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Electronic Voting Technologies in Elections: Russian and Foreign Experience

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Abstract. The study explores the Russian and international experience of using such forms of electronic voting in elections as with the help of a special device (complex) for electronic voting at a polling station (in a voting room, or another specially defined place), and remote electronic voting through a personal computer or a mobile device. The article analyzes the circumstances and conditions that contribute to the development and consolidation of electronic voting in the country's legislation, or, conversely, the conditions that lead to suspension or even rejecting electronic technologies from the electoral process at the state level. Up-to-date information on the use of electronic technologies in the elections has been examined. The stages, problems, and difficulties of introducing electronic voting technologies in elections, as well as directions for further improvement of electronic voting in countries that have chosen the path of long-term development of digitalization of the electoral process are highlighted. In the early 2000s, many countries of the world gained experience in the practical use of electronic technologies in elections. However, the scientific and technological achievements so far did not provide the necessary degree of voters' confidence in the security of the electronic voting system or any reliable result. The prejudice towards electronic voting technologies, as well as high-cost modern electronic systems for implementation, persist in many countries to this day. This is an objective obstacle to the widespread use of electronic technologies in the electoral process. At the same time, the experience of remote electronic voting in Russia and Estonia, the fragmentary inclusion of electronic voting in electoral procedures in a number of other countries, and the widespread use of electronic voting complexes show that electronic technologies in elections are already a reality.

Key words: electoral process, digital technologies, electronic voting complex, remote electronic voting, electronic voter list

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Электронные технологии голосования на выборах: опыт применения в России и за рубежом

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Аннотация. Исследуется российский и международный опыт применения таких форм электронного голосования на выборах, как голосование с помощью специального устройства (комплекса) электронного голосования на избирательном участке (в помещении для голосования, ином специально определенном месте) и дистанционного электронного голосования, осуществляемого избирателем удаленно посредством персонального компьютера или мобильного устройства. Анализируются обстоятельства и условия, которые впоследствии способствовали развитию и закреплению электронного голосования в законодательстве страны, либо, наоборот, на государственном уровне повлекли приостановление или даже отказ от использования электронных технологий в избирательном процессе. Приводится актуальная информация о применении электронных технологий в мировой практике проведения выборов. Освещаются этапы, проблемы и сложности внедрения электронных технологий голосования на выборах, а также направления дальнейшего совершенствования электронного голосования в странах, которые выбрали для себя путь перспективного развития цифровизации избирательного процесса. В начале 2000-х гг. многие страны мира уже имели опыт практического применения электронных технологий на выборах. Однако научно-технические достижения того времени не позволили им обеспечить необходимую степень доверия избирателей к безопасности и защищенности системы электронного голосования, достоверности результатов волеизъявления. Возникшее предубеждение к технологиям электронного голосования, а также недофинансирование высокотратных для внедрения современных электронных систем сохраняется во многих странах до сих пор, что является объективным препятствием для широкого применения электронных технологий в избирательном процессе. В то же время опыт проведения дистанционного электронного голосования в России и Эстонии, а также фрагментарные включения электронного голосования в электоральные процедуры в ряде других стран, широкое использование комплексов электронного голосования показывают, что электронные технологии на выборах – это уже реалии сегодняшнего дня.

Ключевые слова: избирательный процесс, цифровые технологии, электронное голосование, комплекс электронного голосования, дистанционное электронное голосование, электронный список избирателей

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Introduction

Experiments with the latest electronic technologies in the voting process are being conducted by many countries, but frequently, they do not receive official recognition and legislative consolidation.

Electronic technologies in the electoral process in relation to the paperless voting procedure can be divided into two groups¹.

The first group includes electronic technologies (e-voting) that provide the ability to vote at a polling station (or another specially designated place) using a special electronic device (apparatus, machine, complex) without using a paper ballot.

The second group includes electronic technologies that provide remote expression of the voter's will (i-voting). They allow voting without visiting a polling station (or another specially designated place). The voter can express their will by using electronic devices (computer, smart device), means of communication (internet, mobile communications), and the method of identification established by the state.

When using electronic technologies both in person and in a remote voting format, the voter uses an electronic ballot.

It is important to note that remote electronic voting (REV) can be used both as an independent type of voting and as an additional form in combination with traditional paper voting and electronic voting at a polling station.

The analysis of foreign experience allows to conclude that for successful implementation of electronic forms of voting by society and the state, it is necessary to achieve such a level of elaboration of every set of electronic voting mechanisms so that the entire voting process is transparent, reliable, secure, confidential yet trustworthy, convenient, and understandable to any voter.

The negative experience of the introduction of electronic voting may be described as follows: non-acceptance of electronic forms of voting by the authorities and society, and/or suspension or refusal to use them in some countries. Both relate to the technical imperfection of electronic voting systems. Other weaknesses include lack of infrastructure necessary for its implementation, lack of proper monitoring of the voting process and vote counting, low level of public confidence, as well as other reasons.

¹ The article does not investigate the technology of using scanning complexes for processing ballots with the procedure for automatic counting of votes for voting results.

The key to the successful use of electronic technologies in elections in countries where electronic voting has been legislated and widely used (Russia, Estonia) is the unconditional technical readiness of the software product, security systems, phased introduction into the electoral process with a gradual expansion of the area of application, obligation to test electronic complexes and systems before their use, ensuring mass and transparent observation.

As the experience of using electronic forms of voting in Russia has shown, a deep comprehensive study of technological, technical, and organizational issues on introducing electronic voting systems, combined with the proper legal registration of the introduced innovations, allowed to avoid the negative experience of using electronic technologies in elections and actively develop them, following the global trend towards digitalization of all spheres of human life.

Prerequisites for introducing electronic voting

Scientific and technological progress inevitably becomes the driving force behind the improvement of the electoral process. The ability to digitize information can significantly speed up and simplify many electoral actions and procedures, making them simple, convenient, and accessible to any voter (Petrova & Sidorova, 2022:195). That is why states, represented by their legislators and election organizers (Koshel, 2018:165), are trying to introduce electronic technologies into the electoral process.

The first stage in improving the voting procedure in many countries was introduction of electronic voting at polling stations through the development of special voting machines (complexes) (hereinafter referred to as EVC), which allowed voting without paper ballots through automated vote counting².

In Russia, the legislative basis for electronic voting was set up in 2005, when the Federal Law No. 67-FZ of June 12, 2002 On Basic Guarantees of Electoral Rights and the Right to Participate in a Referendum of Citizens of the Russian Federation (hereinafter referred to as Federal Law No. 67-FZ) introduced the concepts of “electronic voting”, “complex for electronic voting”, and “electronic ballot”³.

Federal Law No. 67-FZ originally stipulated that the total number of polling stations with electronic voting should not exceed one percent of the number of polling stations established in the territory where elections are held. Such regulation is a clear example of a phased and cautious trial of new electronic technologies in the electoral process. The use of the EVC in 2006–2012 in Russia was experimental since the

² Electronic Voting Complex (EVC) is a device that provides voting by pressing on touch screen of the device without the use of a paper ballot. To activate the display, different technologies are used such as scanning, card readers, etc. It allows to use different options for people with disabilities (vision, hearing). Processing of voting results is carried out automatically. There are both stationary and portable (for voting at home) devices.

³ Federal Law No. 93-FZ of 21.07.2005 On Amendments to Legislative Acts of the Russian Federation on Elections and Referendums and Other Legislative Acts of the Russian Federation. Collected Legislation of the Russian Federation No. 30 (part 1), Art. 3104 of 25.07.2005.

established restriction excluded the possibility of influencing the election results as a whole in the event of incorrect operation of the EVC. In 2012, this restriction was lifted by amending Federal Law No. 67-FZ, thereby the results of the EVC use in Russia were officially recognized as positive⁴.

The procedure for working with the EVC is regulated by the CEC of Russia on the procedure for electronic voting using complexes for electronic voting in elections held in the Russian Federation, adopted in 2011 and replacing the Temporary Procedure for Electronic Voting and the Use of Complexes for Electronic Voting in Elections and Referendums Held on the Territory of the Russian Federation, as well as the Decree of the CEC of Russia on the procedure for usage when voting in elections to the state authorities of the constituent entities of the Russian Federation, local self-government bodies, referendums on technical means of counting votes, i.e., ballot processing complexes and complexes for electronic voting⁵.

A paper ballot is not required to vote through the EVC, instead, voting takes place using a touch screen. To participate in electronic voting using the EVC, the voter receives a card with a barcode from a member of the precinct election commission. A member of the precinct election commission activates the card for access by reading it on an optical code reader, providing the voter with access to electronic ballot votes only in the constituency where they have an active electoral right, and confirms with the signature the fact of being provided with access to the electronic ballot.

The obvious advantages of EVC are a significant acceleration of voting results, accessibility to voters, simplification of the work of election commissions, elimination of paper ballots costs, and, most importantly, extraterritorial accessibility of voting at polling stations located outside the boundaries of the constituency.

The EVC practice in different countries of the world is very diverse (Khudoley & Khudoley, 2022:478–489).

For example, in Brazil, since 2021 as well as in Bulgaria, voters vote through electronic voting and counting machines. In the United States, Canada, France, Russia,

⁴ The second sentence of paragraph 15 of Article 64 of the Federal Law No. 67-FZ of 12.06.2002 On Basic Guarantees of Electoral Rights and the Right to Participate in the Referendum of Citizens of the Russian Federation as amended by Federal law No. 93-FZ of 21.07.2005 On Amendments to the Legislative Acts of the Russian Federation on Elections and Referendums and Other Legislative Acts of the Russian Federation. Collected Legislation of the Russian Federation, No. 24, Art. 2253 of 17.06.2002. Federal Law No. 157-FZ of 02.10.2012 On Amendments to the Federal Law on Political Parties and the Federal Law On Basic Guarantees of Electoral Rights and the Right to Participate in a Referendum of Citizens of the Russian Federation. Collected Legislation of the Russian Federation, No. 41, Art. 5522 of 08.10.2012.

⁵ Decree of the CEC of Russia No. 31/276-6 of 07.09.2011 On the Procedure for Electronic Voting Using Complexes for Electronic Voting in Elections Held in the Russian Federation. Bulletin of the Central Election Commission of the Russian Federation, No. 13, 2011; Decree of the CEC of Russia No. 249/1602-5 of 10.03.2011 On the Temporary Procedure for Electronic Voting and the Use of Complexes for Electronic Voting in Elections and Referendums Held on the Territory of the Russian Federation. Bulletin of the Central Election Commission of the Russian Federation, No. 2-3, 2011; Decree of the CEC of Russia No. 165/1212-6 of 06.03.2013 On the procedure for Using Technical Means of Vote Counting, i.e., ballot processing complexes and complexes for electronic voting when voting in elections to state authorities of the constituent entities of the Russian Federation, local self-government bodies, referendums // Bulletin of the CEC of Russia, No. 3, 2013

Estonia and other countries, such technical means are used only at some polling stations.

Some States, after the pilot use of EVCs, decide to suspend their application for the sake of further improvement⁶. In some states⁷, the EVCs practice has led to a complete rejection of their use (Matveychev, 2019:17–19).

An important criterion in assessing reliability of the expression of voters' will with EVC, which has a significant impact on transparency, is availability of technology for counting paper ballots (so called *paper trace*) that allows for a manual recount of votes; in this case a voter can be sure that their vote is counted correctly (the result of voting is reflected on paper). In several countries, EVCs are not equipped with paper "trace" technology. In Russia, this requirement applies to all EVC devices.⁸

EVCs significantly expand the possibilities of voting in comparison with paper ballot voting, since they are not tied to the process of receiving and processing paper ballots, counting, canceling, and transferring them to election commissions in accordance with the level of elections and other procedures related to the paper form of the ballot, which inevitably need to be built into the existing algorithms for establishing voting results in the current legislation. However, they do not have the extraterritorial freedom of the place of voting inherent in remote forms of voting⁹.

The second stage of improving the voting procedure in elections can be attributed to the emergence of remote forms of voting, which imply the possibility of voting from any location through voter's own electronic device, means of communication (internet, mobile communications) and established method of identification.

Remote electronic voting (hereinafter referred to as REV) can be afforded by countries with a higher level of development of digital services in the electoral process. An important aspect of REV implementation is the degree of trust and acceptance of e-democracy by the population (Riera et al., 2002:78–98). A necessary condition for the development of remote forms of voting is availability of a reliable system for identifying the voter (Oostveen & Besselaar, 2003).

It should be noted that transition to advanced digital technologies in the electoral process requires large financial and intellectual investments in their development and implementation (Burmester & Magkos, 2003:63–76). High requirements for the security of electronic voting systems and secrecy of selection significantly increase these costs (Jefferson, 2004).

The practice of remote forms of voting in countries where such experience took place is different. In several countries, the i-voting format is used to ensure engagement of certain categories of voters (those with disabilities, those residing in a foreign

⁶ France, Germany, Japan, Peru.

⁷ Great Britain, Ireland, Spain, Italy, Netherlands, Norway, Poland, Denmark.

⁸ France, Finland.

⁹ EVCs are installed at polling stations (other specially designated places).

country). In some states, the use of REV is allowed only in certain types of elections or territories¹⁰.

At the same time, the foreign practice of using i-voting shows that several countries reject using it in elections, justifying the decision by the inability to ensure the secrecy of selection. Several countries are suspending the use of REV to further improve it. Some countries are announcing plans to introduce new voting technologies into the electoral process.¹¹

To date, more than ten countries around the world use REV technologies to one degree or another, while only in Russia and Estonia it may be used throughout the country as an alternative to the traditional form of voting.

The electronic voting system in Estonia was introduced in 2002, with the advent of ID card technology, identification smart cards, which are official identity cards that allow both secure remote authentication and legally binding digital signatures.

The technology of using remote electronic voting in Estonia seems to be very advanced and reliable, especially considering the period of its inception. The chronological process of introducing electronic voting in the Republic of Estonia, the organizational basis, and the procedure for its application have many similarities with the implementation process and procedure for using REV in the Russian Federation.

In Russia, the transition to the electronic form of interaction between state bodies and citizens was carried out rather slowly, due to several objective factors.

The beginning of e-government formation in Russia can formally be considered the year of 2002 when the Government of the Russian Federation approved the federal target program *Electronic Russia (2002–2010)*. However, this was followed by a rather long period of reforming the system of public administration itself¹².

In 2008, the Government of the Russian Federation approved the Concept for e-government formation, which assumed introduction of electronic services in 2009–2010¹³.

In fact, the e-government infrastructure was created and gradually introduced only after the adoption of the State Program *Information Society (2011–2020)*, approved by the Decree of the Government No. 1815-r of October 20, 2010. It was then that the first multifunctional centers and the Unified Portal of Public Services (www.gosuslugi.ru), as well as several other online services, were launched in Russia.

¹⁰ The Netherlands, USA, France, etc. For example, in France, Switzerland, Japan REV is only used at the municipal level, in Australia it is used in individual states, in Bulgaria, Canada, in individual municipalities, etc.

¹¹ Norway, Switzerland, Portugal, etc.; France; Belgium, San Marino, Slovenia.

¹² Decree of the Government of the Russian Federation No. 65 of 28.01.2002 On the Federal Target Program "Electronic Russia (2002 – 2010). Collected Legislation of the Russian Federation, No. 5, Art. 53104 of 04.02.2002.

¹³ Decree of the Government of the Russian Federation No. 632-r of 06.05.2008 On the Concept of Formation of Electronic Government in the Russian Federation until 2010. Collected Legislation of the Russian Federation, No. 20, Art. 2372 of 19.05.2008.

The Presidential Decree No. 203 of May 9, 2017 On the Strategy for the Development of the Information Society in the Russian Federation for 2017–2030, establishes electronic identification, authentication technologies, and information security among the main directions of development of Russian information and communication technologies. At the same time, the Decree defines the key tasks of such technologies, including the development of technologies for electronic interaction of citizens, organizations, state bodies, local self-government bodies, and improvement of e-democracy mechanisms¹⁴.

The first local experiments on the introduction of Internet technologies into the Russian electoral process were carried out in 2008–2009, first in the city of Novomoskovsk, Tula Region, on October 12, 2008, then in the Vladimir, Volgograd, Vologda, Tomsk regions, and the Khanty-Mansi Autonomous Okrug, Yugra. However, at that time we did not speak about the proper level of development of voter identification procedures, ensuring security of information technologies, and consequently, about the possibility of credible will expression by citizens¹⁵.

On the Single Voting Day in 2019, digital polling stations were set up in Russia as an experiment. Voting at such stations was held for the first time during the elections of deputies to the State Duma in single-seat constituencies and heads and legislative (representative) bodies of the constituent entities of the Russian Federation. In 2020, the experiment was continued¹⁶.

Digital polling stations were equipped with EVC. Due to digital polling stations, citizens who were outside their constituency on election day and even outside the Russian Federation were able to take part in the elections. Digital polling locations covered areas where experimental remote voting was not widespread.

¹⁴ Decree of the President of the Russian Federation No. 203 of May 9, 2017 on the Strategy for the Development of the Information Society in the Russian Federation for 2017–2030. Collected Legislation of the Russian Federation, No. 20, Art. 290115 of 05.2017.

¹⁵ The first experience of using Internet technologies in the practice of domestic elections. Available at: <https://www.rcoit.ru/news/17622/> [Accessed 03rd March 2023]. Details of experiments on electronic polling. Available at: https://www.rcoit.ru/upload/iblock/1db/eksperimentalniy_elektronniy_opros.pdf [Accessed 03rd March 2023].

¹⁶ Federal law No. 102-FZ of 29 May 2019 On Conducting an Experiment on Voting at Digital Polling Stations Formed in the Federal city of Moscow, in the By-Elections of Deputies of the State Duma of the Federal Assembly of the Russian Federation of the Seventh Convocation and Elections of Senior Officials of the Constituent Entities of the Russian Federation (heads of the highest executive bodies of state power of the constituent entities of the Russian Federation) held on September 8, 2019» // Collected Legislation of the Russian Federation, No. 22, Art. 2658 of 03.06.2019. Federal Law No. 151-FZ of 23.05.2020 On the Extension for 2020 of the Experiment on Voting at Digital Polling Stations in By-Elections of Deputies of the State Duma of the Federal Assembly of the Russian Federation of the Seventh Convocation and Elections to Public Authorities Constituent Entities of the Russian Federation. Collected Legislation of the Russian Federation, No. 21, Art. 3230 of 25.05.2020.

Legal Regulation and Experience of Remote Electronic Voting in Russia and Estonia

Experimental remote electronic voting technology (Sivitsky & Sorokin, 2016:15) was first held at the elections of deputies of the Moscow City Duma on September 8, 2019¹⁷. In May 2020, the rules on REV appeared in the basic election law, Federal Law No. 67-FZ¹⁸; thus, it became possible to state that REV will develop as additional form of voting in elections. However, its use was still experimental¹⁹.

The legislative consolidation of the basic principles and parameters of REV, which are the same for all elections and referendums on the territory of the Russian Federation, took place in March 2022²⁰.

The successful implementation of REV in the city of Moscow, and then in the Russian Federation, became possible due to the already developed and functioning state information systems – the Unified Program for State and Municipal Services (Functions) of the Russian Federation and the Portal of State and Municipal Services of the City of Moscow²¹, whose special software allows the voter to create an electronic version of themselves by performing a number of registration actions on the Portal (similar to obtaining an ID card in Estonia). Russian citizens who have a full verified account on the Portal have the right to vote remotely²².

In Estonia, an experiment on the use of remote electronic voting was launched in 2005 in municipal elections (Maaten, Madise & Vinkel, 2006).

The results of the experiment were assessed as positive. The electronic voting system has been established throughout the country and is still used along with the traditional form of face-to-face participation. It should be noted that in Estonia the term “electronic voting” refers exclusively to remote voting via the Internet (Tarvi Martens, 2006:15–27).

¹⁷ Federal Law No. 103-FZ of 29.05.2019 On Conducting an Experiment on the Organization and Implementation of Remote Electronic Voting in the Elections of Deputies of the Moscow City Duma of the Seventh Convocation. Official Internet portal of legal information <http://www.pravo.gov.ru>, 29.05.2019; Federal Law No. 152-FZ of 23.05.2020 On Conducting an Experiment on the Organization and Implementation of Remote Electronic Voting in the Federal City of Moscow. Official Internet Portal of Legal Information <http://www.pravo.gov.ru>, 23.05.2020.

¹⁸ Federal Law No. 154-FZ of May 23, 2020 On Amendments to Certain Legislative Acts of the Russian Federation // Collected Legislation of the Russian Federation, No. 21, Art. 3233 of 25.05.2020.

¹⁹ In 2020, REV was used in the All-Russian voting on amendments to the Constitution of the Russian Federation in Moscow and the Nizhny Novgorod Region, and in the by-elections of deputies of the State Duma of the Federal Assembly of the Russian Federation in the Kursk and Yaroslavl Regions. In 2021, during a single voting day, REVs were held in seven constituent entities of the Russian Federation: the cities of Moscow and Sevastopol, Nizhny Novgorod, Yaroslavl, Kursk, Murmansk and Rostov regions.

²⁰ Federal Law No. 60-FZ of March 14, 2022 On Amendments to Certain Legislative Acts of the Russian Federation // Collected Legislation of the Russian Federation, No. 12, Art. 1787 of 21.03.2022.

²¹ Unified portal of state and municipal services (functions) of the Russian Federation URL:<https://www.gosuslugi.ru>; Portal of state and municipal services (functions) of the city of Moscow URL:<http://don't.ru>.

²² A verified account must contain information about the last name, first name and patronymic, phone number, email address, passport details and SNILS, as well as be confirmed in person or online through the gosuslugi.ru portal, the Sber ID service or face-to-face through any of the centers of public services My Documents.

In Estonia, an ID card is used to access the state electronic services, including the electronic voting service (Trechsel & Schuman, 2007:58). To use the ID card, the voter must have special software on their computer, and, if necessary, enter the PIN-codes. When connecting to the system for electronic voting, the procedure for authentication (confirmation of identity) is carried out after introducing the individual pin code and voting is directly confirmed by introducing the second pin code used for digital signature.

Both Russia and Estonia have changed the legal and organizational foundations of electronic voting as new electronic mechanisms and technologies have emerged (Chimarov & Sergienko, 2021: 26). At the same time, it is obvious that all changes are aimed at creating the most comfortable conditions for voters to participate in elections.

For example, until recently, electronic voting in Estonia was available only during the period of the so-called electronic early voting (six to four days before the main voting day). At the same time, early voting using a paper ballot was not provided.

By separating two forms of voting in time, the traditional one using a paper ballot and electronic via the Internet, the legislator pursued the goal of eliminating cases of double voting. For comparison, in Moscow, before introduction of voter lists in electronic form into the electoral process, this goal was achieved through the need for advance registration for REV based on application submitted by the voter.

In Moscow during REV in an experimental mode (2019–2021), the voter had to notify in advance (no earlier than 45 and no later than 3 days before the voting day) that they choose the electronic format of participation²³.

During this period, voters who applied for REV were excluded from the voter lists at their place of residence by deleting the relevant data from the paper voter lists directly by the members of precinct election commissions. A voter excluded from the list of voters at the place of residence in connection with participation in REV had the right to take part exclusively in remote electronic voting and was not entitled to receive a ballot at the polling station²⁴.

In the context of essentially two voter lists, a list of voters voting remotely and voter lists at polling stations, the option of pre-registering for REV and physically deleting such voters from the voter lists at polling stations seemed to be the only possible option. Such a mechanism at that stage of REV development allowed to exclude cases of double voting. At the same time, it should be

²³ Part 4 of Article 6 of the Law of Moscow No. 18 of 22.05.2019 On Conducting an Experiment on the Organization and Implementation of Remote Electronic Voting in the Elections of Deputies of the Moscow City Duma of the Seventh Convocation. Official portal of the Mayor and the Government of Moscow <http://www.mos.ru>, 25.05.2019; Part 4 of Article 6 of the Law of Moscow No. 10 of 10.06.2020 On Conducting an Experiment on the Organization and Implementation of Remote Electronic Voting. Official portal of the Mayor and the Government of Moscow <http://www.mos.ru>, 11.06.2020.

²⁴ Part 4 of Article 6 of the Law of Moscow No. 18 of 22.05.2019 On Conducting an Experiment on the Organization and Implementation of Remote Electronic Voting in the Elections of Deputies of the Moscow City Duma of the Seventh Convocation. Official portal of the Mayor and the Government of Moscow <http://www.mos.ru>, 25.05.2019; Part 4 of Article 6 of the Law of Moscow No. 10 of 10.06.2020 On Conducting an Experiment on the Organization and Implementation of Remote Electronic Voting. Official portal of the Mayor and the Government of Moscow <http://www.mos.ru>, 11.06.2020.

recognized that the existing technical failures and human factor allowed both cases of abuse by voters of active suffrage in the form of repeated voting, and cases of unjustified restrictions on active suffrage, in which a conscientious voter was excluded from the voter list at the polling station, while the system did not allow to vote electronically.

During the period of early voting via the Internet in Estonia, for the voter to be able to freely express their will without pressure, they were granted the right to re-vote an indefinite number of times. The voter could also change his vote cast remotely by voting at the polling station on election day. In this case, the last electronic vote cast or the vote cast at the polling station shall be valid. On the main election day, the vote may not be changed.

The right to change electronic voting in Estonia is intended to ensure freedom of voting, i.e., a voter who believes that he or she has not been able to vote freely or who does not trust his or her computer may vote again. The purpose of change, then, is not to change preferences, but to ensure freedom of choice. It is technically impossible to change the vote cast on paper, since no one can get ballots from the ballot box.

The opportunity to *re-vote* on voting days was also provided by the REV system in Moscow in the elections of deputies to the State Duma of the Federal Assembly of the Russian Federation in 2021²⁵.

It was assumed that the legal norms on the possibility of re-voting would correct the shortcomings in REV associated with technical failures of the Internet connection, when the voter was deprived of the opportunity to vote. In addition, the measure taken was aimed at preventing the potential for exerting pressure on the voters or forcing them to register with REV.

However, the Moscow REV platform did not use this technology in the municipal elections in 2022 due to partly successful experience of its implementation in the previous election campaign²⁶. Moreover, the emergence of the electronic voter list provided freedom of choice of voting method and the ability to change it, which excluded the possibility of urging the voter to register on the REV.

The REV procedure in Moscow at all stages of the experiment did not provide the voter with the opportunity to decide on participation in the REV and subsequently vote at the polling station in person using a paper ballot. Until 2022, in order to participate in the REV, the voter had to submit an application, and after introduction of the electronic voter list system in Moscow, they could decide on the voting method and change it before entering the second factor of voting confirmation in REV and gaining

²⁵ A REV participant could re-vote within 24 hours from the moment of the first voting, but no more than once every three hours, and on the last day of voting on September 19, 2021, until 20.00 Moscow time. At the same time, the last voting was registered. Resolution of the CEC of Russia No. 26/225-8 of July 20, 2021 (as amended on September 3, 2021) On the Procedure for Remote Electronic Voting in the Elections Scheduled for September 19, 2021. Bulletin of the CEC of Russia, No 13, 2021.

²⁶ In practice, this entailed an excessive length of the procedure for summing up the results of the REV.

access to the electronic ballot or before passing the identification procedure at the polling station in the electronic voter list system.

The main innovation of the procedure for remote electronic voting in the elections of deputies of representative bodies of local self-government in the city of Moscow, scheduled for September 11, 2022, was that voters who have the right to participate in i-voting may participate without applying. The waiver of the need to apply for REV participation significantly simplified the procedure for both voters and members of the precinct and territorial election commissions²⁷.

The essence of using the electronic voter list is that due to the developed special software, after the voter gets access to the ballot for i-voting, such a voter is included in the list of those voting in REV and at the same time is excluded from the list of voters at the place of residence at the polling station.

The appearance of a single electronic voter list in both Russia and Estonia solved the problem of the need for organizational separation of voters into two groups (voting electronically and voting using a paper ballot) and allowed not to separate the two voting methods (remote and face-to-face at the polling station) in time.

In the last elections on 5 March 2023, Estonia elected the Riigikogu (National Assembly), the highest representative and legislative authority in the Republic, which in turn elects the Head of State and exercises control over the activities of the Government.

The election week began on Monday and lasted six days of preliminary voting (from February 27 to March 4). At the same time, the voter could choose the most convenient method of voting: at the polling station, choosing to vote at any polling station within their constituency, or electronically using their computer and ID card.

In Estonia, since 2019, voters are no longer tied to their polling station at their place of residence. They may vote at any polling station within their constituency in the relevant election.

In Russia, the current legislation contains the binding of the voter to a specific polling station based on the place of residence, but the voter also has the opportunity to vote at convenient polling location, using the “Mobile Voter” mechanism, or choose a remote voting format when it is provided for in the relevant elections²⁸.

At the same time, in connection with the successful introduction of electronic voter lists in the elections in Moscow (Gadzhieva, 2022), the next step towards improving electoral processes throughout Russia is extension of Moscow's experience to other regions of the Russian Federation and modification of the Mobile Voter

²⁷ Decision of the Moscow City Election Commission No. 17/8 of July 28, 2022 On the Procedure for Remote Electronic Voting in the Elections of Deputies of Representative Bodies of Local Self-Government in the City of Moscow Scheduled for September 11, 2022. Available at https://n-sadovniki.ru/files/sadovni/mo/Vybory/NPA/Resh_Izбирcom/reshenie_mgik_ot_28_07_2022_17-8_o_poryadke_distancionnogo_elektronnoego_golosovaniya.pdf [Accessed 03rd March 2023].

²⁸ Paragraph 16 of Article 64 of the Federal Law On Basic Guarantees of Electoral Rights and the Right to Participate in the Referendum of Citizens of the Russian Federation // Collected Legislation of the Russian Federation, No. 24, Art. 2253 of 17.06.2002;

mechanism. The technical capacity of the electronic voter list system will allow voters to vote (without applying) at any polling station within and outside the boundaries of their constituency at the upcoming elections of the Mayor of Moscow in September 2023. This will further expand the voter's opportunities in terms of freedom to choose not only the method of voting, but also the place of voting.

However, modification of the Mobile Voter mechanism, which is technically easy to provide in the conditions of using electronic voter lists and which opens up the freedom for the voter to visit any polling station within the boundaries of their constituency without the need to go through the procedure of applying to be included and excluded from the voter lists through the Portal of State and Municipal Services, will require changes in certain provisions of Federal Law No. 67-FZ regulating procedures for registration of voters, compiling voter lists and their clarification. In this regard, an experimental option for using transformed and simplified procedures in comparison with the Mobile Voter mechanism²⁹ may allow voting at a polling station through an electronic complex integrated into the REV system, a stationary or portable electronic voting terminal. This means that the voter will be able to participate in REV in two ways: online through their computer or mobile device, or in person at any polling station by voting on the electronic voting terminal.

At the same time, it should be noted that this configuration of the electronic voting procedure may be more successfully implemented in the case of regulatory amendment of certain provisions of Federal Law No. 67-FZ, adapted to new possibilities in the conditions of the electronic list of voters. This involves the procedure for issuing a second ballot to replace a spoiled one (in terms of the ESI, strict binding to the member of the commission who issued the ballot seems unnecessary), the procedure for clarifying information concerning the ESI voter in relation to voting at the electronic voting terminal at the polling station at the location of the voter, the need to print out the list of voters exclusively on paper at the end of the voting time.

The possible integration of REV with electronic voting terminals installed at the polling station will significantly expand variability of the choice of electronic forms of voting.

It seems that such integration may lead to an even higher percentage of voters who prefer REV, especially those for whom voting is inextricably linked with visiting the polling station, and this is a fairly large number of voters, especially among the older generation.

Voters for whom voting via mobile devices is problematic due to age, insufficient skills, or lack of convenient smart devices will also be able to take part in electronic

²⁹ The availability to vote outside the constituency may be ensured within the boundaries of the constituency of the Russian Federation when combining different levels of elections. For example, in the election of the Mayor of Moscow, a voter who has the right to vote for deputies of representative bodies of municipalities in the city of Moscow will be able to exercise their right to vote at any of the electoral terminals (complexes) of electronic voting, including outside the municipality where elections are held.

voting. They will be able to participate in REV at the polling station by voting electronically, or, for people with limited mobility, on a portable electronic voting terminal during voting outside the polling place (voting from home).

The main goal of digitalization of electoral process is undoubtedly the creation of effective mechanisms that ensure the voter's choice without the territorial restrictions; they may arise due to life circumstances of voters who are forced to correlate their capabilities with the desire to exercise active suffrage. From this point of view, REV, combined with the mobility that electronic voting complexes provides for to residents, ability to vote outside their place of residence, both electronically online and electronically at the polling station at their location. Such variability will undoubtedly increase the turnout and the level of involvement of population in the voting process in elections, as V.I. Fedorov rightly points out in his article (Fedorov, 2019:37–42). This thesis is also confirmed by the analysis of voter turnout in the elections in Moscow using remote electronic voting; the results demonstrate steady increase in voting activity, which indicates a high demand among the population for the electronic form of voting due to mobility and extraterritoriality. The upcoming Moscow Mayoral elections in September 2023 are likely to demonstrate a rise in political activity of the population and, considering the expansion of electronic voting opportunities, are expected to show a higher turnout compared to previous elections³⁰.

At present, it is not possible to vote using smart devices in Estonia, although this may be possible in the future. Since March, devices have been used during voting to verify the vote. With their help, you can make sure that the voter's computer was in good working condition and their will was reflected correctly. Technically, to participate in electronic voting, a voter must install a number of additional platforms on their computer, for which appropriate applications are created³¹.

The Russian platform for remote electronic voting does not contain such a restriction, a voter can vote from any device that has access to the Internet.

The requirements for the hardware and software complex of remote electronic voting are formulated in the regulatory legal acts of election commissions, according to which it must meet the most stringent security requirements and ensure establishment and confirmation of voter's ID, vote secrecy, and impossibility of changes to incoming data (blockchain). Voting security is provided for by modern digital technologies³².

³⁰ The final turnout in the municipal elections in Moscow in 2022 was 33.9%, and in 2017 – 14.82%. Available at: <https://www.interfax.ru/moscow/861624> [Accessed 05th March 2023], Available at: <https://www.rbc.ru/rbcfreenews/59b660889a79472e5723be34> [Accessed 05th March 2023].

³¹ Election: Questions concerning reliability of electronic voting. Available at: <https://www.valimised.ee/index.php/ru/elektronnoe-golosovanie/informaciya-ob-e-golosovanii/voprosy-o-nadezhnosti-elektronnogo> [Accessed 05th March 2023]. (in Estonian).

³² See, for example, the Decision of the Moscow City Electoral Commission No. 96/1 of June 17, 2019 On the Requirements for Special Software for the Regional Portal of State and Municipal Services of the city of Moscow. Available at: <http://mosgorizbirkom.ru/11500> [Accessed 05th March 2023]. Official website of the

The electronic election system is based on blockchain, the system that does not allow changing or adjusting the actions of users (voters)³³.

At the same time, all actions of voters in an impersonal and mixed form are broadcast on the Internet, and observers of electronic voting have the opportunity to constantly monitor the safety and immutability of this chain of actions (blocks) and the data recorded in it.

In fact, in Estonia, the purchase of electronic votes is a crime, as well as the purchase of ordinary votes. In case of suspicion, the police begin to investigate the case. The penalty can be either a fine or imprisonment. The transfer of the ID card and passwords is prohibited. Everyone is personally responsible for the safety of their digital identity.

In Russia, legislative norms on liability in the field of digital rights are at the stage of conceptual elaboration. In this regard, the study of legislation of other countries and practices of its application seems to be relevant and is an issue for independent research.

In Russia and Estonia, different in form, but similar in content systems for identifying voters have been created and have proven effective in practice; electronic voting is based on a completely reliable blockchain system, which has already been tested by time and has withstood several hacker attacks.

When using the electronic voting system, the most important issue is to ensure voters' confidence in this method of voting. It is achieved, among other things, through extensive observation of the voting process and vote counting.

In Estonia, on the eve of the elections, the State Election Administration Service invites everyone to take part in training on the electronic voting procedure. At the seminars, which are usually held in online formats, the technical details of the electronic voting process, measures to ensure security in the voting process are considered in detail. Everyone present is welcome to ask questions.

In addition to participating in training seminars, observers may follow the process of setting up the electronic voting system and be present at vote counting.

The counting of electronic votes in Estonia can be supervised by every observer who has been trained, as well as by specially trained independent auditors. As part of the data audit, the number of votes collected and correspondence of the votes to the counted ones are checked using mathematical means. Thus, one may make sure that the process is working correctly.

In the elections in Moscow, observation of electronic voting is implemented at three levels: general, technical, and expert.

Mayor of Moscow How Technology Helps to Preserve Anonymity and Secrecy of Voting. Available at: <https://www.mos.ru/news/item/110761073/> [Accessed 05th March 2023].

³³ For details on blockchain technology, see: (Arefiev, Zhiltsov & Chernyshova, 2021:276 – 281).

The general level of observation is the simplest and does not require special technical training. Any voter can take part in it. Monitoring is carried out using an observer, a special interface you can connect to at: <https://observer.mos.ru>³⁴.

The technical level of REV surveillance is available to anyone with technical training. It offers two options:

1. An observer node is a computer that is directly connected to the blockchain network (blockchain).

2. Software for the formation of analytics on REV.

The developers of the Moscow REV platform are to publish in the public domain on the portal mos.ru technological tools for creating their own observers. Any technically trained person will be able to create their own observer site to monitor the REV progress. The same toolkit was offered to political parties to organize party REV monitoring.

The expert level of monitoring of electronic voting consists of two methods:

1. The verification transaction is one of the innovations of the Moscow REV in 2022; it is the ability to record so-called *verification transactions* in the blockchain.

2. The address of the ballot in the blockchain. From 2022, a REV member may receive the address of their encrypted ballot in the blockchain with a single click and after deciphering the results of online voting independently check if their ballot was accepted.

As we can see, introduction of electronic voting in Russia required a radical renewal of the institution of monitoring, and its professionalization (Lopatin, 2022: 49). This approach allows to ensure trust to the electronic voting system.

The available technical achievements and positive experience in the use of electronic technologies in the electoral process provides for the most optimistic forecast for the further REV development and expansion as an additional guarantee for implementation of the active suffrage of citizens of the Russian Federation. The system is convenient, understandable, easy to use, significantly saves time and effort, and therefore will attract a high interest of voters in choosing this form as an alternative to voting at a polling station.³⁵

A sufficient and high-quality regulatory framework for the implemented experiments, high-level organizational and technical measures taken with their widest possible public discussion left no grounds to doubt the quality of ensuring the active electoral right of citizens who used i-voting, compliance with the principles of electoral law, and the results of voters' choice.

The successful use of remote electronic voting in Russia (Mazurevskiy, 2022:43–45) and Estonia may set an example to other countries in advancing and improving remote forms of voting in elections opening a wide range of obvious

³⁴ The observer in real time allows to see the main statistics on remote electronic voting. This process is similar to the work of observers at polling stations, but the data will be displayed in the form of machine code.

³⁵ At the elections of deputies of representative bodies of local self-government in Moscow, 1,749,448 Muscovites voted with REV, and 695,214 at the polling station. Electronic voting in Moscow is beginning to dominate. *Nezavisimaya gazeta* [electronic resource]. Available at: https://www.of.ru/moscow/2022-09-12/2_8537_12092022.html [Accessed 20th March 2023].

advantages. Despite conservatism and caution that have been demonstrated, the number of countries seeking to develop electronic voting in one form or another is growing worldwide. In Belgium, Slovenia, and San Marino election participants express their opinion on the introduction of remote electronic voting technologies into the electoral process. Along with European countries, REV as an additional form along with traditional voting at polling locations is planned to be introduced in Uzbekistan, Azerbaijan, Georgia, and Moldova.

In this matter, it is important to study and analyze foreign experience in the use of electronic voting.

Findings

To date, both in Russia and abroad, the latest technologies of electronic voting in elections are being actively tested. At the same time, it is obvious that the nature of the use of e-voting (experimental or permanent), the stage of implementation, its types, and the further prospect of application in each particular state directly depend on a number of factors, such as the level of development of public administration digitalization as a whole and the electoral process, in particular, the possibilities of state financing to introduce expensive digital services, the readiness of the political system, the level of development of the institution of public observation and public openness.

An analysis of experiments in implementing electronic voting has identified the main problems hindering its further use or expansion.

It should be noted that the electronic identification and verification system of voters, which is widely used in Russia (Portal of State and Municipal Services) and Estonia (ID-card technology), is not a widespread phenomenon in world practice.

The large-scale introduction of digital technologies in the electoral process implies a financial burden and state investment in creating e-democracy infrastructure. In several European countries, the first experimental practices in remote electronic voting did not lead to a significant rise in the turnout of the population in electronic format and, in general, did not increase the number of citizens participating in elections; therefore, doubts arose about the REV expediency as an additional form of active suffrage with the sufficiently high cost of e-voting.

The instability of operation, imperfection of electronic voting devices, and the REV technological platform used in some countries led to appeals against voting results, gave rise to doubts about the correctness of vote counting and voting results, which, in principle, is a critical risk for elections in terms of their legitimacy (Mintusov & Gulyaev, 2022:123).

The lack of a fully developed tool for monitoring electronic voting in elections was also a factor that lowered the chances of the successful REV implementation. The absence of a verification mechanism (paper trace) that allows the voter to verify the correctness of their will recorded by the electronic voting complex, as well as subsequent possibility of manual counting (control recount) of electronic votes using the complexes, from the point of view of democratic processes,

significantly increases the risks of doubts about the legitimacy of elections (Hyde, 2008:27–35).

Estonian and Russian practices where the main risks identified above have been successfully overcome by improving technologies that meet the criteria of openness, transparency, accessibility, confidentiality, and protection of voting secrecy showed that REV has gained popularity and is in high demand among the population.

In many ways, the stimulus for the development of electronic services in the electoral process is the desire and readiness of the state as a public authority to expand the involvement of the population in exercising democracy (Koshel, 2018:165). The more convenient it is for a voter to use modern tools, the more involved they are. In fact, albeit not at the first stage, even in the medium term, the convenience of electronic format overcomes the polling station turnout with a traditional paper ballot. In the process of introducing and applying the latest electronic technologies in the electoral process, the main task of the state is to preserve the basic principles of electoral law (equal suffrage, secrecy of voting, etc.), to prevent distortion of voting results, and to elect legitimate public authorities (Golovin, 2021:8–10). The development of electronic voting should be based on maintaining a balance of convenience and accessibility of the voting process and its guaranteed legality, variability of voting methods, transparency, openness, and accessibility for public control and observation.

From this point of view, the regulatory framework that combines advanced technologies of e-voting in Moscow in terms of introduction of electronic services, taking into account the upcoming integration of REV and electronic voting complexes based on the already used electronic voter list system, has advanced further than any of the known forms of e-voting in the world, because it plans to combine all the best of electronic voting at this stage of digitalization.

Electronic voter lists, freedom to choose the form of voting (electronic or paper) on any of the voting days, preservation of the traditional paper format of voting, and ability to vote at any polling location within the boundaries of the district without a complicated procedure for inclusion into the voter list, modern electronic voting terminals (complexes), containing a mechanism for voter's checking their selection on the device, a monitoring node, an individual encrypted code in the REV to check their vote – all these must be implemented. Another condition is that any voter may vote without restrictions either remotely or in person at the polling station, and if at the polling station either on an electronic voting device or in the old-fashioned way with a paper ballot. Referring to Russia, we can assert that the active introduction of electronic services in the electoral process creates maximum opportunities for voters to exercise their active suffrage. Ultimately, this is the task of a developed democratic state to ensure the choice made by voters as only they may determine the voting outcome.

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