AN ANALYSIS OF E-VOTING PROCESS ADOPTION FACTORS IN THAILAND GENERAL ELECTION

[1]SIRIYA PHOONOKNIAM, [2]KANCHANA KANCHANASUNTORN

[1,2]University of the Thai Chamber of commerce, Thailand

Abstract - In today general election, Thailand use the ballot paper process which cause a lot of problem. The alternative solution is to implement the Electronic voting (E-voting) system by applying the electronic appliance to cast and count votes in elections replacing of the ballot card. Then a systematic review methodology is used to collecting and analyzing of multiple research and paper from 2007 to 2017 to explore the possible of factor which will impact the e-voting adoption. The aim of this paper is 1) to explore the current election process in Thailand, 2) to study the election process in Estonia where is the first country which implement the full internet voting in nation level since 2005 and India which is the most well-known of implement e-voting machine and 3) to search and collect the possible factors which will influence the e- voting adoption successfully.

Keywords - E-voting Factor, E-voting System, Thailand Election.

I. INTRODUCTION

Ballot card voting systems have been developed to ensure that the principles requirement for democratic elections and ballots are encountered. However, in Thailand election 2019, the ballot card voting system cause a lot of problem and the problems that has the most effect to delay of vote result announcement is the mismatch among the number of voter and the cards [1]. The alternative solution is to implement the Electronic voting (E-voting) system by applying the electronic appliance to cast and count votes in elections replacing of the ballot card. It is expected that the Electronic voting system can improve the logistics process in Thailand election to lower cost, lower human error [2]–[4], more auditability and transparency, and more secure. However, before adopting the e-voting system to Thailand election process, it needs to understand the factors that has the significant effect on the successful of e-voting adoption. The aim of this paper is 1) to explore the election process in Thailand, 2) to study the election process in Estonia where is the first country which implement the full internet voting in nation level since 2005 [5], [6] and India which is the most well-known of implement e-voting machine [7] and 3) to search and collect the possible factors which will influence the e- voting adoption successfully by intensive review from literature, paper and research report.

II. RESEARCH METHODOLOGY

The aim of this study is reviewing current Thailand election process and the two most successful countries which implement the e-voting. Then a systematic review methodology is used to collecting and analyzing of multiple research and paper from 2007 to 2017 to explore the possible of factor which will impact the e-voting adoption. The main keywords are voting, e-voting, internet voting, factor to capture result as much as possible. The research database to perform the search is Scopus, Web of Science and Science Direct.

III. ELECTION PROCESS IN THAILAND

The election processes are promulgated in Organic Law on election of members of the House of Representatives B.E. 2561 in many sections [8]. The authority of election consists one of director of constituency, at least three of committee of constituency. One of duty of committee of constituency is to appoint the committee of polling station which has five persons to control and monitor election process. However, in case the number of eligible voters more than eight hundred persons, the committee of polling station can decide to appoint more committee to support them in everyone hundred persons of eligible voter [9]. The duty of director of constituency, committee of constituency and committee of polling station has diverged responsivity but they still collaboration in election process to guarantee everything is follow by the law and constitution. The following is the duty in each authority [8].Eligible voter announcement, before the election twenty days the committee of constituency will send post mail the eligible list in responsible district to the registrar house address. The letter will inform the name of eligible voter, constituency, polling place and sequence number. Voter verification and registration, at the polling station the eligible voter needs to show the identification which issue by government department then the committee of polling station will provide the ballot paper to process the vote cast. Even though, the eligible voter can only cast vote in registrar constituency and can vote only one time. Vote cast, voter need to mark cross in ballot paper in the check box of candidate number in ballot paper. If the voter wishes to abstention, voter can mark the cross in the checkbox “Do not choose any candidate”. Then voter fold the ballot paper as per structure and put it in ballot box. The vote cast need to keep in

secret, none must not know this vote cast vote by who. Vote count, vote cast is counted at polling station in front of witness. All vote cast need to be counted after election close and send the vote count to the committee of constituency to collect all vote count in constituency and send to the next level. Vote result, the result will be announced after proving the election result is fair and upright and vote count is more than ninety-five percent. The result will be announced when all vote is counted one hundred percent but not later than sixty days after election end. The logistic flow of Thailand election will start when the ballot paper is produced at the authority publishing printing house as shown in fig 1. The Thailand post office is assigned to be the transportation all ballot paper. The ballot paper will be delivered to post office center where establish for this special occasion. The CCTV will be monitor 24 hours to pack the ballot paper with correctness place and prepare to distribute to destination. The truck will have Global Positioning System (GPS) to track the movement of the truck. When the ballot paper arrives at post office in each constituency. The committee of constituency will check the correctness and send to each polling station. The polling station will cross check before keep in the save place until the election date. Every step will have the heavy arm to secure both authority and ballot to make sure no one will try to attempt the election. After count the ballot paper will be consoled to one safety place until the election result has been confirmed and the ballot will be destructed according to Election committee [8].

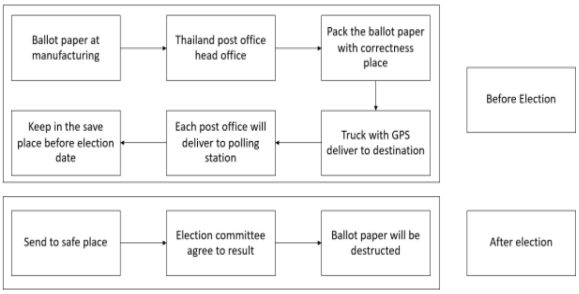

Figure.1. The flow of ballot paper in Thailand election

IV. E-VOTING SYSTEM

E-voting system is electronic systems to cast and count votes in elections to replace the ballot card and to make result more auditable, transparent, secure and help to reduce human error [3], [4], [6]. E-voting will be making voting more reachable for disable people to vote independently. However, each country has different needs, that is why every e-voting solution is varied for each country. E-voting presented Information and Communication Technologies (ICT) to the election process in order to improve the election process such as speed release of election results and ease of voting. E-voting purposes to decrease the time for vote casting and vote counting, to reduce the cost, to improve the accuracy of the results and to reduce invalid votes[10]. E-voting can be divided into two main type: e-voting with physical machine at each polling station and remote e-voting (vote via internet called i-voting).In this paper, we demonstrate the i-voting and e-voting system in the two country, Estonia and India respectively.

A. I-voting system – Estonia

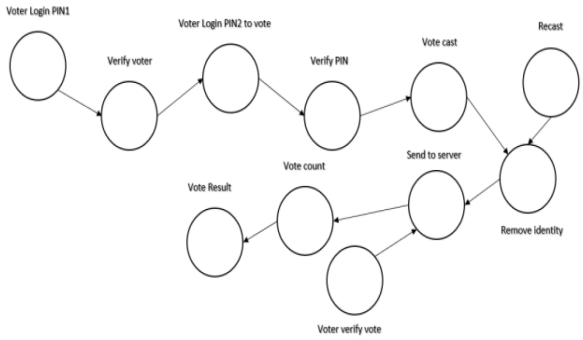

Figure 2.I-voting in Estonia

I-voting in Estonia will be opened to cast vote ten days and be closed four days before the official Election Day. The voter uses the digital signature and tool such as identification card with chip and PIN code to be the tool to cast their vote. The election act in Estonia is stated to support the digital signature to be legal basis for regulation of internet voting and clarify validity criteria for vote cast. In fig 2 I-voting can be divided into four states [5], [11] - [13].Pre-voting, the list of candidates, polling station, electoral districts will be uploaded into system. The election committee will verify the eligible voter when their register in system which qualify to vote. Then system will record in system. The public key and PIN will be given to voter in each election to sign in into I-voting system. During the voting, voter will log in by using PIN. There is 2 set of PINs, first is to login to system to verify the voter the second set is to verify PIN itself. Before vote cast is recorded, systems remove the voter identification to protect the voter identity and to follow the election principle that vote cast must be anonymous. At the same time voter can verify their vote by themselves through the system to confirm their vote. During the process, this process includes the vote has been repeated in system. This is the difference from ballot paper that voter can vote many times until the system is closed. The vote is counted the latest vote. However, if the voter would like to vote at polling station, they still can do it. The vote that takes place in the system will become invalid and the committee will count vote for ballot instead. In the last state is counting vote, the anonymous vote is opened by private key. The vote will be counted with off-line computer. The vote counting will be tallied with eligible votes which are summed by candidates and electoral districts. After proof the vote and tally, the private key is deactivated, and all vote cast will be deleted. The vote count can be monitor real time via

computer with internet or smart phone to make the election transparency and auditable.

B. E-voting – India

In recent India general election there is nearly nine million eligible voters. The one million polling station, 3.96 Electronic Voting Machines (EVM) has been distributed across the country with several transportation mode [14]. Approximately 300-member team of election commission of India (ECI) and 11 million polling staff responsible to entrust to conduct the election successfully [15]. All machine reaches the polling station on time and correct and to follow the ECI commitment that "No Voter Left Behind". Voter must travel not over 2 kilometers to cast their vote [16]. The logistic of EVM can divided into 3 states [17].Pre-election, the EVM and Voter Verifiable Paper Audit Trial (VVPAT) will be stored in the save place and will have the First Level Checking (FLC) to confirm the machines are functional. Visual Inspection of EVM and VVPAT is to inspect of all components of EVM and VVPAT to ensure no misfunctioned. The entry of strong room that have EVMs after FLC has the 24 X 7 CCTV coverage round the clock. Then before the election, the finalization of candidates will be loaded into EVM machine which will monitor by Candidates or their Agents. The preparation is carried out in a large hall. Before the hall is used for preparation, it should be fully screened to ensure that there is not any other electronic device or components of electronic devices that can be tempted the EVMs. The election has been split into many phases, each time the vote ends the EVM and VVPAT will be stored in the strong room under 24 hours security of Returning Officer. In voting process, the polling officer will record the voter roll number in form, then acquire the signature or the thumb imprint of the voter on the register of votes, voter will show the proof of identification and will vote at booth by selecting the candidate by pressing the voting machine. The VVPAT will show the selected number before dropping it into the drop box. Sealing of voting machine after vote cast, the officer will close the control unit to ensure that no votes can be recorded and remove the balloting unit from the control unit and from the printer. Post-election, counting vote cast, after making firm that there is not tempered with voting machine, officer will press button result which the total votes cast, and votes cast by each candidate will be displayed on the control unit. On the 2019 election, the Supreme Court ordered to tally the VVPAT slip in five polling stations instead of one in every assembly segment. Over 20,625 VVPAT slips was counted and the result is there is not any single case of mismatch between VVPAT slip and vote cast [18]. Then officer will seal of voting machine back after the result of voting recorded in a control unit as well as and paper slip according to the Election Commission construct. They will be kept in specially prepared boxes with bellowing record: the name of the constituency, the name of polling station where the control unit has been used, serial number of the control unit and printer, date of election and, date of counting. The vote will count after all phase has been casted and the result will be announced after three days. The vote will be kept in EVM forty-five days after the date of declaration of result. All result and VVPAT will be destructive following the High Court order up to one year then the machine will return to strong room for the next election, according in fig 3.

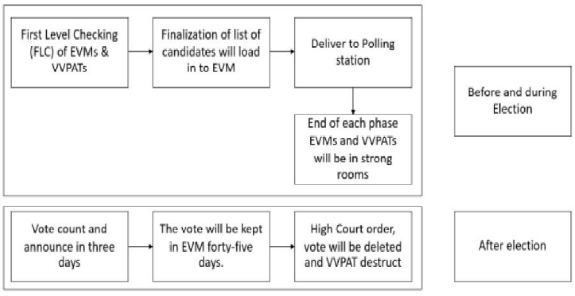

Figure 3.EVM and VVPAT flow

V. COMPARISON OF BALLOT PAPER AND E-VOTING MACHINE

Country	Election Detail				
	Eligible voter	*Cost per Eligible voter*	*Polling station*	*Invalid vote*	*Result date (Day)*
Thailand[a]	51 Million	3.17 US dollar	92,320	2.1 Million	45
India[b]	900 Million	7.97 US dollar	1 Million	0	3
Estonia[c]	1.1 Million	2.96 US dollar	0	0	1

a. Thailand election 2019
b. India election 2019
c. Estonia election 2017 with I-voting

Table I. The summary of the Election in Ballot paper and E-voting

In this section will show the statistic of the ballot paper election in Thailand and e-voting system in India and Estonia. The 2019 Thailand election is set the most expensive in Thailand history. The outstanding scope of Election committee from other general election is campaign of election for both voter and to provide knowledge about new ballot card [19]. The total of the budget of this election is five thousand eight hundred million baht increase from previous Election forty-nine-point two nine percent from the over fifty-one million eligible voter. The budget can be divided into four parts, Advertisement budget, Pre-election arrangement budget, on election date management budget, Post-election budget. The election in India has been set as a phase of voting [14]. The seven-phase polling is start from April 11 to May 19. The reason of divide into seven-phase is the registered voter is nine hundred million people and more than one million polling station and a total of over one million VVPAT units and nearly four million

electronic voting machines deploy to polling stations across India [20]. An electronic voting machine (EVM), which includes a control unit (CU), a ballot unit (BU) and a VVPAT, costs about four hundred and seventy-eight US dollar and fifty-three cent [21]. On the other hand, the election in Estonia use i-voting, the eligible can vote from electronic device which have internet access. In table I is the summary of the election in ballot paper and e-voting system.

VI. E-VOTING ADOPTION FACTORS

The factor to adopt the e-voting may difference in each country due to constrain and variance of context. The factors which both Qadah & Taha, 2007 and Osho, Yisa, &Jebutu, 2015 focus mainly in system point of view. E-voting should be accessible by everyone from anywhere, available [3]. The system should allow only eligible vote can vote, authenticity [22].The valid vote cast should be counted, on the other hand the invalid shouldn't be counted [3], [22]. Privacy of the voter is one of factor to implement the e-voting [3], [22], all vote must be anonymous and can't be tempered the vote, Security [3], [22]. The last point is the system should be easy and simple to use [3].The socio-technical has been used for e-voting system to study the impact of the system on people. The core of success factors to adopt e-voting can describe in three core [23] which are pre-voting, voting and post-voting. It includes the all stakeholders in e-voting system. The aim of this subsystem to ensure all concerns are include in technical subsystem. The last care is environment subsystem, the Act/Law should be included to guarantee the technical subsystem is legal valid. BAKON & Ward, 2017 also investigates the main factor of e-voting adoption by applying Socio-Economic model, Political model and Information and Communication and Technology model to conducting survey, then test the result by regression and correlation analysis. The factor which has the most significant is Political factor and Education factor. Not only survey has been used the Rogers diffusion of innovation Theory is used in Achieng &Ruhode, 2013 and Adeshina&Ojo, 2015. Achieng &Ruhode, 2013 said the logistic problem is the biggest problem to impact the voter to register and participant the vote cast. So, they try to understand more about e-voting adoption to solve this issue. They use the Rogers diffusion of innovation Theory, online survey and in-depth interview to analysis the data what is the factor to start the e-voting in South Africa. There are five factors to adoption e-voting which applicable in South Africa context. The usefulness of e-voting technology, the participants believe that the system is more convenience that paper system and can vote anywhere which reduce time and cost to travel polling station and waiting queues while voting. Also, they convince the system will reduce human error in counting process and increase transparency in the election. On the government side also notice the advertence in team of counting process as well. The new technology should be easy to use compare with the current one to convince the voter, the e-voting should be easier and more understandable. Due to the voter ages are not only teenage but it is also the elder who has no knowledge about technology. So, it should have a proper training both government side and voter side. This training will make them more understand the system and lead to the next factor which is trust in the innovation. If they don't trust the system e-voting won't occur and it will be waste both time and money. E-voting need to invest a lot of resource and infrastructure. The lack of both will delay the implementation of e-voting. Not only the above factor, the environment factor is likewise importance, the political environment in term of law and regulation need to considerate to imply with the new way of election to make it legal and acceptation for all parties. Adeshina & Ojo, 2015 uses as well as the Roger Diffusion of Innovation Theory. They map into four level, Sociopolitical context, Electoral Authority, E-voting technology and Electoral Actors. The result of the factors is the same with other paper in 2017 [24]. The Sociopolitical context is the most importance factor [24], [25], the election committee set up to coordinate the election topic to ensure the security across nation. Electoral Authority the cooperation between parties in election process then the E-voting technology itself need to be accepted, easy to use and flexible in each area. The last one is Electoral Actors to communicate the benefit of e-voting system to gain trust and more understand in system. In 2011, [26] the study was more indicated into the ICT factors which based on UN survey 2008 on E-voting assessment. In UAE election is interested in e-voting as well [27].

Title	E-voting adoption factors		
	Stakeholder	Environment	Technology
ELECTRONIC VOTING SYSTEMS: REQUIREMENTS, DESIGN, AND IMPLEMENTATION (Qadah & Taha, 2007)			X
E-VOTING READINESS IN KENYA: A CASE STUDY OF NAIROBI COUNTRY (Emaase & Mokodir, 2011)		X	X
E-VOTING IN UAE FNC ELECTIONS: A CASE STUDY (Dr. Ali M. Al-Khouri, 2012)	X	X	X
THE ADOPTION AND CHALLENGES OF ELECTRONIC VOTING TECHNOLOGIES WITHIN THE SOUTH AFRICAN CONTEXT (Achieng & Ruhode, 2013b)	X	X	
TOWARDS IMPROVED ADOPTION OF E-VOTING – ANALYSIS OF THE CASE OF NIGERIA (Adeshina & Ojo, 2015a)	X	X	
DESIGN IMPERATIVES FOR E-VOTING AS SOCIOTECHNICAL SYSTEM (Adeshina & Ojo, 2014)			X
WEB 2.0 AND ELECTIONS: A STUDY OF FACTORS INFLUINCING DIASPORA VOTERS ADOPTION OF E-VOTING SYSTEM (BAKON & Ward, 2017)		X	
E-VOTING IN NIGERIA: A SURVEY OF VOTERS' PERCEPTION OF SECURITY AND OTHER TRUST FACTORS (Osho et al., 2015)	X		X
ISSUES AND CHALLENGES OF TRANSITION TO E-VOTING TECHNOLOGY IN NIGERIA (Ahmad et al., 2015)	X	X	X
ELECTRONIC VOTING: CHALLENGES AND PROSPECTS IN NIGERIA'S DEMOCRACY (Alausa & Akingbade, 2017)			X
E-VOTING EXPERIENCES: A CASE OF NAMIBIA AND ESTONIA (Mpekoa & Van Greunen, 2017a)	X	X	
FACTORS FOR E-VOTING ADOPTION - ANALYSIS OF GENERAL ELECTIONS IN NIGERIA (Adeshina & Ojo, 2017)		X	

Table II E-voting adoption factors

They use the voter-recognition system which based on smart card with biometrics and public key cryptography. Their research would like to provide more factor analysis thought e-voting system. The result is legal framework need to support the e-voting, the available of audit the vote counted and allow voter

to check and confirm their vote in counting process. From the intensive review of all published literature resources including research paper, government document and research report in order to investigate the significant factors related to e-voting system adoption, the authors can explore all the possible factors regarded in the literatures as shown in table II. From table II, we can summarize and construct the diagram of factor adoption framework in fig 4 to represent all the key factors that must be concerned when adopting e-voting system and the supporting factors that has the effect on adoption successfully. For the key factors, firstly, stakeholder includes election actors and election authorities [24]. These are the parties that related to election process both individuals and organization. The second pillar is environment. This study focuses on the environment as the surrounding factor that may influence the successful adoption which is culture, political and infrastructure [6], [26], [28] - [31] in Thailand will be considerate into this. The last factor is technology. The readiness of ICT [26], [30], [31] and e-voting system requirement [3], [22], [26], [30], [32] is one of the main factors to implement e-voting. The other related factor which can find out more in the review is the communication [6] and collaboration through the whole process. These will make the e-voting adoption successful [6] and collaboration through the whole process will make the e-voting adoption successful.

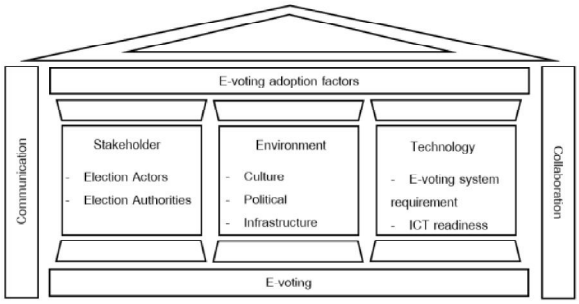

Figure 4 E-voting adoption factors

1) Stakeholder is the most importance factor in e-voting adoption. The focus stakeholders are election actors and election authorities. The election actors are the voters in election process who must aware of usefulness of e-voting election. The benefit of e-voting such as the accessibility, time saving, transportation saving, anti-fraud and reduce human error [3], [4], [6] are the part of convincing the voters to get a good perception in e-voting system compare with ballot paper. As well as the easy to use and well understand in e-voting process. The eligible vote in most of the country will start from age of eighteen until the elderly citizens thus the system should be able to be used in any ages and even, they don't have technology knowledge [3], [33]. Then the technology itself in piloting state should have a mock election to make election actors experience it directly and see the transparency of the system [32]. At the same time the input from them can be collect from mock election to improve the e-voting process before launch to public to prevent any error [27], [34]. After they have a knowledge, it will be easier to accept the technology [2], [32]. The acceptance of technology will determine the e-voting implementation. If it has lack of trust in system and against the changes e-voting adoption will be dismissed. In example in Germany, voter does not trust the system it leads to court order to stop using the e-voting machine until government can prove the system is transparency enough [35] - [37]. On the other hands, the election authorities should be ready to transform to new system with the training plan and well educate thus they can transfer their knowledge to voter [27], [34]. Both election actor and authorities have their own part to make e-voting process successfully.
2) Environment, the voter used to the traditional election so it may not easy to change suddenly, in the survey in South Africa [33] show that environment factor is one of the main factors to influence the success to adopt that e-voting system. The environment include culture, political and infrastructure, so these three factors need to considerate when it comes to introduce the new technology. In each environment is unique to develop the new technology. The culture contains the main area which is legal framework [27], [30], [32], to make e-voting successful implement the legal framework must support the new way of voting. The Acts in constitution would need to accept the digital document and to stress the government readiness of ICT transformation [32]. The law should allow the electronic data can be used in court when it needed. It can expand in difference area such as financial, logistics and administration. While it is importance to review the organic law to allow to adopt the e-voting to advance the sustainable democracy. The behavioral change of the citizen can be linked into environment in cultural area [24], [32]. The attitude and mind set of stakeholders can drive e-voting to the success way. The negative perception of the stakeholder can corrupt the changes [32]. Political parties can be both stakeholder and culture in the factor. Their influence can manipulate the supporter to believes or reject the changes [25], [33]. In the survey [30] show that the Political is the strongest factor to contribute the e-voting adoption. The infrastructure is including both software and hardware [26]. E-voting requires the network to transfer data via internet and the hardware uses to connect the electronic device and stakeholder. The infrastructure will be the backbone in the e-voting to collect vote from every area, tally, collect the result and store vote cast which need to invest a lot of time to develop and budget to

ensure the quality of service [26], [27], [32], [33]. Resources can be one of infrastructure, this is the developer the system to make the technology fulfillment and to meet the basic e-voting system requirement.

3) Technology, the Information and Communication Technologies (ICT) technology can be supporting the e-voting system requirement as well as the infrastructure. The technology development at lease need to meet the basic requirement of e-voting system [3], [22], [26], [30], [31] to gain the trust of stakeholder to use new technology. The system requirement includes available the system should be able to accessible and mobility [22]. Security in the voting process a vote must not be disturbed by anyone [26]. Privacy, the system should ensure that no one will trace the vote case to voter [22]. Eligibility in the democracy system only eligible voter can cast only one vote [22] and everyone has the free right to vote. Transparency, the voter can check their vote is correctly and vote case has been counted and at the end vote cast has been tallied [27]. ICT readiness is one of the keys to transform the system [26]. Poor ICT can be serious challenge to e-voting adoption [31]. The ICT will be the parallel with the other infrastructure to be able to communicate among the system with the large data and can access anywhere, anytime and any device [27], [31]. The readiness of ICT includes since the development process until go-live to ensure the system work properly with harmless to the election process [26].
4) Communication and Collaboration, there is many parties related into this change, so the clear communication need to be well instructed to avoid misunderstanding as well as the collaboration. The strong communication should define the process, project timeline and person in charge in each process [27]. In present day the social media is the core communicate, thus the use of it to communicate can be easily to make the awareness to new generation voter regarding the e-voting process and system. The communication is not only in the project level, but it also includes the interact with public and media to communicate to outside. The new system transformation cannot success in short term. The collaboration amongst parties will affect the efficiency in e-voting adoption [32]. One party can't be success to adopt the e-voting very parties need to use their specialist skill to work together to reach he same objective to adopt e-voting system successfully.

VII. ANALYSIS OF CONCERNED FACTORS TO THAILAND SITUATION

This section provides the analysis of the factor adoption in Thailand election. It presents a summary of report and review from current Thailand election process.

1) Stakeholder, the eligible voter in 2019 Thailand election is around fifty-one million voters. Most of the eligible voter age is thirty-six to fifty ages, thirty percent, and fifty-one to sixty-five ages, twenty four percent, [38]. This period of ages may have a difficultly to learn to new technology especially fifty-one to sixty-five ages. So, the related organization need to have a proper plan to test and train, when they what to implement the new election process. As well as the election authorizes which consist, the election committee, director of constituency, committee of constituency and committee of polling station [8] need to be well train and understand the new technology to be able to expand the knowledge to voter.
2) Environment, in term of culture Thailand has been establish the election for twenty-eight times and it all use ballot paper. It happens frequent to be question the free and fair of the result of election. The need of process or method to be able to drift this question would be increase their trust in organization. Political senses of the new technology will be help to launch the new one successful, in the same way of in Organic Law on election of members of the House of Representatives B.E. 2561, sector 84 [8] state that the committee can use any election method if it can prove this method is secure, easier than ballot paper and reasonable cost. So, it would be a great start that Organic Law pen in any way to use the election method in future. However, the infrastructure needs to be considerate, the way of transports the e-voting machine is difference from ballot paper on top of that the maintenance and storage need to have a clear policy to open to other party to audit and trace to be acceptable and no doubt in the future.
3) Technology, the e-voting machine need to meet the basic requirement otherwise the investment will be loss of nothing same as the case of Ireland. The infrastructure including hardware and software is critical in public administration [39]. In Thailand is trying to develop the governance into digital 4.0 and will implement the internet of thing. However, if we investigate the latest election, the system which use to collect the count from each polling station has crashed due to the high transection [40]. On the other hand, the report from Ministry of Digital Economy and Society collect the statistic of information technology accessibility shows that in urban area access the internet more than suburb area. If Thailand would like to implement the e-voting machine with the inter access need to consider this factor as well, how to collect the counting vote in suburb area. The risk of the attack by unknow when use the network is the other factor

to be considered also. Thus, the e-voting machine to be applied need to be robust and easy to use for everyone and can be used in many election areas.

4) Communication and Collaboration, these need to be established the center of communication center to collect the data and collaboration among the organization. At the same time to communicate to voter who is the one that us the e-voting machine to entrust the system, test and feedback the system. This feedback will be the value information to improve the e-voting system successful. Including the training to relate parties to understand more in e-voting process and be able to expand the knowledge to voter. The context of the National Strategy Act B.E. 2560 (2017 C.E.) indicates that government efficiency and better access to public services is one of the key success. Thus, the communication and collaboration in this area will be the step to achieve the National Strategy having a well-connected and integrated every party together that can provide public services through digital technologies [41].

VIII. CONCLUSION

This paper reviews the current Thailand election process and process in the most successful countries which implement the e-voting and then explore the possible of factor which will influence the e-voting adoption. The successful country is Estonia is the first country in the world where success to implement i-voting in election. India uses Electronic Voting Machine (EVM), the replacement of the ballot box across the country. These two countries encouragement to Thailand may use e-voting as the solution to solve the election problem in vote casting and vote counting. However, it cannot start without considerate the factor. Form the intensive review find out that the common factor can be divided into main three pillars which are stakeholder, environment and technology. The next step is to investigate in deep of these factors that really influence the e-voting adoption in Thailand election by using the suitable tool to determine the related factor to find the appropriate e-voting model to apply in Thailand.

REFERENCES

[1] Workpoint News, "The statistic of election in the past **18** years," 2019. [Online]. Available: https://workpointnews.com/2019/05/09/เปิดสถิติ-เลือกตั้ง-2562-ที่/. [Accessed: 20-May-2019].

[2] N. Mpekoa and D. Van Greunen, "E-voting experiences: A case of Namibia and Estonia," in 2017 IST-Africa Week Conference, IST-Africa 2017, 2017, pp. 1–8.

[3] O. Osho, V. L. Yisa, and O. J. Jebutu, "E-voting in Nigeria: A survey of voters' perception of security and other trust factors," in CYBER-Abuja 2015 - International Conference on Cyberspace Governance: The Imperative for National and Economic Security - Proceedings, 2015, pp. 202–211.

[4] D. W. S. Alausa and L. O. Akingbade, "Electronic Voting : Challenges and Prospects in Nigeria ' s Democracy," Int. J. Eng. Sci., vol. 6, no. 5, pp. 67–76, 2017.

[5] [5] Laura Sheeter, "Estonia forges ahead with e-vote," BBC news, 2005. [Online]. Available: http://news.bbc.co.uk/2/hi/europe/4343374.stm. [Accessed: 13-Apr-2019].

[6] N. Mpekoa and D. Van Greunen, "E-voting experiences: A case of Namibia and Estonia," 2017 IST-Africa Week Conf. IST-Africa 2017, pp. 1–8, 2017.

[7] S. Wolchok et al., "Security analysis of India's electronic voting machines," p. 1, 2010.

[8] Royal Thai Government Gazette, Organic Law on election of members of the House of Representatives B.E. 2561. 2019.

[9] Royal Thai Government Gazette, Rules on election of members ofthe House of Representatives B.E. 2561. 2018.

[10] E. Considerations, Introducing Electronic Voting, no. December. 2011.

[11] State Electoral Office of Estonia, "General Framework of Electronic Voting and Implementation thereof at National Elections in Estonia," no. May, pp. 1–21, 2016.

[12] C. K. Adiputra, R. Hjort, and H. Sato, "A Proposal of Blockchain-Based Electronic Voting System," in Proceedings of the 2nd World Conference on Smart Trends in Systems, Security and Sustainability, WorldS4 2018, 2019.

[13] S. Heiberg and J. Willemson, "Verifiable internet voting in Estonia," in 2014 6th International Conference on Electronic Voting: Verifying the Vote, EVOTE 2014 - IEEE Proceedings, 2015.

[14] A. Chughtai and S. Khalid, "India elections: All you need to know," Aljazeera, 2019. [Online]. Available: https://www.aljazeera.com/indepth/interactive/2019/04/indian-elections-190410185739389.html. [Accessed: 17-Apr-2019].

[15] SarveshMathi, "Logistics Behind the World's Largest Election," Medium, 2019. [Online]. Available: https://medium.com/@sarveshmathi/logistics-behind-the-worlds-largest-election-7a944b76aa4f. [Accessed: 10-Oct-2019].

[16] Annalisa Merelli, "It only takes India a month to set up a better election than the US," QUARTZ, 2019. [Online]. Available: https://qz.com/1570687/how-indias-massive-2019-election-will-work/. [Accessed: 16-Sep-2019].

[17] Election Commission of India, "Manual on Electronic Voting Machine and VVPAT," 2019.

[18] A. Paliwal, "Election Commission data shows EVM-VVPAT tally was completely correct," India Today, 2019. [Online]. Available: https://www.indiatoday.in/elections/lok-sabha-2019/story/election-commission-data-shows-evm-vvpat-tally-was-completely-correct-1534194-2019-05-25.

[19] ITAX, "The Budget in Thailand election in 2019," 2019. [Online]. Available: https://www.itax.in.th/media/งบเลือกตั้ง-2562/. [Accessed: 22-Apr-2019].

[20] Outlook, "After SC order, 20,600 polling stations to have EVM-VVPAT match," Outlook, 2019. [Online]. Available: https://www.outlookindia.com/newsscroll/after-sc-order-20600-polling-stations-to-have-evmvvpat-match/1511862. [Accessed: 17-Apr-2019].

[21] Hindustantimes, "Rs 4,500 crore needed for new EVMs for simultaneous polls: Law Commission," 2018. [Online]. Available: https://www.hindustantimes.com/india-news/rs-4-500-crore-needed-for-new-evms-for-simultaneous-polls-law-commission/story-uk9jr4jwH6PANgdDhmwHdO.html. [Accessed: 05-May-2019].

[22] G. Z. Qadah and R. Taha, "Electronic voting systems: Requirements, design, and implementation," Comput. Stand. Interfaces, vol. 29, no. 3, pp. 376–386, 2007.

[23] S. A. Adeshina and A. Ojo, "Design imperatives for e-voting as a sociotechnical system," Proceedings of the 11th International Conference on Electronics, Computer and Computation, ICECCO 2014. 2014.

[24] S. A. Adeshina and A. Ojo, "Factors for e-voting adoption - analysis of general elections in Nigeria," Gov. Inf. Q., no. August, pp. 0–1, 2017.

[25] S. A. Adeshina and A. Ojo, "Towards improved adoption of e-voting," no. October, pp. 403–412, 2015.
[26] B. Emaase and P. Mokodir, "E-Voting Readiness in Kenya: a Case Study of Nairobi County," 2011.
[27] Dr. Ali M. Al-Khouri, "E-Voting in UAE FNC Elections: A Case Study," Inf. Knowl. Manag., vol. 2, no. 6, pp. 25-84–84, 2012.
[28] A. M. Al-Khouri, "Information and Knowledge Management E-Voting in UAE FNC Elections: A Case Study," Inf. Knowl. Manag., vol. 2, no. 6, 2012.
[29] M. Achieng and E. Ruhode, "The Adoption and Challenges of Electronic Voting Technologies Within the South African Context," Int. J. Manag. Inf. Technol., vol. 5, no. 4, pp. 1–12, 2013.
[30] K. A. BAKON and T. Ward, "Web 2.0 and Elections: a Study of Factors Influincing Diaspora Voters Adoption of E-Voting System," Int. J. Inf. Syst. Eng., vol. 3, no. 1, pp. 01–10, 2017.
[31] S. Ahmad, S. A. J. Abdullah, and R. B. Arshad, "Issues and Challenges of Transition to e-Voting Technology in Nigeria," Public Policy Adm. Res., vol. 5, no. 4, pp. 95–102, 2015.
[32] A. Sabo, S. A. J. Abdullah, and R. Arshad, "Issues and challenges of transition to e-voting technology in Nigeria," Public Policy Adm. Res., vol. 5, no. 4, pp. 95–102, 2015.
[33] M. Achieng and E. Ruhode, "The adoption and challenges of electronic voting technologies within the South African context," Int. J. Manag. Inf. Technol., vol. 5, no. August, 2013.
[34] S. A. Adeshina and A. Ojo, "Towards improved adoption of e-voting," no. January 2016, pp. 403–412, 2015.
[35] J. iEsteve, B. Goldsmith, and J. Turner, "International Experience with E-Voting Norwegian E-Vote Project," no. June, pp. 1–196, 2012.
[36] M. O. Meara and S. M. Brady, "Survey & Analysis of E-Voting Solutions," University of Dublin, Trinity College, 2013.
[37] National Democratic Institute, "The Constitutionality of Electronic Voting in Germany," National Democratic Institute, 2019.
[38] Official Statstics Registration Sytstems, "Household statistic," 2019. [Online]. Available: http://stat.dopa.go.th/stat/y_stat61.html. [Accessed: 24-Jun-2019].
[39] D. Brown, "International Review of Administrative Sciences Electronic government and public administration International Review of Administrative Sciences Electronic government and public administration," vol. 71, no. 2, pp. 241–254, 2005.
[40] The Bangkok insight editorial team, "ECT announce the reason of counting vote delay," The bangkok insight, 2019.

★★★