



## E-Voting System for Election with Mobile Based Apps

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**Abstract.** Election is an important moment for the democratic process in Indonesia, Indonesia has held elections regularly for a long time. Election in Indonesia still carried out conventionally by coming to *Tempat Pemungutan Suara* (TPS) or Voting Place to vote. The purpose of this research is to design a mobile based election e-voting system as means to conduct elections for head of state or region and make it easier for the people to vote without having to travel. The research method used in this research is descriptive analysis with a qualitative approach. The result of this research is to show that the E-PIL application can make it easier for *Komisi Pemilihan Umum* (KPU) to carry out election (*pemilu*) also make it easier for the people to vote only by accessing E-PIL application that can be accessed via each smartphone. The main concept of this application is e-voting feature for election that can be used in every election agenda. Also makes it easier for the KPU in voting process because E-PIL application can only be used by 1 ID on 1 device that integrated with the government. In the end, E-PIL application is present as a medium for elections as well as to adapt in today's digital world.

**Keywords:** System, Mobile Apps, Government

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### 1. Introduction

Indonesia is a country that embrace democracy. In conducting presidential and vice-presidential elections, the legislature election, and even village head elections are carried out by voting. In Indonesia, elections are held accordance with Law (*undang-undang*) no. 7 of 2017 about elections [1].

The current election implementation process in Indonesia still uses conventional mechanisms that have several procedural stages, in which every citizen has the right to vote to come to the polling station on election day. Elections are carried out by voting on the ballot paper and then placing it in the ballot box. After the voting process is complete, the vote counting process is carried out in stages. However, the implementation of conventional elections is still considered to have several weaknesses, one of the weaknesses is occurrence of fraud in the administration of elections. The election fraud caused the democratic election principles damaged [2].

In political marketing, two important characteristics that influences voting behaviour is trust and information [3]. As the fourth most populous nation, spread across a chain of thousand islands, the election in Indonesia, is required to count votes from 479.000 polling stations. Because of that, the process of tiered counting votes from municipalities to provincial, create challenge in terms of resource such as longer time and higher cost [4]. To solve various problems, technology has become one part of human lives [5] The technology is expected to answers the problems of previous elections such as, cutting the election costs, eliminating cheats, and fixing vote miscalculations [6] Therefore, with e-voting is expected to cut down the cost of resources as the disadvantage of the current paper-based voting systems.

In Junior Hendri Wijaya ' s research, he explained that the implementation of e-voting in Indonesia can improve the quality of democracy seen from the facts of the SWOT analysis which produces more opportunities and strengths for Indonesia, although there are still weaknesses and threats in the implementation of the e-voting system in Indonesian elections [1]. The application of e-voting by Imas Noita and friends, aims to find out the mechanisms and problems of organizing elections as a form of public service in Indonesia [2]. Then there is M-Vote designed by Adel Khelifi, M-Vote is a mobile application that uses three levels of security, which is username and password, national ID and fingerprint. The result of this research show that M-Vote is a very secure mobile application to facilitate the voting process for most people, because they only need a mobile phone and internet connection to participate in the voting process [7]. Dana Indra Senses stated that in his research based on a quantitative survey and the suggestion of a state of the art, electronic voting system suitable for use in Indonesia, It shows that most respondents are ready to use the e-voting system [8]. There is also research on Smart Voting by Buvanapriya. R which has the main goal of developing a voting engine that is compatible with high security. The proposed system is designed for use in India. With fingerprint security as the last step to make a selection [9]. From those previous studies, we can see that the role of technology is very important, especially for the electoral system but in Indonesia itself still uses conventional mechanisms for elections.

The purpose of this research is to design a mobile-based election e-voting system as a means to conduct elections for heads of state/region and make it easier for the public to make vote without having to travel. The research method used in this study is a descriptive analysis method with a qualitative approach.

## 2. Method

The research method used in this study was descriptive analysis using a qualitative approach [10]. Data collection uses a literature review because there is no implementation of an e-voting system in Indonesia at this time [1]. And observing the use of mobile voting applications in other countries. System design includes making application design. The

elements that will be investigated in this research are the technical application work that will be shown (see Figure 1).

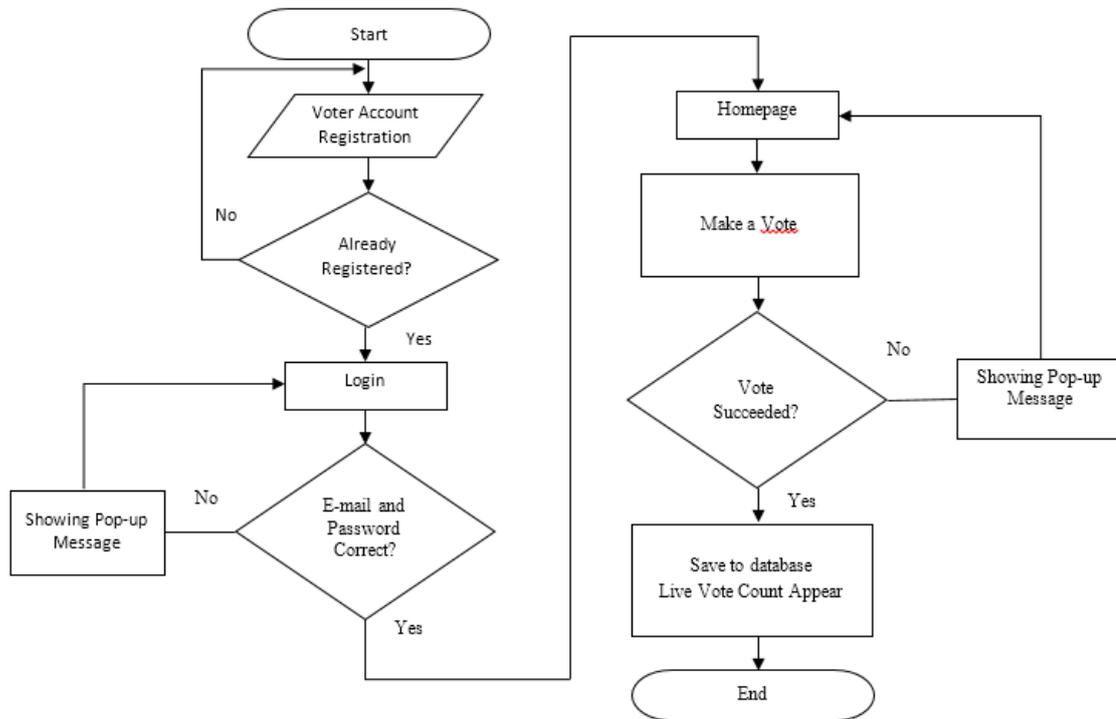
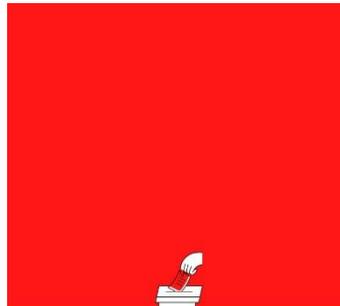


Figure 1. Application Work Flowchart

### 3. Results and Discussion

The online election application created has the name E-PIL which stands for “*Electronic – Pemilihan*”. This application will contain online vote feature and vote’s live count. When the app is opened user will be given two options, Login and Register. Press Register if user does not have an account / not registered. Press Login if users already have an account (see Figure 2).

On the register page that will be shown in Figure 3, users will be redirected to make an account on the E-PIL app. To make an account, users must enter personal data, such as ; email, phone number, ID number, family card number (No. KK), and password for the account. If the registration is succeeded, a popup message will appear saying “Your data has been saved, Please Login” (see Figure 4). Figure 5 will show the Login page on the E-PIL app. On this page, the users only need to enter the e-mail and password of the account that has been registered in the E-PIL app to login (see Figure 5). If the E-mail or password entered is wrong or not registered. Then a pop-up message will appear that says “Wrong Email or Password, Please Try Again” . User is expected to enter the correct e-mail and password. And if the account is not registered, first register the user account in the Register page (see Figure 6).



E-PIL

Pemilihan Umum Online Indonesia

Indonesian online election

Login

Register

Figure 2. App Start View

Figure 3. Account Register Page

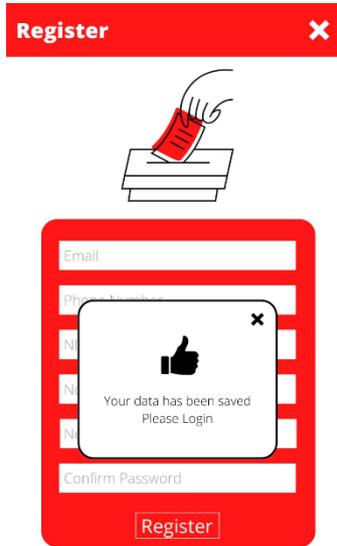


Figure 4. Pop-up Message Indicating Successful Registration



Figure 5. Login Page E-PIL App

Login

Login using e-mail and password



Don't Have An Account? [Register](#)

**Figure 6.** Pop-up Message if the login failed

If the login is successful, user will be directly directed to E-PIL app homepage. On the homepage there are two features that can be used, the first is Vote feature (Figure 8) to make vote and then there is the Live Count feature (Figure 9) to view the temporary election calculations (See Figure 7).

Figure 8 shows the Vote feature page that contains photos and the vision and mission of the candidate pair that will be elected, also a Vote button to choose one of the candidate pairs (see Figure 8).

When the user successfully makes vote, the user will be immediately directed to the notification page that notifies the user that he/she has made a vote. And on that page, there is a Live Count button to go directly to the Live Count page (see Figure 9).

E-PIL



Welcome to E-PIL

Indonesian online election App



Click to vote



Live Count

Figure 7. E-PIL App Homepage



Figure 8. E-PIL App Voting Page

E-PIL



**Thank You For Voting**

To see provisional election results  
click the button below

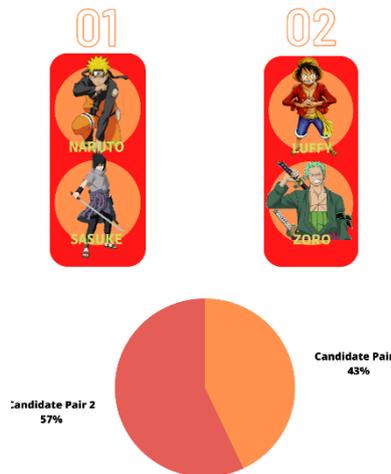


**Live Count**

**Figure 9.** Halaman Pemberitahuan

Furthermore, Figure 10 show the Live Count page which serves to display provisional election result that still on going. On this page there are photos of the candidates' pairs and also the percentage of voters shown using a Pie Chart (see Figure 10).

**Live Count**



**Figure 10.** E-PIL App Live Count Page

E-PIL application design was created to help and also make it easier for the Indonesian people to carry out election without having to travel. This application has several features, which is e-voting and live count that can be used to support the implementation of online election in Indonesia. This research resulted an online election application design, namely the

E-PIL app that can be implemented in Indonesian election. And also, can facilitate the Komisi Pemilihan Umum (KPU) to carry out elections. It also makes it easier for the people to do vote only by accessing the E-PIL app through their own smartphones. And also, this research is expected to be developed further so that e-voting can be implemented in Indonesia.

#### 4. Conclusion

Throughout the long history of the democratic process in the world, especially in Indonesia, with the progress of the times long with technology and the change of community needs, a powerful way to resolve conflicts peacefully, whether political, religious, or economic, is through elections because they are based on the will of the majority. Therefore, elections lead to a transitional period in any country. The security, integrity and process of the election itself can affect the outcome of the election. The design of the E-PIL is expected to improve the voting process by making it easier for voters to cast their vote only by accessing the application using their own smartphones. Simplifying the registration process by only asking for e-mail, cell phone numbers, Population Identification Numbers (NIK) and Family Card Numbers (KK Numbers) to ensure the eligibility of the voter, and password for the user account. In the end, the E-PIL application is present as an online election media and also to adapt in today's digital world.

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