

VOTING METHODS: CHALLENGES, MODERN TENDENCIES AND EXPERIENCE GLOBALLY

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ABSTRACT

In this article, we would concentrate mainly on applying modern technologies in the electoral process worldwide. Fair and free elections are supposed to be a “prerequisite” of democracy, a necessary element to secure foundational constitutional values and international legal norms. Voting is an essential tool (both mechanism and instrument) for any democratic government globally. It is the most crucial factor which makes government not only from the people but also for the people and by the people. Despite the digitalization of several vital aspects of modern life, elections are still primarily conducted offline, on paper. Even today, in 2021, the paper ballot has been used for voting in most countries worldwide, where voters mark their choice on the paper and put it in the ballot box. At the end of any elections (local, regional, national), the votes are counted, and the results are declared. Usually, voters have to be present at the polling station to vote (this makes the entire process very time-consuming and expensive). In modern life, scholars, politicians, and security experts talk about applying blockchain-based voting, digital identity, cloud communities, crypto-voting, etc. Some argue that blockchain technologies might revitalize voting, while others are still convinced that blockchain-based voting could threaten democracy (fundamental constitutional values). Here, we’ll try to point out pros and contras, analyze strong and weak sides, as well as opportunities and challenges, compare few types of voting already in use in different countries. Digital voting (e-voting) in a digital age is vital in the global movement toward (allows to shift to) digitalizing democracy. Blockchain-based voting is a global digital instrument in the toolkit that can counter the risks of traditional voting and e-voting processes. Block chain-based voting guarantees safety and security of a balanced constitutional order by promoting self-governance, enhancing civic participation (developing participative democracy), and controlling how electoral processes operate.

Keywords: Elections Block chain-Based Voting, Citizenship, Crypto-Voting, Digital Identity, Paper-Based Voting, Right to Vote, Europe, Ukraine, USA

INTRODUCTION

It is recognized on the international level that 'everyone has the right to be recognized as a person before the law': Article 6 of the Universal Declaration on Human Rights 1948 and Article 16 of the International Covenant on Civil and Political Rights 1966 (further - ICCPR). The right to vote, be elected, and participate in the political process is a crucial and essential feature of every democratic society (Johnson, 2019). The political freedom of speech and debate, and freedom of association, lead to a multi-party system and the right to organized political opposition. Free elections with regular repetition in a relatively short period ensure the people's control overpower by the political majority. The government is accountable for the people's representation (Kobyletskyi & Paslavska, 2012).

Blockchain technology is a modern game-changer in politics and law (Orgad, 2018). Everyone can create and register his/her digital identity; has an option to control what to do with

it and decide with whom to share what. Blockchain technologies in modern days can help to achieve the UN goal of granting an ID to everyone. No one should be left behind it. We talk about sustainable development goal 16.9 prescribed in United Nations Legal Identity Agenda ('legal identity for all, including birth registration, by 2030'), and indicator 17.19.2 ("support to statistical capacity-building in developing countries, which have conducted at least one population and housing census in the last ten years; and have achieved 100% birth registration and 80 % death registration") <https://unstats.un.org/legal-identity-agenda>.

Furthermore, proof of legal identity of every person is defined as a credential, such as a birth certificate, identity card, or digital identity credential, recognized as official proof of legal identity under national law and following emerging international norms and principles. Civil registration is defined as the continuous, permanent, compulsory, and universal recording of the occurrence and characteristics of vital events about the population, as provided through decree or regulation according to the legal requirement in each country. Usually, civil registration is carried out by responsible state bodies empowered by the government primarily to establish the documents provided by the law.

In international law, a 'state' usually possesses four necessary qualities: a permanent population (citizens), a defined territory (with borders), government, and a capacity to enter into relations with other states (Article 1, Montevideo Convention, 1933). Modern international law does not recognize the concept of a 'virtual state' – a decentralized, borderless (no physical territory) virtual nation that functions as a government service platform. It is a severe challenge to the traditional definition of a 'state.' A virtual political community cannot effectively perform institutional functions.

We can find the primary legal source for blockchain technologies in the electoral process in Article 25(1) of the ICCPR 1966. According to it, 'every citizen shall have the right and the opportunity ... to take part in the conduct of public affairs, directly or *via* freely chosen representatives.'

In the last few decades, modern democracies have witnessed a low rate of political participation and civic engagement with existing governmental institutions (on different tiers). Low voter turnout, specifically regarding young people, raises significant concerns (challenges) for many representative democracies (De-Filippi, 2018). Trust and personal concern in public institutions has dropped to the point that it has become difficult and not interesting for people (citizens, non-citizen residents) to engage in political activity on local, regional, national, and supranational levels.

So far, electronic voting (e-voting) is a highly discussable topic from the viewpoint of improving the efficiency and convenience of elections. Electronic voting is supposed to be implemented on the national level and realized. It reflects the opinions of many young people, tech-savvy and those facing difficulties while visiting polling stations. Within blockchain technology and cryptography, everyone (any user) can log in and cast his/her ballot by signing it with a private key. Trusted miners (voters) could verify whether the votes are legit or not by using the voter's public keys that make the entire e-voting process transparent, cost-effective, safe, and secure. While attempting to build an electronic voting system that satisfies the legal requirements of legislators has been a challenge for a long time.

Traditional Way of Voting

Such factors as well-being (prosperity, happiness), gender, age, education, and income make a crucial influence on applying different voting types, methods, and mechanisms. The Code of Good Practice in Electoral Matters (2002) prepared by the Venice Commission summarised essential principles, standards, and conditions for voting:

- Universal suffrage: All human beings have the right to vote and to stand for election;
- Equal suffrage: Each voter has the same number of votes, each vote has the same weight, and equality of opportunity has to be ensured;
- Free suffrage: The voter has the right to form and to express his/her opinion in an accessible manner, without any coercion or undue influence;
- Secret suffrage: The voter has the right to vote secretly as an individual, and the state has to protect that right;
- Direct suffrage: The ballots cast by the voters directly determine the person(s) elected;
- Frequency of elections: Elections must be held at regular intervals;
- Respect for fundamental rights: Democratic elections require respect for human rights;
- Regulatory levels and stability of electoral law: Rules of electoral law must have at least the rank of a statute; rules on technical matters and detail may be included in regulations of the executive;
- Procedural guarantees: These include procedural safeguards (legal watchdogs) aiming to ensure proper organization of elections on all tiers of government by an impartial body, the observation of elections by national and international observers, an effective system of appeal;
- Electoral system: Within the respect of all the principles mentioned above.

Currently, most countries, states, and territories worldwide conduct their elections on every tier solely by applying ‘traditional’ voting methods (Pankevych, 2020, p. 188-189). It is necessary to vote in one way only: to cast the ballot, only on election day, the eligible person who needs to vote must appear in person at the assigned polling station in the constituency of registration.

The dataset recently compiled by International IDEA reveals that Europe, with only 14 percent of countries use solely traditional polling station voting methods, is the continent with the lowest number of such cases (IDEA, 2021) Table 1.

| Table 1 PAPER-BASED VOTING | |
|---|--|
| Strong sides: Traditional mechanisms and instruments of voting | Weak sides: Disappointment (distrust) with the results; time-consuming; binding to the physical place of residence (polling station); indifference (non-engagement) of young people; lack of integration of non-citizen residents into host state-society dichotomy |
| Opportunities: Mutual development of relevant legislation and voting process | Threats/challenges: Passive civic participation (lack of interest; lack of patriotism); deep concern on security issues |

On the electoral 'mass-market' globally, we usually mention three target groups: citizen residents, non-resident citizens, and non-citizen residents (Pankevych & Sofinska, 2020). In different countries globally, their rights, duties, and privileges are other (the particular impact those rules have on people who have a right to vote and/or be elected). Therefore, this brief SWOT analysis on voting is drafted to demonstrate that the traditional way (method) is no longer useful due to the rapid development of technologies (e-voting, I-voting, block chain-based voting).

USA: Specific Case

The physical presence of every voter at the polling station during the election while casting a ballot is a severe obstacle in times of mobility, and it hampers technology development in voting.

In the USA, fashion on voting changed since 1960 tremendously: from butterfly ballot to e-voting and i-voting (block chain-based). However, a 1997 state law passed in Texas allows for legal voting from space, with an absentee ballot system set for astronauts to vote with the address "low Earth orbit" (Brabaw, 2020). According to NASA, most American astronauts who vote while in space choose to vote as Texas residents because they move to Houston for training

before their mission begins. This is a truly unique experience in casting his/her ballot during national (for example, presidential elections). Before an American astronaut can vote, NASA has to test that the ballot can be filled out. The county clerk sends a test ballot to NASA's Johnson Space Center in Houston. Space station training computer tests whether someone can fill the ballot out and send it back to the responsible clerk. If the ballot passes the test, the real ballot is duly encrypted and sent to a particular astronaut on the International Space Station. That responsible clerk also sends credentials specific to the voting crew member for security in opening the ballot. The astronaut in question then fills it out electronically and sends it by e-mail back down to the county responsible clerk to record the vote. That responsible clerk also has a password to ensure they're the only person to open the e-mail with the ballot (Brabaw, 2020).

Yes, in the USA, e-voting is applied both in politically binding national and sub-national elections (elections for public office or direct democracy initiatives and elections for the regional legislature or executive office, etc.). Once again, the COVID-19 misfortune changed the electoral mechanisms and instruments. For example, voting in the 2020 presidential election was different for many Americans than in few last years (much more absentee ballots and early voters).

Among 190 researched countries globally: 144 (vast majority) do not use e-voting currently, 26 use e-voting in politically binding national elections, 15 apply e-voting in politically binding sub-national elections, four use e-voting in other elections with EMB participation, and about one country there is no information. Furthermore, in this survey, compared to Europe, we can find that among 144 researched countries worldwide, 11 Asian countries (15%) use e-voting in politically binding national elections, 6 Americans (24%) apply e-voting in politically binding sub-national elections. Among 44 European researched countries, 39 do not apply e-voting currently (IDEA) <https://www.idea.int/data-tools/question-view/742>.

Europe & E-Voting: Modern Trends

E-voting is related to a whole range of modern forms of e-democracy: advisory online opinion polls, e-voting on public policy, participative budgeting, e-plebiscites, e-referendums, e-elections (even I-voting), etc. (Sofinska, 2016). E-voting can promote different types of democracy (representative, direct, participative) on all tiers of government. E-voting, as any other applied voting method, must respect all principles for democratic elections and referendums. The accelerated changes in its underlying technology present a real challenge to such conformity as they introduce new opportunities and threats in an ongoing manner. Everything must be well-designed, managed, and coordinated appropriately and security-based.

On 14 June 2017, the Council of Europe adopted a new Recommendation CM/Rec (2017)5 on Standards for E-Voting. This new Recommendation follows the previous Rec (2004)11 and the primary purpose is to ensure that electronic voting complies with principles of democratic elections and is the only existing international standard on e-voting so far. It deals with the most critical part of election technology, namely e-voting, which means using electronic means to cast and count the vote (voting machines, ballot scanners, digital pens, and internet voting systems, etc.). This new Recommendation aims to harmonize the implementation of the principles and standards of democratic elections and referendums when using e-voting, thus rebuilding the trust and confidence of voters in their respective voting process and domestic e-voting schemes.

E-voting enables voters to cast their votes from a place other than the polling station in their voting district. It facilitates both the casting of the vote by the voter and the participation in elections and referendums of citizens entitled to vote while residing or staying abroad. It widens desirable access to the voting process for every voter with disabilities or those who have other difficulties in being physically present at a polling station and using the devices available there. E-voting increases voter turnout by providing additional voting channels and bringing the voting process in line with new developments in society and the increasing use of new technologies to

pursue democracy and constitutional principles. It reduces, over time, the overall cost to the electoral authorities of conducting an election or referendum, delivers voting results reliably and more quickly and finally provides the electorate with a better service by offering a variety of voting channels.

One of the European countries with well-developed technologies in voting is Estonia. This country uses not only e-voting (automatic registration, remote voting) in politically-binding national elections (parliamentary) and national referendum, but also in local and supranational elections (to the European Parliament).

Among 44 European researched countries, majority (39) do not apply e-voting currently, while five use it in politically-binding national elections, three use in politically-binding sub-national elections and France use it in other elections with EMB participation (IDEA) <https://www.idea.int/data-tools/question-view/742>.

| Usage of e-voting | Quantity of European countries | European countries |
|---|---------------------------------------|---|
| Yes, in politically-binding national elections (elections for public office or direct democracy initiatives) | 5 (11.4%) | Belgium, Bulgaria, Estonia, France, Russia |
| Yes, in politically-binding sub-national elections (e.g. elections for regional legislature or executive office etc.) | 3 (6.8%) | Armenia, Belgium, Bulgaria |
| Yes, in other elections with EMB participation (e.g. non-binding referendums) | 1 (2.3%) | France |
| No, e-voting is not used currently | 39 (88.6%) | Andorra, Austria, Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Finland, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lichtenstein, Lithuania, Luxemburg, Malta, Moldova, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, UK |

Here we come to Ukraine. Democratic processes in Ukraine reflect worldwide tendencies (Pankevych, 2017). Possibility of installation of e-voting in Ukraine is a very tangible and discussable topic. In 2011, Oleksandr Tyshchenko (then an MP in Ukraine) initiated a draft of a new Concept related to implementing the electronic voting system in Ukraine. It outlined the relevance and feasibility of improving the current voting system (in the context of electronic voting), declared the benefits of its implementation and proposed its indicative model.

The fundamental objective of the introduction of electronic voting in Ukraine, up to his mind, are time costs, the impact of human resources on voting and counting in the traditional way, as well as the development and transportation of ballots. The concept was drafted and developed on the basis of the recommendation of the Committee of Ministers of the Council of Europe (2004) 11 on legal, operational, and technical standards for electronic voting and the report of the Venice Commission for Democracy through Law in 2005. The apparent benefits of e-voting are such: human resources, but also improvement of the availability (accessibility), operability, security of the system, and unconditional reporting on the preparation, voting, and counting of votes.

We share the opinion of scholars that the introduction of e-voting in Ukraine is necessary, first of all, to ensure the practical application of the right to vote (specifically after the results of presidential and parliamentary elections (2019), local in 2015 and 2020). Numerous studies show that the applications are different voting mechanisms that depend directly on factors such as level of well-being, gender, age, level of education and income, etc.

E-voting is popular in many countries globally, being as convenient and fashionable as transparent and secure. The primary purpose of the e-voting mechanism is to attract much more citizens and non-citizen residents to participate in the dichotomy of 'state-society'. A significant factor is the participation of highly skilled mobile youth (those with scientific degrees and high social status) and proper timing to improve their skills (so far modern block chain technology allows). Crypto-voting is the innovative integrated electronic voting system (e-voting) system based on block chain technology. Crypto-voting is aimed to develop a new electronic voting system integrated with one or more electoral event management procedures (credential distribution, voting, ballot collection, preference counting, publication of the results, etc.) *via* the application of two linked Block chains: The first one registers the eligible voters and their voting, while the other counts the votes assigned to the various candidates (result). Cryptographic techniques are used to ensure the security of block chain-based voting (Fusco, 2018).

Block Chain-Based Voting: Modern Challenges and Tendencies

Block-chain technology is known for being the basis of crypto currencies, such as the Bitcoin system, which started in 2007. Now, Bit-coin is an essential and functional crypto currency in terms of capitalization. Block-chain is a distributed and decentralized data structure that records chronologically a specific typology of data (called transactions). Block-Chain users usually interact with the block-chain by sending transaction requests within a peer-to-peer network.

Implementing some form of block-chain-based voting is now a reality worldwide (usually, as a part of an e-voting initiative). Block-chain-based voting is recently in use globally: In Estonia (2019 parliamentary elections, more than 40% of ballots were cast using the I-voting), India, Japan (2020 local elections in Tsukuba city), Russia, Sierra Leone, South Korea, Thailand, the USA (2018 midterm election in West Virginia, 2019 in the city of Denver, Colorado and the 2020 Presidential election in Utah County), etc.

Block-Chain-based voting has a specific design and structure. When it is time to vote (national, regional, or local elections), the authentication of every user requires three distinct pieces of evidence: identification number, the password supplied on registration, ballot card, which contains a QR code. There are two applicable methods of voting (web browser, physical polling station). Every user makes a choice which way to use because the authentication details are different. However, to vote, they must provide all three mentioned above pieces of information (evidence). Every user will be able to vote at a local polling station or *via* the internet (the URL provided on the ballot card).

After selecting their vote (among different selecting options, including the abstention) and then confirming the submission, the vote will become a transaction. Further, it will be appropriately encrypted with the relevant key.

Once the vote is confirmed, the polling station will generate a transaction to remove the user's vote within the voter block-chain. It is important to note that two distinct block-chains are being held regarding voting: the first one contains transactions relating to which users have registered and which users still have a vote. The second includes the contents of the vote. Using these two distinct block-chains, we ensure every voter's anonymity when selecting his/her vote. Cryptographic techniques are used to ensure the security of block-chain-based voting (Yu et al., 2018).

| Table 3 BLOCK-CHAIN-BASED VOTING | |
|--|--|
| Strong sides: transparent, secure; not binding to the physical place of residence (polling station); strengthening the social integration of youth and foreigners-residents; development of innovative mechanisms and instruments of voting | Weak sides: discriminatory and exclusive; non-mutual implementation of relevant legislation and installation of voting technologies; non-sufficient communication between people and government regarding blockchain-based voting |
| Opportunities: attraction (involvement, engagement, integration) of young people; strengthen public confidence in electoral and political processes; to minimize risks in electoral and political processes | Threats/challenges: to fundamental democratic values; to traditional way of voting (older people and vulnerable groups); to the integrity of the electoral process; to voter registration databases |

Researchers highlight domination, complexity, accessibility, lack of public confidence, and digital literacy, and technical know-how among risks presented in block-chain-based voting due to its complex nature (Johnson, 2019). The complex nature of block-chain is linked to one of the crucial challenges facing both public and private block-chains: scalability (the scale and speed at which transactions (voting) can occur on a block-chain network). Block-Chain-based voting is supposed to minimize the potential risk for domination, enhance safety and security, and facilitate greater transparency and openness in decision-making processes on different tiers of government while maintaining the privacy and anonymity of every voter in a manner consistent with principles and good governance standards in contemporary constitutionalism.

Block-Chain-based voting aims to receive transparent governance by enhancing accountability, integrity, traceability, and anonymity (Ayed, 2017). The EU attempts to engage in multi-actor dialogues concerning the role of block-chain technology in regulating risks across Europe. The EU creates newsletters on the EU Block-Chain Observatory Forum and EU Block-Chain roundtables. It has published few reports in divergent areas, highlighting the role of block-chain in public services and voting, throughout Europe. Application of block-chain technology must be consistent with the legal requirement based on the EU primary law: “the institutions shall maintain an open, transparent, and regular dialogue with representative associations and civil society” (Art 11.2 TEU).

The European Union attempts to be a leader in blockchain technology by using it as an innovator and as a home to powerful blockchain-based independent platforms and applications. The main virtues of blockchain are; environmental sustainability (should be sustainable and energy-efficient), data protection (should be compatible with and, where possible, support EU data protection and privacy regulations), e-identity, digital identity (should respect and be consistent with, but also enhance the usefulness of, EU evolving e-Identity framework), cybersecurity (should be able to provide high levels of cybersecurity and safety), interoperability (should be interoperable between themselves and with legacy systems in the outside world).

It is essential that block-chain-based voting does not become a means for factional societal interests, such as political, technical, or legal elements, to dominate decision-making processes. Block-Chain-based voting is its potential to foster democratic ideals linked to equality and non-domination, as there is no central command or established hierarchy on a fully operational block-chain network (Johnson, 2019, p. 251).

CONCLUSIONS

The Covid-19 misfortune shakes the foundations of electoral policies and practices that had consolidated over several decades. It forces to adopt new and change (transform) the pattern; the pandemic has also shed light on new, forthcoming challenges that, looking ahead, manage future elections worldwide. Despite the solid societal values and procedural integrity of traditional

paper-based voting, Covid-19 misfortune has rapidly proven this method as anachronistic and inadequate, confirming the notion that: firstly, traditional voting, on its own, is no longer capable of guaranteeing the enfranchisement of voters who are, in the modern world, increasingly on the move. Secondly, to meet evolving and pressing needs of present-time elections, electoral policies and practices require urgent review, adjustment and more meaningful applicability to new, tremendously changing realities typically arising over time.

Block-Chain technologies make voting safer, more voter-friendly, accessible, and convenient, and resorting to digital technology. Block-Chain-based voting is developing technology: crypto-voting is the new integrated electronic voting system using block-chain technology in voting. Block-Chain-based voting can quickly transform (revolutionize) existing electoral and political processes in the digital age (a real game-changer). It is a decentralized, immutable, accessible, transparent, platform-independent, and the secure process connected to the right to vote, be elected, and participate in dichotomy state-society (the cornerstone of modern constitutionalism).

Democratic societies in the XXI century face a significant challenge in finding true balance and harmony between constitutional values and the technological tools that emerge. Block-Chain based voting should serve democracy and therefore employ strong cryptography to secure the election process. While researched paper-based voting, e-voting, and block chain based voting (crypto-voting), we are looking for the most acceptable voting method, realistically feasible immediately, with minimal disruption of voter expectations globally.

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