

BLOCKCHAIN-BASED ELECTRONIC VOTING: LESSONS FROM ESTONIA

LE TRAN QUOC CONG

Ho Chi Minh City University of Law, Vietnam

Email: ltqcong@hcmulaw.edu.vn

NGUYEN DAO PHUONG THUY

Ho Chi Minh City University of Law, Vietnam

Email: ndpthuy@hcmulaw.edu.vn

HUYNH THI NGOC NHI

Ho Chi Minh City University of Law, Vietnam

Email: huynhthngocnhi@gmail.com

TRAN VAN ANH

Ho Chi Minh City University of Law, Vietnam

Email: tvanh181016@gmail.com

Abstract

The article explores the challenges and possibilities of blockchain-based elections, drawing comparisons with Estonia's practical and legal experience in organizing and implementing such systems. On that basis, the article provides an assessment of the potential for electronic voting applications as well as recommendations on how to deploy this method for Vietnam to improve the effectiveness of election activities in a comprehensive and appropriate manner consistent with current Constitutional principles.

Keywords: blockchain, election, e-voting, elector, right to vote

Received: 10 June 2024 / Revised: 12 July 2024 / Accepted: 1 August 2024

1. Issues arising from traditional (paper ballot) voting in the technological era

In a democracy, state power must belong to the people and be exercised with the consent of the people. The fundamental mechanism to convert this consent into state power is through organizing free and fair elections.¹ Designing and implementing a progressive and appropriate electoral system is a top priority for any democratic rule-of-law state, including Vietnam.² This is the most common method for people to exercise their direct democratic rights.

In Vietnam, the four election principles “universal, equal, direct and secret suffrage” recognized in the 2013 Constitution have been seriously and effectively implemented through the organization of recent elections. However, in practice, the electoral rights of voters have not been comprehensively guaranteed, with many shortcomings in the direct voting process and related organizational tasks.

1 Suu, N. Q. (2016), ‘Bầu cử ở Việt Nam - Những nội dung cần quan tâm’, *Tạp chí Quản lý nhà nước* [trans: ‘Elections in Vietnam - Contents that need to pay attention’, *State Management Journal*], Vol. 5, No. 244, p. 7.

2 Vu, V. N. (2012), ‘Vai trò của bầu cử trong việc xây dựng nhà nước pháp quyền của dân, do dân, vì dân’, *Tạp chí Nhà nước và Pháp luật* [trans: ‘The role of elections in building a rule of law state of the people, by the people, for the people’, *Journal of State and Law*], Vol. 2, pp. 11-25.

1.1. Problems arising from the manual nature of traditional paper ballot voting

Regarding the issue of election organization costs, according to the 2015 Law on Election of deputies to the National Assembly and deputies to the People's Councils ("Election Law"), all costs for an election such as (i) document and publication costs for the election; (ii) administrative and election guidance propaganda costs; (iii) conference organization costs; (iv) Leadership, inspection, and election supervision costs; (v) citizen reception and election complaint resolution costs,...³ are all sourced from the state budget.⁴ As guided by Circular No. 102/2020/TT-BTC dated 23 November 2020, of the Ministry of Finance, from the practical elections of the 15th National Assembly and People's Councils at all levels for the 2021-2026 term, the budget was used for a large number of tasks, from the smallest logistical tasks.⁵ Summarizing the election, the total cost for the election organization, as calculated, was over 2,000 billion VND for additional budget allocations.⁶ Organizing a complete election requires a huge budget and long preparation time, but despite such huge costs, the infrastructure and documents from the previous election are hardly reusable, raising concerns.

Concerning errors in the election service stages, the timing of this election coincided with the impact of the Covid-19 pandemic, exposing the existing limitations of paper ballot voting. The pandemic posed many challenges for election-related tasks, such as determining the voting rights of quarantined voters, especially those quarantined in their residential administrative unit. Some localities with many workers, students, and pupils faced difficulties in reviewing, compiling voter lists, printing, and distributing additional voter cards; there were reports of voters not receiving voter cards.⁷

For the National Election Council, the past period has shown that in performing its tasks and powers, there were limitations such as errors in ballot printing leading to the cancellation of election results and re-elections in some areas; mistakes in controlling the number of ballots issued, the number

3 Dung, N. D., Duong, L. B., Liem, D. V. (2021), '*Vietnamese Constitutional law textbook*', Hanoi National University Publisher, Hanoi, p. 227.

4 Article 7 of the Law on Election of Deputies to the National Assembly and Deputies to the People's Councils No. 85/2015/QH13 (signed on 25 June 2015).

5 Circular No. 102/2020/TT-BTC of the Ministry of Finance guiding the preparation of estimates, management, use and settlement of funds for the election of XV National Assembly deputies and Council deputies at all levels for the 2021-2026 term (signed 23 November 2020).

6 Bich, L. (2021), 'Bổ sung kinh phí bầu cử đại biểu Quốc hội và đại biểu HĐND các cấp', *Báo điện tử Đảng Cộng sản Việt Nam* [trans: 'Additional funding for elections of National Assembly deputies and People's Council deputies at all levels', *Communist Party of Vietnam electronic newspaper*]. Retrieved from: <https://daihoi13.dangcongsan.vn/bau-cu-dai-bieu-quoc-hoi-khoa-xv-va-dai-bieu-hdnd-cac-cap/tin-tuc/bo-sung-kinh-phi-bau-cu-dai-bieu-quoc-hoi-va-dai-bieu-hdnd-cac-cap-7164> [accessed 07 June 2024].

7 National Election Council (2021), *Summary report of the election of XV National Assembly deputies and People's Council deputies at all levels for the 2021 - 2026 term*, No. 783/BC-HĐBCQG, pp. 26-27.

of collected ballots, stamping voted ballots, reports of voters not receiving voter cards, and printing and distributing additional voter cards.⁸

About persistent issues of proxy voting, based on the previous analysis, Vietnam's election procedures need to comply with four constitutional election principles. Specifically, Vietnam's principles of secret ballots and direct elections are being implemented to require people to be physically present at the voting locations to cast their votes. As a result, it differs from certain other nations, like France, Belgium, Japan, etc.⁹ which occasionally permits proxy voting to establish an environment that best protects the citizens' right to vote. According to Vietnamese law, proxy voting is a violation of the principles of direct voting and secret voting (Clause 3, Article 69 of the 2015 Election Law contains the only exception that permits proxy voting), which is to minimize mistakes in elections. However, looking at the practical implementation of these principles in Vietnam through the National Election Council's records, in the election of deputies to the 15th National Assembly and People's Councils at all levels for the 2021–2026 term, there were still cases of voters voting on behalf of others in their families.¹⁰ Proxy voting does not reflect the will and aspirations of voters in the nation's most important political activity, making the election's purpose unattainable. However, it is necessary to recognize the reality that, with traditional voting methods where people must vote in person at polling stations, densely populated areas pose difficulties in reviewing and identifying voters and their ballots. Another aspect to consider is whether the individuals and organizations responsible for conducting and supervising the voting activities perform their duties properly without a "quick completion" mentality. The reliance on human resources leads to certain limitations in controlling the "direct" and "secret" nature of ballots.

1.2. Difficulties in ensuring voting rights for voters in special cases

In practice, ensuring the voting rights of voters in special cases such as those in remote areas, overseas Vietnamese citizens, voters in hospitals, maternity homes, facilities for disabled people, elderly care facilities with fewer than fifty voters, or in cases of national pandemics, faces many obstacles with traditional paper ballot voting.¹¹ Therefore, traditional elections still face challenges in ensuring the voting rights of voters in remote areas and special cases.

8 Tuan, N. M. (2021), 'Những bất cập của chế định Hội đồng Bầu cử quốc gia và hướng hoàn thiện', *Tạp chí Nghiên cứu lập pháp* [trans: 'Inadequacies of the National Election Council institution and directions for improvement', *Journal of Legislative Studies*], Vol. 14, No. 438, p. 9.

9 International IDEA, "Global in-country proxy voting data". Retrieved from: <https://www.idea.int/data-tools/tools/special-voting-arrangements/proxy-voting-in-country> [accessed 26 June 2024].

10 National Election Council (2021), *supra* note 7, p. 27.

11 Clauses 3 and 4, Article 69 of the 2015 Law on Election of National Assembly Deputies and People's Council Deputies.

First, for voters in remote areas, election propaganda activities are limited compared to other areas due to difficulties in terrain, weather conditions, and economy. Additionally, issues such as funding, human resources, and other supporting means require more investment in these areas.¹²

Second, for overseas Vietnamese citizens, Article 29(4) of the Election Law is still formal and does not create maximum convenience for this group of voters. According to this provision, overseas Vietnamese citizens only have the right to vote if they return to Vietnam 24 hours before the voting starts. This implies that overseas Vietnamese citizens can only vote if they are in Vietnam, despite not being among those deprived of voting rights by law. Additionally, for voters listed in the voter list but having to go abroad on election day, they will essentially lose their voting rights. This directly conflicts with the principles of direct, secret voting and universal suffrage. Overseas voters, although fully entitled to vote, cannot exercise their legitimate rights, leading to election results not truly reflecting the will of all Vietnamese people on critical national issues, and the principle of universal suffrage is not fully realized.

Third, for voters as stipulated in point b, clause 3, Article 11 of the Election Law, where the location has fewer than fifty voters, a separate polling station cannot be established.¹³ The law stipulates that in such cases, if voters cannot go to the polling station, the Election Committee will bring auxiliary ballot boxes and ballots to their residence or treatment place for voting.¹⁴ However, ensuring the principle of direct voting by transporting ballot boxes to voters makes the organization more difficult, costlier, and often does not guarantee the principle of secret voting as these facilities typically do not have private voting rooms.

Fourth, in unforeseen events such as natural disasters or pandemics, fully and seriously implementing election principles is challenging. Notably, the election of deputies to the 15th National Assembly and People's Councils at all levels for the 2021–2026 term occurred amid the unresolved Covid-19 pandemic, leading to people voting during the pandemic. Voting rights can be restricted for public health protection reasons,¹⁵ but postponing elections inevitably impacts the exercise of citizens' fundamental rights and the nation's democracy, especially if postponement is prolonged when previous term

12 Trinh, L. X. (2016), 'Đảm bảo quyền bầu cử, ứng cử của người dân tộc thiểu số', *Báo Biên phòng* [trans: 'Ensure the right to vote and run for election of ethnic minorities', *Border Guard Newspaper*]. Retrieved from: <https://www.bienphong.com.vn/dam-bao-quyen-bau-cu-ung-cu-cua-nguoi-dan-toc-thieu-so-post> [accessed 15 May 2024].

13 Point b, Clause 3, Article 11 of the Law on Election of Deputies to the National Assembly and Deputies to the People's Councils No. 85/2015/QH13 dated 25 June 2015.

14 Article 60 of the Law on Election of Deputies to the National Assembly and Deputies to the People's Councils No. 85/2015/QH13 dated 25 June 2015.

15 Article 4 of the International Covenant on Civil and Political Rights (adopted on 16 December 1966).

deputies' mandates have expired.¹⁶ During the severe pandemic phase, over 80 countries and territories worldwide,¹⁷ such as North Macedonia, Sri Lanka, and Ethiopia decided to postpone general elections to protect public health.¹⁸ Having to choose between the nation's destiny and public health is a challenging issue for traditional paper ballot voting in such unforeseen contexts.

Thus, despite being used continuously, traditional voting methods still have certain limitations, even though relevant agencies and organizations have made efforts to address them. Therefore, applying a more effective and complete alternative voting method is necessary. In the context of technological development, electronic voting is a method worth considering due to its unique features.

2. Potential for electronic voting applications using blockchain technology in election activities

2.1. Overview of electronic voting

In recent years, the robust development of 4.0 digital technologies has opened many opportunities to improve the effectiveness of the electoral process, and one of the methods being continuously tested globally is electronic voting. This method has long been a topic of interest due to its convenience and ability to address the limitations of traditional paper voting.¹⁹ According to the Organization for Security and Co-operation in Europe/Office for Democratic Institutions and Human Rights (OSCE/ODIHR) and the Council of Europe with Recommendation CM/Rec (2017)/5, electronic voting is defined as the use of information and communication technology (ICT) for voting and vote counting.²⁰

Despite its advancements over traditional voting methods, concerns about the possible cybersecurity risks of this type of electronic voting system and the legitimacy of election results are still being raised.²¹ An electronic

16 Ionel, Z. and Tessa, F. (2020), 'Impact of the pandemic on elections around the world: From safety concerns to political crises', *European Parliamentary Research Service*, p. 4. Retrieved from: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652017/EPRS_BRI\(2020\)652017_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/652017/EPRS_BRI(2020)652017_EN.pdf) [accessed 24 October 2024].

17 International IDEA (2022), 'Global overview of COVID-19: Impact on elections'. Retrieved from: <https://www.idea.int/news-media/multimedia-reports/global-overview-covid-19-impact-elections> [accessed 29 April 2024].

18 Ionel, Z. and Tessa, F. (2020), *supra* note 16, p. 3.

19 International IDEA (2011), *Introducing electronic voting: Essential considerations*, Policy Paper, p. 10-11. Retrieved from: <https://www.idea.int/sites/default/files/2023-09/introducing-electronic-voting.pdf> [accessed 29 April 2024].

20 OSCE/ODIHR (2013), *Handbook for the observation of new voting technologies*, Organization for Security and Co-operation in Europe. Retrieved from: https://www.osce.org/odihr/elections/new_voting_technologies [accessed 6 June 2024]; EU Committee of Ministers, *Explanatory Memorandum to Recommendation CM/Rec(2017)5 of the Committee of Ministers to member States on standards for e-voting* (14 June 2017). Retrieved from: <https://rm.coe.int/168071bc84> [accessed 6 June 2024].

21 European Commission (2018), *Study on the benefits and drawbacks of remote voting*, p. 8. Retrieved from: https://commission.europa.eu/system/files/2020-06/20181121_remote_voting_final_report_final_clean.pdf [accessed 26 June 2024].

voting system typically consists of multiple components and is deployed on the Internet with a central server, making it susceptible to network attacks that can compromise election results. It can present more severe issues than traditional paper voting, such as ensuring voter anonymity, and voter manipulation risks. When issues arose throughout the testing process – such as the 2018 allegations regarding security and secrecy with the Voatz system utilized by several U.S. states – doubts regarding this matter became more profound.²² Alternatively, there is the issue of public trust in this voting method, as evidenced by Norway, which tested it during municipal elections in 2011 and 2013 but stopped because of security concerns,²³ or Switzerland because the percentage of citizens participating in using this voting method is low.²⁴ Therefore, it's understandable why, at present, electronic voting trials are limited and even suspended in some countries.²⁵

In this context, Estonia is a notable exception, being the first country worldwide to offer all voters the option of remote electronic voting in all national elections. A key factor in the success of Estonia's electronic voting application is the use of decentralized blockchain technology. The potential of this technology to enhance voting is analyzed in the sections below.

2.2. Blockchain's technical potential to improve voting

According to the European Central Bank (ECB), blockchain is understood as a ledger recording all transactions. These transactions are grouped into blocks and executed by a decentralized system.²⁶ Blockchain, which is built on an advanced technical structure primarily intended for data storage and electronic transaction processing, offers several exceptional features²⁷ that make it an effective solution for developing a dependable.

Its decentralized nature prevents single-point control and makes data

- 22 Greenhalgh, S. (2022), 'Internet voting is being pushed by false claims and deceptive marketing', E-Vote-ID, *Seventh International Joint Conference on Electronic Voting: E-Vote-ID 2022 - Proceedings II*, University of Tartu, p. 62. Retrieved from: https://www.researchgate.net/Seventh_International_Joint_Conference_on_Electronic_Voting_E-Vote-ID_2022 [accessed 10 November 2023]
- 23 Blanco, D. Y. M. del, Gasco, M. (2019), 'A protocolized, comparative study of helios voting and Scytl/iVote', *Proceedings of the 6th International Conference on eDemocracy & eGovernment (ICEDEG)*, 2019, p. 31–38.
- 24 Górný, M. (2021), 'I-voting - opportunities and threats. Conditions for the effective implementation of Internet voting on the example of Switzerland and Estonia', pp. 138–139. Retrieved from: https://www.researchgate.net/publication/351082470_I-voting_-_opportunities_and_threats_Conditions_for_the_effective_implementation_of_Internet_voting_on_the_example_of_Switzerland_and_Estonia [accessed 26 June 2024].
- 25 Ehin, P. et al. (2022), 'Internet voting in Estonia 2005 – 2019: Evidence from eleven elections', *Government Information Quarterly*, p. 2. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S0740624X2200051X> [accessed 6 June 2024].
- 26 European Central Bank (ECB) (2015), *Virtual currency schemes – A further analysis*, p. 33; Finck, M. (2018), 'Blockchains: Regulating the unknown', *German Law Journal*, Vol. 19, No. 4, p. 667.
- 27 ASTRI (2016), *Whitepaper on distributed ledger technology, commissioned by Hong Kong Monetary Authority*. Retrieved from: https://www.hkma.gov.hk/media/eng/doc/key-functions/financial-infrastructure/Whitepaper_On_Distributed_Ledger_Technology.pdf [accessed 6 June 2024].

alteration nearly impossible, enhancing security and transparency.²⁸ The immutability of recorded transactions ensures vote accuracy and prevents tampering.²⁹ The system's elevated security protects against hacking attempts and maintains voter privacy.³⁰ Lastly, blockchain's transparency allows for complete transaction history tracking and auditing, further bolstering the integrity of the voting process.³¹ These characteristics collectively address many challenges faced by traditional and electronic voting systems, making blockchain a promising tool for secure and transparent elections.

2.3. Potential to improve unresolved problems in the voting process

The blockchain technology can optimally address the shortcomings of traditional voting and the risks faced by conventional electronic voting systems,³² as analyzed in section 2. *First*, by minimizing proxy voting, each voter is associated with a unique electronic identification code, requiring biometric verification. Vietnam's 2023 Law Identification supports this by including biometric data in the Identification Database. *Second*, electronic voting optimizes election funds, allowing reuse of facilities from previous elections and reducing invalid ballots, minimizing re-election risks. *Third*, electronic voting ensures voting rights for special cases, such as for voters living overseas or in remote areas, voting during pandemics. The principle of direct voting is maintained through candidate selection and the pressing of the vote button on devices. For electronic voting, the Internet or supporting software serves as a technical means to facilitate faster and more convenient voting.³³ *Fourth*, to address security risks, blockchain voting systems use permitted or private blockchains, requiring special access.³⁴

- 28 Farooq, M. S., Iftikhar, U. and Khelifi, A. (2022), 'A framework to make voting system transparent using blockchain technology', *IEEE Access*, Vol. 10, p. 59959; Vladucu, M. V. et al. (2023), 'E-voting meets blockchain: A survey', *IEEE Access*, Vol. 11, p. 23294.
- 29 Sadia, K., Masduzzaman, M., Paul R. K., and Islam, A. (2020), 'Blockchain based secure E-voting with the assistance of smart contract', *Proceedings of the International Conference on Blockchain Technology (IC-BCT)*, Springer, pp. 161–176.
- 30 Rahman, M. R., Tripathi, A. M., and Noida, G. (2022), 'E-voting with blockchain technology', *YMER*, Vol. 21, No. 5, pp. 641–644; Cetinkaya, O. and Cetinkaya, D. (2007), 'Verification and validation issues in electronic voting', *Electronic Journal E-Government*, Vol. 5, No. 2, pp. 117–126.
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- 32 Jafar, U., Aziz, M. J. Ab and Shukur, Z. (2021), 'Blockchain for electronic voting system - Review and open research challenges', *National Library of Medicine - National Center for Biotechnology Information*. Retrieved from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8434614/> [accessed 6 June 2024].
- 33 Nhiem, V. V. (2021), *Giáo trình Luật Hiến pháp Việt Nam [Vietnamese Constitutional Law Textbook]*, Hong Duc Publisher, Ho Chi Minh, pp. 280–281.
- 34 Zheng Z. et al. (2017), 'An overview of blockchain technology: Architecture, consensus, and future trends', *Proceedings of the IEEE International Congress on Big Data (Big Data Congress)*, pp. 557–563. Retrieved from: https://www.researchgate.net/publication/318131748_An_Overview_of_Blockchain_Technology_Architecture_Consensus_and_Future_Trends [accessed 6 June 2024]; Roopika, J. (2020), 'Blockchain technology: History, concepts, and applications', *International Research Journal of Engineering and Technology (IRJET)*. Retrieved from: <https://www.irjet.net/archives/V7/i10/IRJET-V7I10109.pdf> [accessed 3 June 2024].

No single entity controls the system, and data is immutable and decentralized.³⁵ These address network attacks and result tampering. Secret voting is ensured through private keys, maintaining voter anonymity.³⁶

While enhancing efficiency, blockchain voting has limitations like third-party identity verification dependency. However, ongoing research and technological advancements continue to improve its security and efficiency. Several countries, including Switzerland, the United States (US), Russia, and notably Estonia, have trialed or adopted blockchain-supported electronic voting systems.³⁷

3. Estonia's experience in implementing electronic voting with the support of blockchain technology

Estonia's success in electronic voting relies on (i) enhancing technical infrastructure and citizen confidence, and (ii) establishing a robust legal framework.

Regarding technical infrastructure and building people's trust, the foundation for Estonia's successful electronic voting is based on the X-Road data exchange middleware and the national public key infrastructure (PKI) with a strong encryption system – the electronic identification card (ID card). The ID card, capable of tightly linking digital and physical identities, has facilitated Estonia's smooth online public services. In particular, ID card has the potential to be used in public key infrastructure for authentication, protection of certain data (such as electronic ballot data),³⁸ and signature identification.³⁹ These two pillars of Estonia's digital society were first deployed in the 2000s and still play an extremely important role in implementing public administrative procedures for the Estonian people. Estonians have a great deal of faith in their country's digital government. According to survey data in 2020, 82% of Estonians trust Estonia's digital services and e-governance.⁴⁰ It can be affirmed that the high development of the national technical infrastructure has earned the people's trust, which is a favorable condition and key for this country to conduct electronic voting successfully.⁴¹

Regarding the legal framework, at a general level, Article 60 of the Constitution of the Republic of Estonia⁴² stipulates the general principle for the elections: "Elections shall be general, uniform and direct. Voting shall

35 ASTRI (2016), *supra* note 27, p. 30.

36 Champagne, P. (2014), *The book of Satoshi*, e53 Publishing LLC, United States of America, p. 21-22

37 Vladucu, M. V. et al. (2023), *supra* note 28, pp. 23293-23302.

38 Almeida, R. L. et al. (2023), 'Impact of decentralization on electronic voting systems: A systematic literature survey', *IEEE Access*, Vol. 11, p. 132405.

39 OECD iLibrary (2019), 'Digital opportunities for better agricultural policies'. Retrieved from: <https://www.oecd-ilibrary.org/sites/510a82b5-en/index.html?itemId=/content/component/510a82b5-en> [accessed 9 June 2024].

40 Ragg, T. (2020), 'Eesti digiriik naudib nii kohalike elanike kui e-residentide toetust', *Ajaleht Pealinn*. Retrieved from: <https://pealinn.ee/2020/06/04/eesti-digiriik-naudib-nii-kohalike-elanike-kui-e-residentide-toetust> [accessed 27 June 2024].

41 Ehin, P. et al, *supra* note 25, p. 4.

42 Article 60 of the Constitution of the Republic of Estonia.

be secret”. Estonia’s electronic voting is governed by detailed laws such as the Parliamentary Election Act, Local Government Council Election Act, Referendum Act, and European Parliament Election Act. Over nearly two decades, these frameworks have evolved through amendments to ensure comprehensive regulations for electronic elections.

The most comprehensive and directly regulating laws on electronic voting in Estonia are stipulated in the Parliamentary Election Act. It sets electronic voting as a separate chapter (Chapter 7) regulating issues such as procedures, methods, and how voters vote electronically. Additionally, there are scattered regulations in other chapters addressing issues such as the authority of the National Election Committee (equivalent to the National Election Council in Vietnam), vote counting and verification methods (Articles 60 and 85.1), or authorities responsible for electronic voting (Articles 9, 15, and 85.2). At the local level, there is the Municipal Council Election Act. Similar to the Parliamentary Election Act, this law also dedicates Chapter 7 and has scattered regulations in other chapters addressing electronic voting issues. The Local Government Council Election Act, European Parliament Election Act, and Referendum Act all reference the Parliamentary Election Act for electronic voting regulations. Uniquely, the Referendum Act outlines specific steps for voter login, including identification, voting procedures, signature verification, and voter confirmation (Article 41.3).

From Estonia’s practical experience, some observations about the success reasons in applying electronic voting in this country can be drawn as follows: *First*, Estonia has laid a solid foundation in the e-government model and built people’s trust in electronic public services. *Second*, the country has developed relatively comprehensive legal frameworks regulating election management (both conventional and electronic elections) and technological development. These factors have created the basic conditions for the successful implementation of blockchain-applied electronic voting.

4. Potential for applying electronic voting using blockchain technology for election activities in Vietnam

4.1. The Necessity of Applying Technology in Election Activities in Vietnam

In Vietnam, learning from the limitations of the 2021 election, the summary report of the Election Council proposed promoting research and enhancing the application of information technology and digital applications to address the shortcomings of traditional paper voting.⁴³ The implementation of digital transformation goals includes Decision No. 942/QĐ-TTg, outlining an e-government strategy and blockchain-based digital currency by the State Bank of Vietnam. Decision No. 06/QĐ-TTg (6 January 2022)

⁴³ National Election Council (2021), *supra* note 7, p. 31.

focuses on population data and electronic identification for national digital transformation. Decision No. 422/QĐ-TTg (4 April 2022) lists online public services, including free digital signatures.

Additionally, Resolution No. 27/NQ/TW in 2022 briefly proposes researching voting rights for overseas Vietnamese citizens without specifying the implementation process. This gap in the legal system presents an opportunity for Vietnam to trial electronic voting, leveraging international experiences and exploring non-traditional voting methods.

4.2. Specific suggestions

With Vietnam's rapid digital transformation in public administration and insights from Estonia's technical infrastructure, the key technological prerequisites for applying electronic voting in Vietnam include:

First, regarding the development level of online public services, two foundational conditions need to be met: (i) electronic identification must reach level 2⁴⁴ for all eligible citizens; (ii) the provision of online public services in all state agencies, especially those directly related to election management, must reach level 2.⁴⁵

Second, a comprehensive electronic voting model needs to be built. Detailed issues regarding the establishment and operation of this model need to be listed and guided for the public to understand. According to the authors, three key issues of the electronic voting model need to be clearly defined for voters, including: (i) basic guidance on how the model is established and operated; (ii) the agency which is primarily responsible for operating the electronic voting system; and (iii) how voters vote and how the system records the votes. Additionally, the conditions for Internet coverage, technological devices for electronic voting, and voters wishing to use electronic voting methods with digital signatures or electronic identification verification are important for voters to carry out this voting method. Furthermore, adding regulations for electronic voting is essential. The proposed Law on Election of Deputies to the National Assembly and People's Councils offers an advantage for Vietnam, as it governs both central and local elections, unlike Estonia's separate laws. This streamlines electronic voting regulations and avoids multiple law amendments. It is suggested to trial electronic voting in technologically advanced provinces and for overseas voters, allowing people to choose their voting method, ensuring the freedom to exercise their rights.

For Vietnam's practical context, a key issue is building people's trust in digital transformation activities. People are the voters, the subjects deciding whether to use electronic voting. Therefore, only with the people's trust and

44 Clause 2, Article 12 of the Decree No. 59/2022/ND-CP regulating electronic identification and authentication.

45 Point a, Clause 1, Article 11 of the Decree No. 42/2022/ND-CP regulating the provision of information and online public services of state agencies in the network environment.

proactive participation in digital transformation processes, especially in public administration, will the opportunity for successful electronic voting application arise.⁴⁶ Electronic voting should be seen as an advanced service, not a quick fix for electoral limitations.⁴⁷ Vietnam should carefully and comprehensively evaluate potential risks and difficulties before deciding to trial this method.⁴⁸ ●

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Author Contribution

All authors contributed to the study conception and design. All authors read and approved the final manuscript.

Declarations

Conflict of Interest: The authors declare no competing interests.

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