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ELECTRONIC VOTING: PROSPECTS FOR UKRAINE

Abstracts. The article states that the issues of unification and digital transformation of electoral processes have recently become widely discussed in Ukraine. The author notes that the main goal of the ideologues of e-voting is to simplify election procedures, debureaucratize election processes, make it easier for voters to vote, speed up the counting process, minimize the possibility of influencing the counting of votes and establishing voting results. The article examines the main types of procedures and types of electronic voting. The author also emphasizes the importance of complying with Recommendation CM / Rec (2017) 5 of the Committee of Ministers of the Council of Europe to member states on electronic voting standards (adopted by the Committee of Ministers on 14 June 2017). Examining the history of the introduction of e-voting in the world practice and determining the reasons for abandoning such practices in some countries, the author analyzed and summarized the positive and negative aspects of the introduction

of e-voting for certain aspects of the electoral process. The author notes that the system of "electronic elections" is known in world practice, but the question of its application is quite controversial given the distrust of the system itself; the impossibility of ensuring the secrecy of the vote, provided that the voter is identified during, for example, online voting; impossibility of independent observation and verification of data when counting votes. According to the author, the introduction of electronic voting is a matter of separate careful study given the different history of both success and failure of the failed application of the electronic voting system in world practice.

Keywords: elections, electronic voting, remote voting, early voting, impersonal voting.

ЕЛЕКТРОННЕ ГОЛОСУВАННЯ: ПЕРСПЕКТИВИ ДЛЯ УКРАЇНИ

Анотація. Визначено, що питання уніфікації та цифрової трансформації виборчих процесів останнім часом набувають в Україні широкої дискусії. Основною метою, яку ідеологи впровадження електронного голосування ставлять перед собою, є спрощення виборчих процедур, дебюрократизація виборчих процесів, доступність для виборців до системи голосування, пришвидшення процесу підрахунку голосів, мінімізація можливості впливу на підрахунок голосів виборців та встановлення результатів голосування. Досліджено основні види процедур та типи електронного голосування. Також наголошується на важливості дотримання Рекомендацій CM/Rec (2017)5 Комітету Міністрів Ради Європи державам-членам щодо стандартів електронного голосування (прийнято Комітетом Міністрів 14 червня 2017 року). Досліджуючи історію впровадження у світовій практиці електронного голосування та визначаючи причини відмови від такої практики в окремих країнах, проаналізовано та узагальнено позитивні й негативні аспекти впровадження електронного голосування для окремих процедур виборчого процесу. Зауважено, що система "електронних виборів" добре відома у світовій практиці, проте питання її застосування є доволі дискусійним з огляду на недовіру до самої системи; неможливості забезпечення таємниці голосування за умови ідентифікації виборця під час, наприклад, інтернет-голосування; неможливості незалежного спостереження та верифікації даних при підрахунку голосів виборців. Упровадження електронного голосування є питанням окремого ретельного дослідження з огляду на різну історію як успіху, так й історію невдалого застосування у світовій практиці системи електронного голосування.

Ключові слова: вибори, електронне голосування, дистанційне голосування, дочасне голосування, неперсональне голосування.

ЭЛЕКТРОННОЕ ГОЛОСОВАНИЕ: ПЕРСПЕКТИВЫ ДЛЯ УКРАИНЫ

Аннотация. Определено, что вопросы унификации и цифровой трансформации избирательных процессов в последнее время в Украине широко

дискуссируются. Основной целью, которую идеологи внедрения электронного голосования ставят перед собой, является упрощение избирательных процедур, дебюрократизация избирательных процессов, доступность для избирателей к системе голосования, ускорения процесса подсчета голосов, минимизация возможности влияния на подсчет голосов избирателей и установления результатов голосования. Исследованы основные виды процедур и типы электронного голосования. Также отмечено важность соблюдения рекомендаций CM/Rec (2017) 5 Комитета Министров Совета Европы государствам-членам относительно стандартов электронного голосования (принят Комитетом Министров 14 июня 2017). Исследуя историю внедрения в мировой практике электронного голосования и определяя причины отказа от такой практики в отдельных странах, проанализированы и обобщены положительные и отрицательные аспекты внедрения электронного голосования для отдельных процедур избирательного процесса. Отмечено, что система "электронных выборов" хорошо известна в мировой практике, однако вопрос ее применения довольно дискуссионный, учитывая недоверие к самой системе; невозможности обеспечения тайны голосования при условии идентификации избирателя во время, например, интернет-голосования; невозможности независимого наблюдения и верификации данных при подсчете голосов избирателей. Внедрение электронного голосования является вопросом отдельного тщательного исследования, учитывая разную историю как успеха, так и историю неудачного применения в мировой практике системы электронного голосования.

Ключевые слова: выборы, электронное голосование, дистанционное голосование, досрочное голосование, неперсональное голосование.

Problem Statement. Simplification of election procedures, streamlining electoral processes, access for voters to the voting system, the acceleration of the counting process, minimizing the impact on the counting of votes and establishment of voting results are the main tasks that can be solved theoretically using electronic voting in elections. "Electronic election" (e-election) systems are well-known in the world practice, but the issue of their application is quite debatable, given the lack of confidence in the ability to prevent unconditional non-interference in the system to distort the data of voting results. Other debatable aspects: the impossibility of ensuring the secrecy of the vote, provided that the voter is identified during, for example, online voting. Or the inability to independently monitor and verify data when counting votes. These and other problems have led some countries to abandon the practice of electronic voting in elections. Taking this into account, when deciding on the introduction of an electronic voting system in Ukraine, it is important to analyse its positive and negative aspects.

Analysis of recent researches and publications. Consideration of the problems of e-democracy is presented by the works of scientists, namely: A. Akimov, S. Dziuba, E. Brek, K. Verges, I. Zhyliaiev, D. Caddy, H. Kokhalyk, N. Makhnachova, F. Noble, S. Polumienko, I. Ruban, A. Semenchenko and others.

The issues of introduction of the electronic voting system and approaches to its organization were studied by the following foreign and domestic scientists, namely: M. Buchyn, M. Hrachov, N. Hrytsiak, D. Kovaliov, R. Krimmer, A. Konstantynivska, Yu. Kliuchkovskyi, K. Matrenina, M. Mikhrovska, M. Mostova, I. Polovko, A. Prosser, I. Sidenko, S. Soloviov, N. Tytovska, D. Uhgriumov, S. Fatieieva, S. Fomina, and V. Khalyziev.

Formulating the goals of the article. To study the practice of applying the world experience of electronic voting; to determine the positive and negative aspects of electronic voting and the prospects for using electronic voting in elections for Ukraine.

Presentation of the main material. The issues of unification and digital transformation of electoral processes have recently become widely discussed in Ukraine. However, the introduction of electronic voting is a matter of separate careful study because of the different history of both success and failure of the failed application of the electronic voting system in world practice.

At the same time, the legislation of different countries has a different interpretation of the concept of "electronic voting". For example, the term "electronic voting" is used in Austria to refer to any form of voting that takes place outside a polling station: via the Internet, SMS voting or voting via any electronic device.

Experts define the following types of electronic voting in world practice:

1. Voting at a polling station using an electronic system (Vote-recording Technologies): a voter registers his ID-card in a special reader, enters his password on the voting website, where he receives an e-ballot and reflects his/her choice. When voting is completed, such mailboxes automatically count the votes.

2. Optical Scan Marksense: a voter selects a candidate by marking on a special ballot, which is then processed by an election machine that uses optical means to count the votes at the polling station.

3. Voting with punched cards: the voter uses special cards that are read by a computer, marking the candidate with a special code that remains on the punched card; then the voter lowers the punch card to the ballot box, which automatically counts.

4. Direct-recording Electronic Voting System (DRE): the voter selects a candidate on the touch screen of a computer, after which the machine counts the votes using a special program. Identification is through fingerprints or an ID card.

5. Remote and "early" voting: the voter chooses a candidate through a secure communication channel (software on the Internet). Most often it is sending a special e-mail to the polling station or voting on a specially created website. The vote enrolment procedure takes place only after prior identification [1].

The following popular types of e-voting procedures can be defined conditionally: outside the polling station (for example, using Passport ID and the Internet); personal voting in the polling stations with the help of electronic ballot boxes (the ballot is inserted into a digital ballot box, which is connected to the Internet, after reading the ballot, the system automatically recognizes the voice and counts the results); voting using special digital terminals (system with touch screens with the possibility of authorization using identification system).

In our opinion, electronic voting should ensure that the voter has access to voting systems, clearly reflect the will of the voter, contain no signs of discrimination, ensure secrecy (anonymity of voting) and be able to verify the results of elections.

It should be noted that CM/Rec (2017) 5 Recommendation of the Committee of Ministers of the Council of Europe to member states on electronic voting standards (adopted by the Committee of Ministers on June 14, 2017) contains, inter alia, the following requirements for the electronic voting system: respect all principles applicable to democratic elections and referendums; assess the risks, in particular the specific risks of e-suffrage, and address them with appropriate measures. The recommendation confirms that "public confidence in the government ... is a necessary condition for the introduction of electronic voting". The Recommendation states that "all principles of democratic elections" must be observed. The Recommendation contains about 50 standards for electronic voting, which should ensure compliance with the above standards (related to universal, free, equal suffrage and secret ballot), as well as standards relating to regulatory and organizational requirements for e-voting, monitoring and transparency, accountability, reliability and security of the electronic voting system [2].

For the first time in 2000, the United States (State of Oregon) conducted online voting, but the most widespread in the 2004 election campaign was the system of reading information from ballot papers filled out by the voter personally manually. This e-voting system was first used as an experiment in the 1996 municipal elections in Brazil, later in 2000, it was used in municipal elections throughout the country, and in 2002 in the national presidential elections. Since then, it is personal voting in the counting rooms with the help of terminals is the most common in the world, given that they can work autonomously.

Today, Estonia is the undisputed leader in the implementation of e-voting, where since 2005, the number of voters who voted online has grown over the years from 2 % in 2005 to 31 % in the 2014 elections. The basis of the Estonian Internet voting system is the use of Estonian identity cards like ID-cards, which allow its holder to put a digital signature on official, legally binding documents. Early Internet voting is possible in the country. Besides, voters can change their preferences an unlimited number of times, but the last voting option counts. The successful practice of using electronic voting is also considered to exist in Kazakhstan.

Citizens' trust plays an important role in the implementation of the elec-

tronic voting system. For example, the majority of Australians support the introduction of electronic voting: the electronic electoral system is mainly supported by people aged 25 to 34, who have home computers and are familiar with electronic payment systems. In Brazil, to ensure the reliability of the system in 2009, a competition of hackers was organized to test the resistance to "hacking" of the system and to form additional confidence in these technologies. And in Venezuela in the 2005 election, an effective means of restoring confidence was the mass recounting of paper tracks in 45 % of polling stations and the elimination of the automated identification process. In India, due to the opposition's distrust of ballot machines, it was demonstrated that the motherboard is easily and without loss of functionality removed, the chip code is read, and the chips can be changed to reprogrammed: therefore, the possibility of interfering with the system has been proven [3].

In some countries, there is ambiguity about e-voting at different levels: for example, e-voting is not supported at the national level in Canada and Switzerland, but at the local level the trust and popularity of e-voting allow it to be used.

However, the world practice of electronic elections has the experience of abandoning electronic voting, for example, Bahrain in 2006 abandoned electronic voting on security issues. Similarly, Ireland, after significant investment, abandoned electronic voting in 2009 due to the unreliability of the system. Lithuania refused such a vote on suspicion of possible interference in the system. The Netherlands returned to paper voting in 2008, the main reasons being the danger of secrecy of the vote and high dependence on sellers and certified agencies. In 2014, Norway also suspended the process of introducing electronic voting in the context of the security issue (but suspended it temporarily). In Japan, electronic voting has now been abandoned due to the imperfection of the technical means for voting. And in 2009, Germany declared the e-voting procedure unconstitutional.

The United Kingdom conducted more than thirty online test polls in local elections from 2002 to 2007, but in 2005 it was found that e-voting systems were too expensive and did not increase voter turnout. Moldova has also abandoned the idea of such a vote after lengthy research. Following a pilot vote in 2008, Finland did not implement the system. In 2017, France abolished the possibility of electronic voting for citizens abroad (but voting by mail for citizens abroad remained). The Dominican Republic also has a negative experience of electronic voting in local elections on February 12, 2020: its system broke down after the start of voting, the voting procedure was stopped and re-elections were called.

Therefore, for an objective understanding of the feasibility of electronic voting, it is important to understand the advantages and disadvantages of such voting (Table).

In Ukraine, the first attempts to legislate the introduction of electronic voting were in 2011 through the initiative of the *On the Concept of "Introduction of Electronic voting"* bill (Reg. № 8656 of June 10, 2011) [3].

Generalization of Positive and Negative Aspects of Electronic Voting

Object	ADVANTAGES of e-voting	DISADVANTAGES of e-voting
1	2	3
VOTER TURNOUT	• Better adapted to the needs of an increasingly mobile society. • Increasing the number of young voters who are ready to participate in elections using information technology	• Reduction of turnout at the expense of older voters and voters who will not have the technical ability to vote
VOTING PROCEDURE	• Possibility to use various technical means for voting. • Ability to use multilingual user interfaces, which can serve the multilingual electorate better than paper ballots. • Ability to vote for several days at a convenient time for the voter. • The voting procedure is more convenient for people with disabilities and voters who are out of access to the Polling Station (PS). • An e-ballot can be easier to understand and fill out	• Limited openness and understanding the system for non-experts. • Possible lack of public confidence in e-voting elections due to shortcomings in the protection system. • Depending on the type of voting, the voter will have to provide the opportunity to vote (ID-code, electronic signature, registration in the system, the study of the voting system, subject to remote voting like providing a voting point). • Lack of proper software (especially acute for uncovered Internet environments). • Inequality of voter access to voting means (ignorance, lack of technological opportunities, etc.)
PROTECTION OF ELECTION RESULTS AND SECRECY OF VOTING	• Prevention of fraud at polling stations and during summing up by reducing human intervention. • The ability to vote remotely significantly reduces the risk of pressure to vote and increases the reliability of choice. • The counting of votes can be observed in real-time. • The decrease in the number spoiled election ballot-papers: electoral systems can warn voters about invalid votes. • Incident reduction sale of votes, enabling voting one voter more than once	• Potential violation of the secrecy of the ballot, especially for systems that simultaneously perform the functions of voter authentication and voting. • Increasing security requirements to protect the voting system. • The lower level of control by the election commission due to high dependence on technology. • Limited conversion options. • It is almost impossible to completely protect yourself from viruses and hacker attacks. The slightest threats can be dangerous when it comes to deciding the fate of the state. The use of centralized databases on which voting results are stored is especially dangerous. • Impossibility of independent observation of the voting process

1	2	3
ESTABLISHMENT OF ELECTION RESULTS	• More accurate results due to the exclusion of the error factor. • Effective management of complex formulas of electoral systems that require complex counting procedures. • Better presentation of complex ballots. • Faster counting of votes and formation of tables	• Lack of transparency. • Limited openness and understanding of the system by those who are not experts. • Risk of being manipulated by insiders with extended access to the system or by external hackers. • Probability of fraud by large-scale manipulation by a small group of insiders
ECONOMIC AND TECHNICAL RATIONALE	• Potential long-term cost savings by saving election commission staff time and reducing costs. • Potential long-term savings in the production and distribution of ballots. • Cost savings on transportation of ballots	• Lack of harmonized standards for e-voting systems. • System certification is required, but there are no widely agreed certification standards. • Increased costs for the purchase and maintenance of e-voting systems. • The need for additional information campaigns for voters. • There may be a conflict with the existing legal framework. • Growing demands on IT equipment, infrastructure and the environment

However, the project was not supported. Subsequently, in 2017, the Cabinet of Ministers of Ukraine approved the Concept for the Development of Electronic Democracy in Ukraine and the Action Plan for its Implementation, according to which by 2018, the implementation of the electronic voting system was to take place. By Order of the Cabinet of Ministers of Ukraine № 405-p dated June 12, 2019 *On Approval of the Action Plan for the Implementation of the Concept of Democracy Development in Ukraine for 2019–2020* sets new deadlines for implementing electronic voting, as well as the electronic election process, electronic referendums and electronic plebiscites — the 3rd Quarter of 2020. However, the reform of the election legislation with the adoption of the Electoral Code of Ukraine does not provide for the introduction of electronic voting. Thus, today in Ukraine the issue of electronic voting is outside the legal field and requires a balanced decision based on the results of studying the world practice of electronic voting.

According to a study by the International Foundation for Electoral Systems on the feasibility of introducing new electoral technologies (February 2020) [4], the relevant recommendations were provided, the main ones being:

• to launch an inclusive, large-scale consultation process with all Ukrainian election stakeholders;

• to simplify election procedures, to pay attention to the professionalization of specialists in this field;

• the Government of Ukraine must adequately and stably increase budget allocations for the election process;

• a comprehensive survey of citizens' knowledge of and trust in e-democracy and electoral technologies should be conducted;

• to launch an important CEC-led research initiative as soon as possible to determine which e-voting and Internet voting models are appropriate for Ukraine;

• to finalize cybersecurity legislation in Ukraine to establish appropriate agencies with which the CEC will cooperate to protect any new election technologies; and

• to conduct experimental testing of new voting technologies.

Conclusions and suggestions. Electronic voting is certainly aimed at simplifying election procedures and access to the voting system and may provide for the possibility of early voting. However, before the introduction of such a system in Ukraine, it is important to study the practice of implementing the system of "electronic elections" in countries that have a positive history of its use, and in countries that have now abandoned such practices. It should be noted that today there is a general reverse tendency towards the introduction of electronic voting in elections. This is mainly due to the lack of trust in various aspects of public life and state institutions, and therefore in the electronic voting system. Besides, such a system has other significant drawbacks: it is often the identification of the "online voter", thus violating the secrecy of the election and the ability to control the will of a particular voter. On the other hand, it is impossible to verify the voting results: there is a lack of independent observation of the voting process and the establishment of voting results. It is these aspects that generate the voter's distrust of the electoral process. Thus, ensuring democratic transparent electoral processes with the introduction of electronic voting will be an urgent task. The use of electronic voting requires a thorough rationale of the feasibility of its implementation.

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