not delaying the implementation of an online democratic election. Therefore, electronic voting or e-voting is very possible (Priyono and Dihan, 2015).

Information technology has developed rapidly, mainly through Internet technology. Due to the increasing number of Internet users in the world, the Internet is the right media to disseminate information to individuals and groups. Rapid advances in technology today can affect and

facilitate human activities in various fields. One of them is in the political field (Election), which can take advantage of this technological progress. The Election Information System is currently an innovative and very important choice in implementing one of the pillars of quality democracy, in order to realise popular sovereignty, such as Election by electronic voting (Zulita, 2015; Purwanti, 2015).

The e-voting system provides several different characteristics of traditional voting techniques and also provides enhanced features of the voting system compared to traditional voting systems, such as accuracy, comfort, flexibility, privacy, verification and mobility (Anand and Divya, 2012). Through the e-voting system, the use of paper can be reduced to as little as possible. The e-voting system can be seen as a "business process" of a series of electoral processes and is expected to significantly reduce paper use in voting (Haryati, et al., 2014; Michael et al., 2019).

Broadly speaking, we can see the difference between systems that choose traditionally or e-Voting: there are 8 differences (Khan et al., 2011).

Table 1: Differences in Traditional Voting With E-Voting

Traditional Voting System	**Electronic Voting System**
Paper Based	Electronic System
Large number of Polling Agents required	Web Connectivity Needed and ICT Infrastructure required.
Operating cost of papers and ballots, on each election.	First time operating cost of ICT infrastructure.
Lack of transparency	More transparent
Delay in output result	The output result is very quick
Lot of political influence	Lack of political influence
Requirement of human resource at the place of voting	Direct recording electronic (DRE) system
Physical presence of voter in polling station	Usable voting system by mobile/handheld device

E-voting is a mechanism for choosing that has been used more widely in many countries in the world (Esteve et al., 2012). E-voting has been applied in many countries, including countries in South America and Asia (Goldsmith and Ruthrauff, 2013). Two countries in Asia that have implemented e-voting at the national level are the Philippines and India (Phillips and Soudriette, 2012; Achieng and Ruhode, 2013). Indonesia, a neighbouring country to the Philippines, has also implemented e-voting, but not at the national level (Darmawan et al., 2014).

E-voting can be adopted and implemented in many regions in Indonesia based on the Constitutional Court Decision Number 14/PUUIX/2013 and the Republic of Indonesia Law Number 11 of 2008 concerning Information and Electronic Transactions (Darmawan and Nurhandjati, 2016). The application of e-voting has succeeded in achieving the principles of accountability, participation, transparency, effectiveness, and efficiency (Anistiawati, 2014; Qadah and Taha, 2007). E-Voting is one of the most effective and efficient ways to overcome various problems such as fraud, authentication or validity of voters, security or data security, and also must be able to accommodate the desire for speed and accuracy in counting the votes. The system used is also transparent where the voter and the chosen candidate can receive the results of the vote count. All of the above is made possible by the existence of an electronic-voting system (Lestariningati, 2015).

An electronic voting machine is an electronic device used to record sound in place of ballot papers and boxes that were previously used in conventional voting systems. This is a simple machine that can be operated easily by polling officers and voters. Being a stand-alone machine without network connectivity, no one can interfere with programming and manipulate the results (Kumar and Walia, 2011).

Based on the explanation above, the author will make modelling using UML as well as the design of inputs and outputs as a framework. UML (Unified Modelling Language) is a language for determining, visualising, constructing, and documenting the artefacts of a software system. Real modelling is used to simplify complex problems in a way that is easier to learn and understand (Rasooli & Abedini, 2017).

Method

Research was conducted through several stages of research, including 1). Study literature by reading journals to understand the design of e-voting. 2). Make observations and interviews to obtain the data needed. 3). Determine and collect data for designing e-voting from the field.

Results and Discussion

Issues of Organising Elections in Indonesia

Voting is one method used for important decision making in democratic life. In countries that adhere to a democratic political system, including Indonesia, voting is used to make very crucial decisions, among others, to elect people's representatives (legislative), or elect a new leader of the country.

In the voting process in Indonesia, several problems often arise in the implementation, such as

fraud, human error, lack of guaranteed confidentiality of choice and the occurrence of "buying and selling" votes (Lestariningati, 2015). This is what triggers horizontal and vertical conflicts in the community. Horizontal conflicts occur between communities supporting certain candidates, and communities favouring other candidates, while vertical conflicts occur between the community and the election organisers.

As seen from the perpetrators, fraud can be divided into fraud committed by voters and fraud committed by the election committee. In the voter registration process there are still many mistakes. This error occurs because the population registration system is still not going well, so the use of identity cards causes many voters to have more than one vote. This situation is often used by certain parties to increase their chances so they can win the vote. Some forms of fraud committed by voters are:

1. The vote of the voter is represented by another person
2. Voters vote more than once.

Fraud committed by the election committee occurs because management and supervision are weak, providing opportunities to commit fraud, namely:

1. Using a sound card without being attended by voters – absenteeism manipulated.
2. Add or change the results of calculations that have been signed by the committee and witnesses.
3. There is an intentional element where the voting committee provides a sound card that is not in accordance with the specified polling station.
4. Changing the number of votes both by sending and counting votes that have been accumulated by the structure committee above the TPS committee.

Meanwhile, the error factor that can occur is due to the fault of the person himself, namely:

1. Voters are wrong in giving a sign on the sound card because the provisions of the validity of the marking are unclear, so many sound cards are declared invalid.
2. Error on voter cards coming at the polling station.
3. Error calculation in PPS, PPK, Level II KPUD, Level I KPUD, Central KPU.
4. Errors in including the calculation results.
5. Errors in the list of voters (those who have died are still listed in the voter list).
6. The sound card is late.
7. Slow sound calculation and lack of accuracy.

Voting as a Solution for Election Implementation in Indonesia

The development of information technology today has brought great changes to humans. The

use of computer technology in the implementation of voting is known as electronic voting or commonly referred to as e-voting. The e-voting system as an electronic system also has several weaknesses, namely the elements in the voting process such as tools for voting, software and networking, where all three elements are designed, created and operated by humans which of course can enable fraud. Besides errors in cryptography, errors in the software being operated, threats to the network and also especially for voting techniques without using paper or commonly called paperless voting, can cause difficulties in conducting audits on voting if there are demands for recalculation requests. The concern that arises is the existence of fraud that can manipulate the results of the voting.

E-Voting is intended to reduce errors and speed up the process of vote counting in elections. The advantages of E-Voting compared to traditional ballot/ballot boxes are 1). Eliminating the possibility of illegitimate and doubtful voices which, in many cases, are the root cause of the controversy and election petitions. 2). Make the counting process much faster than conventional systems. 3). Reducing the amount of paper used so that it saves a lot of trees that make this process environmentally friendly. 4). Reducing printing costs to almost zero because only one sheet of ballot paper is needed for each Polling (Anistiawati, 2014).

The application of e-voting itself has been running in several countries, especially the European and American continents. Each country has its own e-voting system that has been adjusted to the state and infrastructure of the country. This system uses the Internet as a media for voting. E-voting is very likely to be adopted and implemented in Indonesia because it has a clear legal basis based on Constitutional Court Decree Number 14/PUUIX/2013 and Republic of Indonesia Law Number 11 of 2008 concerning Information and Electronic Transactions.

Designing the E-Voting Procedure

The implementation of e-voting itself is divided into two, namely onsite voting and remote-voting. Onsite voting is that voters come to a predetermined polling station, while for remote-voting, voters can vote without having to come to polling stations; votes can be given via the Internet, or SMS (Short Message Service). The system design created is an onsite voting system, because remote-voting is an extension of telecommunications network technology. In addition, trust in information technology and communication networks still needs to be improved.

The voting in Indonesia can be divided into several stages, namely: registration, authentication, voting, vote counting, vote validation and sending the results of the vote count.

A citizen can become a voter if he has registered at the local polling station. Registration is done by collecting data based on the KTP or registered by the village or RT/RW, then the voter

card is given.

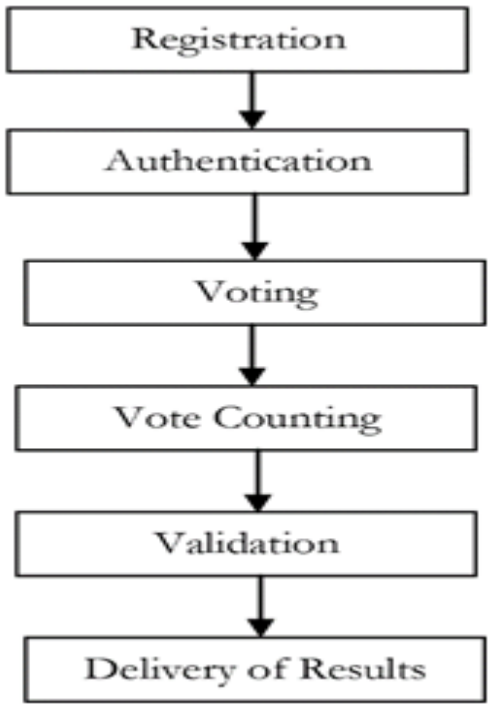
After the registration process is complete, the voters come to the local polling station by showing the voter card and signing the absentee declaration. Then the voters are given a ballot paper by the voter committee to cast their vote on the paper and put it in the ballot box.

After the voting process is complete, then the committee will examine the ballot paper as to whether it meets the requirements or not, and the calculation is done manually. The accumulated vote is witnessed by the official and signed.

After that, the results of the validated vote count are sent physically to the Subdistrict, Regency/City Election Commission, Provincial Election Commission and then sent to the centre for the determination of results.

Following are pictures of the voting process in Indonesia:

Figure 1. Voting Process



When viewed from the process that goes on as above, one of the frauds that can occur is due to the population record that has not gone well. The concept of using multiple identity cards causes voters who have more than one sound card. The sound calculation is still done manually, causing the vote to be slow. In addition, because it only relies on calculations made by humans where there is still a possibility of human error occurring, the results of the calculations

obtained are inaccurate. In contrast, the desired system is a system that can overcome fraud so that voting results can be obtained that truly represent the voice of the people.

In the voting process, voters come to the polling station, in the example above, for example, voters come to polling station X. Voters show voter cards given during registration to the polling station committee, and after being declared valid, voters are allowed to use voting machines by equating fingerprint patterns with data contained in the database first. If there are difficulties in reading the fingerprint pattern, the voter is allowed to enter the unique code printed on the voter card to facilitate the reading of fingerprints.

Voting is done using techniques without using paper, namely by pressing a button or touching the monitor screen – this technique is good to use if there are quite a number of parties and candidates. Automatically the incoming sound is calculated directly and accumulated. In addition, the DRE machine is also connected to the printer, which will automatically print the results paper which is then inserted into the ballot box. The use of printed paper is physical evidence that can be used when the audit process is carried out. If the voter card print process fails, the voter is given the opportunity to choose again until the voting card can be printed, then automatically the fingerprint record is deleted from the database, and entered into the record list that the voter has voted.

After the sound calculation is completed, the number of incoming votes is accumulated and sent to the central pooling server. Delivery of the results of the vote calculation is sent using a closed network such as a VPN (Virtual Private Network). The calculation results appear in the terminal, then matched against the number of votes in the voice box. After being verified by the witnesses and committee of the polling station, the official report (BA) is printed by the terminal which is then signed. Delivery in the form of electronic data is automatically carried out by TPS pooling servers directly to the central pooling server using closed networks. The minutes that have been signed and the ballot boxes are sent to the Level II Election Commission, to avoid inflating the vote.

To avoid fraud that occurs at the level above the TPS, there are Terminal II Level KPUDs, Level I Election Commission, and Central KPU. The terminal will retrieve data from the central pooling server, then verify the minutes and ballot boxes that come from each polling station in their respective regions, signed by the committee and witnesses then sent to the centre. Each Level II Election Commission will send the results to the Level I Election Commission, then forward them to the Central KPU, so the results of the vote count can be announced. By using this system design, the level of fraud that might occur in each polling station, Level II KPUD, Level I Election Commission and Central KPU can be reduced.

Conclusion

The e-voting system that was built reduces the problem of the voting process that was previously obtained in paper form. The use of databases in the e-voting system as data storage facilitates the processing of citizen data, selection to vote to count. The e-voting system can produce appropriate and fast voting so as to minimise fraud that can lead to conflict. When compared with the system used in America and the Netherlands, basically the process is done the same, the difference is the sub-process or features in the process due to culture, electronic systems, infrastructure and fraud that has arisen. The system design in this article is a stepping stone for developing into a mobile voting system, where the use of mobile voting is one way to reduce the number of abstentions in Indonesia.

REFERENCES

Achieng, M., & Ruhode, E. (2013). The Adoption and Challenges of Electronic Voting Technologies within the South African Context. International Journal of Managing Information Technology (IJMIT), 5(4), 1-12.

Anand, A., & Divya, P. (2012). An efficient online voting system. International Journal of Modern Engineering Research, 2(4), 2631-2634.

Anistiawati, M. L. (2014). Implementasi Kebijakan Penerapan Elektronik Voting (E-voting) dalam Pemilihan Kepala Desa (Studi Kasus: Pemilihan Kepala Desa di Desa Mendoyo Dangin Tukad, Kecamatan Mendoyo Kabupaten Jembrana). Citizen Charter, 1(2).

Darmawan, I., & Nurhandjati, N. (2016). Why Adopt E-voting? Study on Village Leader Elections in Musi Rawas, South Sumatera". Jurnal Politik, 1(2), 205-229.

Darmawan, I., Nurhandjati, E., & Kartini, E. (2014). Memahami E-voting: Berkaca dari Pengalaman Negara-negara Lain dan Jembrana (Bali)". Jakarta: Yayasan Obor Indonesia.

Esteve, B., Jordi, B. G., & Turner, J. (2012). International Experience with E-voting. Norwegian E-vote Project. Washington DC: IFES.

Goldsmith, B., & Ruthrauff, H. (2013). Implementing and overseeing electronic voting and counting technologies: Case study report on electronic voting in the Netherlands. United States Agency for International Development (USAID) under Award No. DFD-A-00-08-00350-00.

Haryati, H., Adi, K., & Suryono, S. Sistem Pemungutan Suara Elektronik Menggunakan Model Poll Site E-Voting. JSINBIS (Jurnal Sistem Informasi Bisnis), 4(1), 67-74.

Khan, M. Q., Mehmood, F., Khan, D., & Hussain, W. (2011). Barriers to Implement E-Voting System in Pakistan. Journal of Applied and Emerging Sciences, 2(2), 131-135.

Kumar, S., & Walia, E. (2011). Analysis of Electronic Voting System in Various Countries. International Journal on Computer Science and Engineering, 3(5), 1825-1830.

Lestariningati, S. I. (2015). Desain Sistem On-Site Voting Untuk Mengatasi Fraud. Seminar Nasional Informatika (SEMNASIF), 1(6), 81-86.

Michael, T., Hufron, Sahetapy, W. L. (2019). Is Holiday Overview in Indonesia General Election Legal? Edición Especial, 35(20).

Phillips, M. D., & Soudriette, R. W. (2012). Testing democracy: how independent testing of e-voting systems safeguards electoral integrity. In 5th International Conference on Electronic Voting 2012 (EVOTE2012). Gesellschaft für Informatik eV.

Priyono, E., & Dihan. F. N. (205). E-Voting: Urgensi Transparansi dan Akuntabilitas. Seminar Nasional Informatika (SEMNASIF), 1(5), 55-62.

Purwati, N. (2015). Perancangan sistem E-Voting untuk Pemilihan Kepala Daerah (PILKADA). Jurnal Bianglala Informatika, 3(1).

Qadah, G. Z., & Taha, R. (2007). Electronic voting systems: Requirements, design, and implementation. Computer Standards & Interfaces, 29(3), 376-386.

Rasooli, M., & Abedini, M. (2017). The Relationship between Organisational Support and Job Satisfaction of Experts and Managers of Islamic Azad University of Qeshm and Subsidiaries (International Units, Medical, Sama, Hormuz and Khamir). *Dutch Journal of Finance and Management, 1*(2), 42. https://doi.org/10.29333/djfm/5818

Zulita, L. N. (2015). E-Votting Pemilihan Walikota Bengkulu di Komisi Pemilihan Umum (KPU) Kota Bengkulu. Jurnal Media Infotama, 11(2), 181-190.