The Legal Aspects and the Enhanced Role of Cybersecurity in Protecting the Electronic Voting Process in the Context of Jordan Parliament Election Law No. (4) of 2022

Mohmmad H. AImajali[1], Mohamed F. Ghazwi[1], Faisal T. Alqudah[1], Medyen J. ALmahasnah[2], Hakam H. Alajarmeh[2] and Ala' A. Masarweh[3]*

[1]Faculty of Law, Department of Law, Al-Zaytoonah University of Jordan, Amman, Jordan
[2]Faculty of Law, Department of Law, Isra University, Amman, Jordan
[3]King Hussein School of Computing Sciences, Princess Sumaya University for Technology, Amman, Jordan

Abstract: This study, entitled: "The legal aspects and the enhanced role of cybersecurity in protecting the electronic voting process", dealt with the concept of the electronic voting process, in addition to the most important characteristics of that process, as well as highlighting the pros and cons related to the electronic voting system. Then, the researchers singled out a proposed approach for the electronic voting process in terms of the adopted mechanism and cyber protection in accordance with the provisions of the Jordanian Election Law No. (4) of 2022. At the end of the research, the researchers recommended activating the text of Article 40 of the electoral law by issuing legislation that regulates the electronic voting process and enhances the protection of cyber security, and then updating the technical and legislative system of the Independent Election Commission and the Ministry of Political Development.

1 Introduction

The growth and development of electronic systems that implement major and essential operations in governmental and parliamentary institutions and public utilities should be noted as one of the effects of the information technology revolution. These systems are characterized by a high degree of integrated organization, speed, transparency, and integrity in the application of procedures and methodologies derived from them [1]. The so-called electronic government is said to have improved as a result of the use of electronic systems, and references to the potential of using an electronic voting system have since shifted from the so-called electronic government to the requirements of the legislative authority [2].

This study focuses on a descriptive and analytical study of the significance, justifications, and requirements for the use of an electronic voting system in parliamentary elections, with an indication of the practical procedures of this system and the advantages that can be obtained from its application as a tactical substitute for the conventional systems under which elections are held, and around which there is some controversy regarding their validity, accuracy, and integrity. This has led many countries around the world to experiment with secure and robust electronic voting systems that work in accordance with the specifications of good governance, starting with the articles of the constitution, passing through a consensual electoral law that is representative of all groups and spectrums of society. [3], [4].

The importance of this study lies in the fact that it examines the relationship between democracy and the advancement of modern technology, which has significant benefits for the government, the population, and the institutions of civil society. It also clarifies the methods employed to ensure a secure and productive electoral process in light of the growth of information technology. The importance of this study also stems from how it will increase the transparency and integrity of how parliamentary elections are conducted. This is because the electronic voting system limits human interference, minimizes errors that can occur during traditional voting, and gives candidates and observers direct access to the voting process up until the results are announced. The importance of the study is further highlighted by the discovery that a security and protection system for the electronic voting process may be implemented based on the state's physical capabilities and supporting infrastructure. [5], [6], [7].

1.1 Research Objectives

1- To emphasize the benefits and necessity of using the electronic voting system as one of the tools to improve the qualities of good governance in the conduct of elections (participation, transparency, accountability).

*Corresponding author e-mail: moh.almajali@zuj.edu.jo

2- Describe the benefits of the electronic voting system over the traditional voting system using the following criteria: accuracy, impartiality, speed, cost, flexibility, information security, and the scope of statistics and analysis.

3- Introduce the electronic voting system's operational mechanism, practical procedures, requirements and conditions for its use, as well as guidelines for the security and protection of the system's operations and data to the decision-maker and the entities involved with conducting elections.

The main issues addressed in this research are as follows:

1. To what extent can electronic voting achieve local and international standards of integrity and transparency of the electoral process?

2. Can this system be applied in the Hashemite Kingdom of Jordan? This is after reviewing the Jordanian Election Law No. (4) of (2022), which indicated in Article (40) the possibility of conducting the counting or voting process by electronic means, the provisions of which are determined through a system issued by the Council of Ministers to achieve this end.

3. Among the issues facing the application of the electronic voting systems are the challenges of accepting the electronic culture for most voters, as well as the problems of cybersecurity and information protection in the electronic system, which may be exposed to data theft and alteration and falsification of election results, which affects the transparency and confidentiality of the voting process.

Until recently, the electoral process was limited to traditional paper-based elections. Since then, the electoral process has undergone numerous changes as a result of the natural development of societies and the increase in their number and complexity [8].

As a result, various electoral patterns emerged in contemporary democratic experiences, and the intervention of the Internet and technological tools in political life established a new sort of technical or digital democracy [9].

Civil societies strive to strengthen their legal systems and political construction in order to develop and make their electoral system fairer and more transparent, in accordance with fixed standards, without which it is impossible to speak of competitive democratic elections that perform the functions entrusted to them. It is one of the most significant criteria for improving and updating the electoral system and responding to enormous technological changes in order to open new doors to a better form and concept of democracy in digital voting [10].

Cybersecurity is discussed to demonstrate to the research's target group the judicial concept of electronic voting and then discuss the most prominent characteristics of this type of voting, and then to illustrate the most prominent pros and cons of the electronic voting process, and this is what will be discussed in the first part of this study.

1.2 The Concept of Electronic Voting

Electronic voting means directing the political right to elections and choosing candidates through the use of information technology instead of traditional methods such as ballot papers and ballot boxes, and then storing the results in computer systems according to certain technical and security standards to achieve the highest level of transparency, accuracy and security while ensuring the integrity of the electoral process in its electronic for [11].

It is also known as: A term that encompasses many different ways of voting, including both electronic polling and modern methods of sorting results [12].

Electronic voting also refers to the use of information technology at various stages of elections, such as registering voter and candidate data, validating voter identity, and finally electronically counting and tallying votes. All of these procedures are carried out under the integrated electoral system without the need for traditional processing methods [13].

From the above, it is clear to us that the electronic voting process has four stages: registering voters with the registration department, then issuing documents that include eligible voters and candidates, then voting using electronic papers, through which the identity of the elected is verified, and then the selection process for candidates is carried out in front of the voters [1].

Based on the above, we may conclude that electronic voting has a number of characteristics, the most significant of which are as follows:

- Electronic voting is more accurate and impartial than traditional methods, and e-voting provides the user with a sense of security and confidence through interaction with electronic devices and solutions, in addition to providing more accurate results, which reduces human error because the operations are carried out automatically according to the system, without the need for workers to carry out the voting procedures, transmit information, count and obtain results [12].

- The use of technology in the electoral process has played a significant role in facilitating the task of the electoral administration in terms of the high costs that the traditional process required, such as printing and storing paper, and the large numbers of employees needed to ensure the integrity of registration from the electoral rolls, and accurate and complete counting of the names of voters and their electoral districts [1].

- Through the use of image and biometric data, electronic voting minimizes electoral crimes since it is impossible for non-voters to cast a ballot, especially in modern cultures where electronic means are commonly employed [12].

1.3 Forms of Electronic Voting

1-   Internet Voting (I-Voting)

This mechanism developed from electronic voting in the 1990s and the early 2000s. It allows voters to cast their ballots using any computer connected to the Internet, even from home. Several countries, including Switzerland, France, and the Philippines, have conducted specific experiments to use this type of voting.

2-   Voting by Email

An election card is sent through email to complete this process. The necessary candidate is selected by the voter. It's installed in a PDF file and delivered in the email. The message and the card are printed and kept until the voting process starts.

3-   Voting by Mobile Phone

Voters can cast their ballots electronically by calling the telephone voting registration center from their mobile phones. The voice and time of the call are then recorded, and the audio recording is kept as proof of the electronic voting process with the agency in charge of overseeing the electoral process.

4-   Voting by Scanner

A mark is placed in front of the desired candidate that the voter wants to vote for on cards or lists containing the names of all candidates. As an optical reader connected to a computer, it is utilized here to read the cards and count them.

It is evident to the researchers that there is a positive role for electronic voting, but on the other hand, there are a number of challenges facing this process after researching several international experiences of electronic voting and after reviewing a set of legal, political, and technical researches. [13], [14], [15]

1.4 The Positive Role of Electronic Voting in the Electoral Process

By relying on the registration of voter data via biometric scanners, such as fingerprint, iris, or DNA, to distinguish the voter from others, the use of the electronic voting system in the electoral process reflects a civilized image of the state in front of the international community and also offers the advantage of obtaining data quickly and clearly [9].

Electronic voting also has the benefit of reducing the number of staff needed in the administrative bodies that oversee and manage the electoral process, which helps the public administration of the nation throughout the electoral process given the high expenses associated with traditional elections [16].

It becomes obvious to us that e-voting will decrease the acts of electoral crimes, such as fraud and document fraud, and that e-voting will enhance the proportion of voting owing to the convenience of e-voting [13].

Due to the existence of a number of international agreements and national laws that protect their civil and political rights, the electronic voting system aids in obtaining the votes of all citizens, whether at home or abroad. Electronic voting is also thought to be the most effective way for people with special needs to participate in the electoral process [11].

1.5 Administrative Security and Technical Difficulties of the Electronic Voting Process

The electronic voting process faces a number of challenges, which can be summed up in the following points [10], [16], [14]:

- Resistance to change: A human's psychology causes him to oppose change in many aspects of life, notably in the context of politics. According to many sources, this resistance takes diverse forms, and for some individuals with political power and influence, it becomes more pronounced out of a concern that this shift will diminish their influence in political manners.

- Financial cost: The use of modern technology in the electoral process necessitates the availability of fundamental elements such as reliable electrical power and high productive capacity because the use of electronic means requires spending enormous sums of money to provide electronic devices and electronic security means, knowing that the greater the accuracy and security guarantees of electronic devices, the higher their price.

- Hacking: There's a chance that foreign hacking operations could target the electronic system. A case of electronic hacking is what happened to the Central Election Committee of the Russian electronic system, which originated in Europe. This was addressed by the passage of numerous rules that, on the one hand, punish the perpetrators and, on the other hand, offer guarantees. The equipment used for electronic voting ensures the privacy of votes and prevents data hacking.

- Lack of transparency: This is because the electronic voting process does not take place under the eyes of the observers, unlike the manual voting, which is under their supervision, starting from the export of the ballot paper and the voter's declaration of his/her identity to the end of the votes being counted and the announcement of the results. The use of the electronic system enhances transparency because it limits human interventions (intended and unintended) and reduces errors associated with the electoral process, which is traditionally carried out due to its reliance on paper materials.

- Username and Password: Using a simple username or a weak password means weakening the voting system in front of hackers. One of the biggest risks of systems dependent on certain information is the theft of information and theft of the system or tampering with its contents is possible. Some have suggested using a complex password to increase protection, but this may raise the possibility of forgetting the password or making an error when entered by the voter, and this is what prompted some researchers to suggest a new structure for voting systems that is chosen before the elections by the voter and is entered and stored on the system asking the voter about any of them at random on election day.

- Physical protection techniques: Researchers have suggested the use of an electronic voting system based on the use of smart cards, by which the voter's identity is verified. It is also possible to store information related to the voter's biometrics information, such as iris, or fingerprint etc. It is important to study the application of these systems carefully, as they increase the level of system security and reduce the chances of identity fraud, but they require a high cost in terms of cards, scanners, and technical systems.

From the foregoing, it becomes clear to researchers that modern democratic systems must have a number of criteria to move towards electronic voting, and among the most important of these criteria is the existence of legislation and law regulating electronic voting from the first stages of the electoral process until the appearance of the election results. In addition to the existence of a modern technical standard and an electronic government in the country, and a structure capable of accommodating this type of electoral process.

The most prominent and most important criterion for the electoral process is the standard of integrity and transparency, and the protection of the electoral process from cyber-attacks and illegal intrusion. Therefore, researchers found that they must develop a modern vision to protect the electronic voting process.

2 Literature Review

An online voting system, often known as electronic voting, is something that uses the internet to allow individuals to vote during an election period. The online voting method can also be implicated in expressing the democratic setup in a manner that increases the number of participants in any other national stream of elections locally or nationally. The online voting method is primarily employed in relation to the policies of the political system. The overall goal of online voting is to maximize the number of individuals who vote from any location on a specific voting day [17].

Cloud computing is a type of on-demand availability that includes computer resources, such as data storage and computational power, without the user having a direct way to actively manage it. This term is commonly used to describe data centers that are accessible to a large number of individuals or users over the Internet. Several researches have been conducted in the past to investigate the possibility of implementing an electronic voting system using cloud computing [17].

The work of [18] probed the possibility of using an online voting system using cloud computing in India. They highlighted the issues with the current manual election system in use. They also stated that online systems boost work speed and give accurate results. They introduced a prototype voting design using cloud, which then they tested on real life situations.

[17] Highlighted the need of implementing an online voting system to tackle the issues of the manual voting process. In their research, they attempted to implement an online voting system using C# programming language, Microsoft Azure cloud, and Microsoft SQL server.

It is an accessible, decentralized database. The data is duplicated and distributed across multiple computers, and the entire block chain is decentralized. This implies that no single person or organization (such as a government or a company) has control over the blockchain; this is a radical departure from centralized databases that are controlled and administered by companies and other organizations. Since the entire blockchain is replicated across multiple computers, every user has

access to the entire blockchain. Transactions or records are not processed by a centralized administrator, but rather by a network of users collaborating to verify data and reach consensus. If this sounds familiar, it is because Bitcoin operates in a similar manner. Bitcoin is the first practical application of a blockchain. [19]

[20] Proposed an electronic voting system based on the cloud with blockchain technology as a security method. They indicated that securing the cloud database by using blockchain will assure the security of this data from any tampering in their research.

[21] Probed the possibility of maintaining the privacy of an electronic voting system using the cloud based on encrypting the ID. Their proposed system consisted of three main phases, the first being registration, the second being the voting polls, and the third phase being the declaration of results. Through their system the Election Commission of India can use cloud computing to search for and verify vote data. In their work, they stated that the proposed system is highly secure due to the use of performance analysis, as well as the data transmitted is secure.

A Smart Voting System was introduced by [22]. The research presents a method in which voting is generally based on fingerprint application, giving individuals a simple way to vote and ensuring 100% voting. Such digital voting method retrieves a list of all voters in the state who are over the age of eighteen from a database. This system improves the security of online voting by utilizing the concepts of biometric and stenographic authentication. Homomorphic methods are utilized to encrypt the accumulated votes and then decrypt them during the results process. One of the benefits of this technique is that an automatic voter ID is generated. It has been pointed out that this digital system can reduce manual work.

Previous research has analyzed the possibility of implementing an electronic voting system based on the cloud. However, none of the researches addressed the issue of cyber security thoroughly, which has the potential of affecting any voting outcome if the voting system is not secured properly. Furthermore, an electronic voting system should be built on the foundation of the voting law which is used in the majority of the countries around the world. Therefore, any system proposed should address the legal issues of the voting process.

3 Methodology

The structure of the proposed approach to the electronic voting system is based on the use of cloud computing technologies, which are based on the ability to access services by means of limited resources (specifications) through Internet browsers or smart phone applications, in addition to the effective role of this technology in saving infrastructure costs and high-specification devices and reducing software licensing costs, as these technologies depend mainly on (pay as much as you use), in addition to the features of requesting basic services - such as backup services and various security services - directly, easily and as needed.

Three fundamental layers make up the framework of the proposed approach: the usage layer, the services layer, and the database administration and storage layer. The details of these layers are as follows:

- Usage Layer: This layer includes the provision of an electronic link to the service or a smart application, through whose interface the services can be accessed via Internet browsing, by the users of the system, who are voters and government agencies responsible for managing election operations.

- Services layer: This layer is considered the core of the electronic voting system, as it includes the four basic processes of electronic voting, which include registration, user identification, voting and finally tabulation. This layer by first using design programs and programming languages through computing services (Platform as a Service: (PAAS)), and hosting services for the system through computing services (Software as a Service: (SAAS)) and thus the need to pay lower costs at the level of construction or implementation.

- Database management and storage layer: In this layer, cloud computing services (PAAS) are used to process and administer the system's basic databases without the need for additional software license fees. In order to ensure data integrity and system health during the course of system operation, this layer also comprises storage synchronization and backup services.

The proposed approach offers an electronic mechanism for conducting elections that is compatible with the conventional process, compliant with electoral laws, and improved by a number of services and rules that ensure the security of election data.
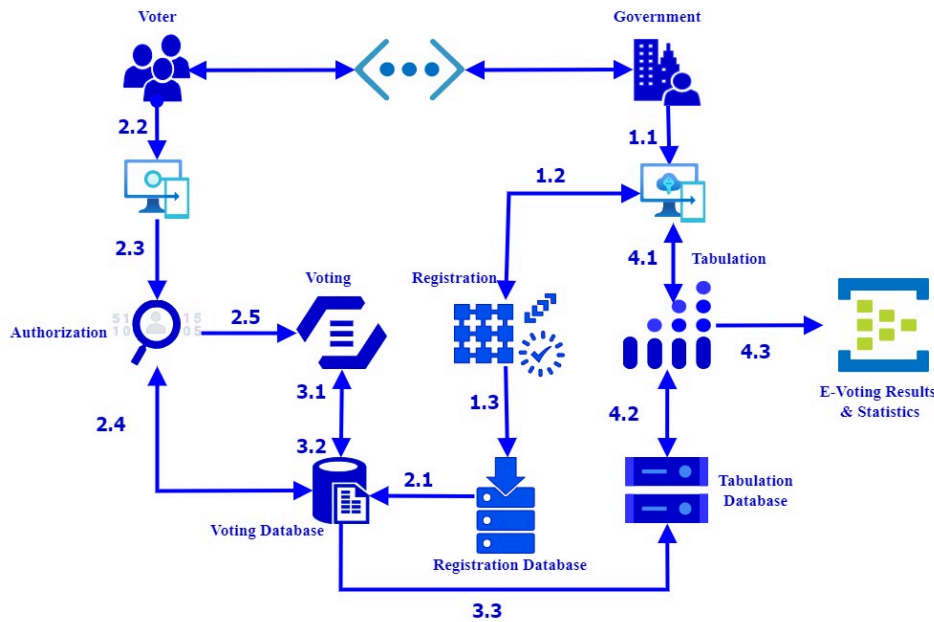
Fig. 1: Illustrates the general outline of the proposed model's working mechanism

As seen in the figure above, the mechanism of the form's work begins after the approval of the voters, candidate lists, and the data of the final lists. This mechanism can be clarified in more detail through the following phases:

1.　　　The registration phase entails the preparation of voter, candidate, and list databases as well as their hosting within the third layer by the official authorities allowed to carry out registration procedures. The registration process consists of the following steps:

1.1-　　Access to cloud computing services related to the electronic voting system through Internet browsers or smart phone application interfaces without the need of special specifications for access devices.

1.2-　　Login, define permissions, and ensure that the user is authorized to perform registration operations.

1.3-　　Upload the approved list, candidate, and voter data. The usage of secure data upload protocols and measures to implement standards are emphasized in this phase in order to guarantee the integrity of data after uploading.

2.　　　The process by which a voter logs in to vote, confirms their information and privileges, and then is granted the necessary access to voting facilities. The following steps can be used to explain this:

2.1-　　First, the registration data must be uploaded to the polling database according to the scheduled dates.

2.2-　　User (voter) login through Internet browsers or applications designated to access electronic voting services.

2.3-　　The user's identity is verified, and the vote is valid, and this step is perhaps one of the most important steps provided by the system, it mostly depends on a set of security verification policies for the systems. Often the login will be made with the citizen's national identification number and the use of a temporary password that is sent automatically to the user's mobile phone from the system if identification of the user and his electoral validity. After that, verification of the user's identity will be carried out and the use of the voter's biometrics such as iris or face identification will be carried out.

2.4-　　When the voter identification processes are completed, the information is presented to the voter for confirmation. Then, the data of this process is recorded in the polling database, in addition to some additional information required by the security of the electronic voting system, such as time and date, as well as the address of the device used for electronic voting.

3.　　　Voting phase: here the system will automatically display the electoral lists and candidate's data so that the voter can easily browse the lists of the candidates and preview their photos, which facilitates the selection process. Perhaps this phase is considered one of the most crucial phases concerned with the determinants of using the system, as the proposed approach should not allow electoral abuses, such as choosing more than one list or choosing more candidates than what is allowed, or choosing candidates from different lists, in addition to that. This will prevent incomprehensible writing or inappropriate phrases that sometimes occur in traditional polling processes. To detail the steps of this stage:

3.1-   Acquire voting data according to voter information: this is where the voter can choose their selections and then validate the voting process. The lists and candidate information are uploaded in which the voter is permitted to vote.

3.2-   The voter's selections for voting are recorded in the voting database, and their record is completed by changing their status to (Voted).

3.3-   The polling records are synchronized with the counting database, and the synchronization procedure comprises syncing the voters who completed the vote as well as the voting process data. This synchronization is done independently so that the voter's selections cannot be known, hence increasing the privacy of the electronic voting process.

4.   The tabulation phase involves a variety of options and statistics related to the electoral process, as well as the analysis of polling data and the computation of voting results. The following methods are used to accomplish this through the authorized entities in accordance with the timetables established for these operations:

4.1-   Use of web browsers or smart applications to log on to electronic tabulation services.

4.2-   Upload tabulation data: This is where the tabulation data is uploaded and displayed through results and statistics interfaces, but this data is not directly accessible except through the control of cloud computing services, which is the highest level in the hierarchy of responsibility, and therefore this is a guarantee of the confidentiality and privacy of the data.

4.3-   Sorting the results: In this step, the voting process' results and statistics are calculated and presented in pertinent reports that will be released after approval.

Cyber Alignment with the Proposed Approach

Electronic voting is more efficient, faster, and more accurate than manual ballot counting. However, because they can be used to acquire information and interact with other systems, information systems may be vulnerable to cyber threats. For instance, any flaws in the devices utilized to provide registration data could give unauthorized users (hackers) access to voter records.

Cybersecurity threats to elections typically come in one of three forms [23]:

1-   Confidentiality attacks (information theft): Examples include stealing voting registration information or preliminary tabulation results. The integrity of the system may be questioned if data is stolen.

2-   Integrity attacks (altering data or system operations): This may involve modifying voter tabulation and/or aggregation results, which could have a significant impact on the outcome. This involves any efforts to alter the actual votes that were submitted.

3-   Attacks on voting infrastructure's availability (denial of service) may occur in the form of a DDoS or a ransom ware attack. Cybercriminals might significantly disrupt voting by paralyzing voter registration databases and voting system hardware.

The countermeasures against attacks on cloud computing are as follows: [24]

1-   Data Encryption: Any cloud system's first line of defense for data security is encryption. Cloud-protected data is hidden using encryption techniques that employ sophisticated algorithms. When transferring and storing data in a cloud infrastructure, it must be encrypted in all phases: at the source phase (on the user's end), in transit phase (as it transfers from user to a cloud server), and at rest phase (when it is stored in the cloud database).

2-   Make use of multi-factor authentication and complex passwords: Multi-factor authentication must be used in place of a typical username and password authentication verification.

3-   Intrusion Detection: Utilize an intrusion detection system that is able to identify and alert you to any unauthorized use of cloud services.

4-   Backup: can be delivered as a service

5-   Disaster Recovery and Fault Tolerance: can be delivered as a service

3.1 Legal Alignment with the Proposed Approach

By examining the electronic voting system models from previous studies, it was discovered that there is a legal deficiency in the way the electronic voting process is organized, despite the significance of meeting the requirements of the legislation governing the election process, which embodies democracy and the people's choice of political representatives, in addition to the supervisory and legislative functions, which are thought to be the foundation for the exclusion., despite the great importance of achieving the requirements of the legislation governing the election process, which embodies the

meanings of democracy and the people's choice of political representatives, in addition to the supervisory and legislative function, which is considered The basis for the existence of the House of Representatives.

After reviewing and studying the Jordanian House of Representatives Election Law No. (4) of 2022, it became clear to us that the Jordanian legislator has a tendency to adopt the electronic voting system, based on the text of Article 40/h of the aforementioned law, which states the following: "Notwithstanding what is stated in this article, the council may decide to conduct the process of voting or sorting, or both, by electronic means, the terms and conditions of which are determined in accordance with a system issued for this purpose". The type of system intended here is an executive-type system, based on the text of Article (31) of the Jordanian Constitution with all its amendments until 2022, which stated "The King ratifies and promulgates laws and orders the development of the necessary regulations for their implementation, provided that they do not include anything that contradicts their provisions". Based on the above, this research offers a technological model that complies with the legal information in the electoral legislation regarding the voting, sorting, and issuance of results, together with a statement of a model that supports these legal texts.

It should be noted that the proposed approach has been designed based on the procedures followed in accordance with the Jordanian House of Representatives Election Law No. (4) of 2022, which are as follows:

1. Article (30) The election shall be secret and direct: the proposed approach supports the secrecy of the election through a set of procedures, the most important of which is separating the voting databases from the tabulation databases, but the voting results are synchronized and included in the tabulation database, and the voter's choices are kept within the voting database for digital forensic investigation purposes if needed. This is in addition to the importance of data encryption in its various stages and limiting access to it to the authorized entities only.

2. Article (31) The voter casts their vote at the polling and counting center within his electoral district: The proposed approach determines the electoral district for the voter automatically and according to the electoral district's data approved in the voters' register.

3. Article (33) Voting begins at seven o'clock in the morning of the day specified for that and ends at seven o'clock in the evening of the same day: It is obvious that electronic systems are distinguished by the ability to specify work periods.

4. Article (36) Voting shall be on the form approved by the Council for the ballot paper, provided that each ballot paper is stamped with the seal of the concerned electoral district and signed by the head of the voting and counting committee: This article requires the approval of the forms used by the competent authorities in advance. There is no doubt that these forms can be included in the form of documents used for the electronic voting process.

5. Article 40: The voter exercises his/her right to vote in accordance with the following:

   a) When a voter arrives before the voting and counting committee, the committee uses computers and paper tables to verify both the voter's identity and the presence of his name on the final list of voters in the electoral district. These lists serve as electronic and written evidence that a voter has used his or her right to vote.

   b) The head of the voting and counting committee, or one of its voting members, hands over the two ballot papers.

   c) The voter marks one or both of the ballot papers.

   d) With regard to the local list, the voter shall:

1. Mark in the space provided for the name, number or symbol of one of the candidates lists in the electoral district.

2. Write in the space provided for one or more of the names of the candidates within the list that has been marked only.

   e) With regard to the party list, the voter shall be marked in the space designated for the name or number of one of the candidates lists in the general electoral district.

   f) The voter places the two ballot papers in the box designated for each of them, in front of the committee and those present.

   g) The voter's finger shall be inked with the substance designated for that or by any method specified by the executive instructions.

   h) Notwithstanding what is stated in this article, the Council may decide to conduct the process of voting or sorting, or both, by electronic means whose terms and conditions are determined in accordance with a system issued for this purpose.

The proposed approach indicates the possibility of applying all of what was stated in Article (40) in terms of identifying the voter's identity and the presence of his data in the election records, as well as the flexibility in dealing with the

automatic identification of forms (ballot papers) and the ease of selecting options by the voter and navigating between the data of lists, candidates and party lists. In addition to updating the voter's status to (vote) and the ability to send text messages to the voter's mobile phone.

4 The Results and Discussion

After we finished presenting the research details, the researchers reached a set of results and recommendations, which are presented in the following:

1- The use of voting in the electoral process reflects the state's intellectual and technical progress, in addition to accelerating the electoral process and providing accuracy in procedures.

2- All political groups were able to participate because to the electronic voting system, particularly those who were abroad or with special needs.

3- There are different methods for practicing electronic voting, such as scanning, punch cards, and direct electronic registration.

4- There are important safeguards to protect the electronic voting system, including the process of international supervision and control, electoral appeals, and technical protections related to the cyber protection of devices and the electronic voting system.

5 Recommendations

1- The researchers advise the Council of Ministers to adopt laws governing electronic voting in Jordan's judicial system in response to the text of Article (40) of the Jordanian Election Law.

2- Finding a cooperation mechanism between the Independent Election Commission, the Ministry of media and the Ministry of Political Development, by preparing courses and workshops on exercising political rights through electronic means.

3- The Independent Election Commission should have alternative emergency plans to deal with any accidental cases that are expected to occur, such as technical failures of equipment or fraud and illegal intrusion.

4- Prepare a team specialized in managing the electoral process from the stage of voter registration until the results appear in the official press.

Conflicts of Interest Statement

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

References

[1] D. Park and M. Satt, "Article Design and implementation of a cryptographically secure electronic voting infrastructure," June, pp. 0-9, 2022.

[2] I. Khandaker and S. Jungang, "*A blockchain-based electronic voting system without third parties*," vol. 5, no. 5, 2022.

[3] S. Alsous, "Students Attitudes Towards Electronic Tests abd their Opinions About Them," *Journal of Education /Al Mejlh Altrbwyh,* vol. 36, no. 144 (2), pp. 255-291, doi: 0085-036-144-009, 2022.

[4] A. Saif, "Developing Mathematics Syllabi of Secondary Schools in Republic of Yemen in According to the 21st Century Skills," *Journal of Education /Al Mejlh Altrbwyh*, vol. 36, no. 144 (2), pp. 193-220, doi: 0085-036-144-007, 2022.

[5] A. Aljazaf, "Twitter's Coverage for the Hashtag #corruption Cases in the State of Kuwait: An Analytical Study," *Arab Journal for the Humanities*, vol. 158, pp. 79-123, doi: 10.3412/0117-040-158-004, 2022.

[6] H. Murad, S. al-Fadhli, and A. Dashti, "Students' Perceptions of Distance Learning During the Corona Pandemic Crisis: The Kuwaiti Private Universities as a Case Study," *Arab Journal for the Humanities*, vol. 40, no. 158, pp. 271-287, doi: 10.34120/0117-040-158-009, 2022.

[7]   F. Alsalem, "Social Media-Related FOMO (Fear of Missing out on Opportunities) Among Kuwaiti Youths," *Arab Journal for the Humanities*, vol. 159, pp. 11-56, doi: 10.34120/0117-040-159-001, 2022.

[8]   A. O. Helmy, "*Legal Regulation Of Electronic Voting Techniques And Its Impact On The Effectiveness Of Parliamentary Elections The United Arab Emirates (Comparative Study*)," vol. 6, no. 8, pp. 6198-6208, 2022.

[9]   M. Kassen, "Politicization of e-voting rejection: reflections from Kazakhstan," Transforming Government: *People, Process and* Policy, vol. 14, no. 2, pp. 305-330, doi: 10.1108/TG-11-2019-0106, 2020.

[10]   P. Baudier, G. Kondrateva, C. Ammi, and E. Seulliet, "Peace engineering: The contribution of blockchain systems to the e-voting process," *Technological Forecasting and Social Change*, vol. 162, pp. 120397, doi: 10.1016/j.techfore.2020.120397, 2021.

[11]   A. H. Trechsel, "*Potential and Challenges of E-Voting in the European Union Study,"* European Union Democracy Observatory (EUDO), vol. 11, 2016.

[12]   A. P. Amit Kumar Chakrabarty, "International Journal of Social Sciences (IJSS)," *International Journal of Social Sciences*, vol. 10, pp. 42-52, 2021.

[13]   A. Essex and N. Goodman, "Protecting Electoral Integrity in the Digital Age: Developing E-Voting Regulations in Canada," *Election Law Journal: Rules, Politics, and Policy*, vol. 19, no. 2, pp. 162-179, doi: 10.1089/elj.2019.0568, 2020.

[14]   H. S. Umar, J. Atte, and S. Haruna, "Electronic Voting As an Instrument for Free, Fair and Credible Elections in Nigerian Political System: Issues and Challenges," *European Journal of Political Science Studies*, vol. 5, no. 2, pp. 1-16, doi: 10.46827/ejpss.v5i2.1215, 2022.

[15]   M. H. Almajali, F. Abed, A. Alshawabkeh, and A. Emirates, "*The Legal Status of Electronic Administrative Decision through Signature of the Competent Authority for issuing it (Analytic Study*)," vol. 9, no. 7, pp. 380-400.

[16]   S. Risnanto, Y. B. A. Rahim, N. S. Herman, and A. Abdurrohman, "E-Voting readiness mapping for general election implementation," *Journal of Theoretical and Applied Information Technology*, vol. 98, no. 20, pp. 3280-3290, 2020.

[17]   R. Govindaraj, P. Kumaresan, and K. Sree Harshitha, "Online Voting System using Cloud," International Conference on Emerging Trends in Information Technology and Engineering, *Ic-ETITE* 2020, pp. 6-9, doi: 10.1109/ic-ETITE47903.2020.245, 2020.

[18]   D. B. Dandekar, G. Umratkar, P. Manwar, S. Sute, Z. Ansari, H. Khan, B. Ansari, and B. Joshi, "*ONLINE VOTING SYSTEM USING CLOUD COMPUTING*," International Research Journal of Modernization in Engineering Technology and Science www.irjmets.com @International Research Journal of Modernization in Engineering. www.irjmets.com, 2022.

[19]   A. Al-jabra, H. AlNuhait, S. Almanasra, and H. Al-Khawaja, "A vision towards the future of cryptocurrencies Rooting, its financial significance, and legal challenges in its use," *Information Sciences Letters*, vol. 12, no. 8, pp. 2545-2557, doi: 10.18576/isl/120811, 2023.

[20]   S. L, H. Pransanth K C, S. Sabareesh, S. Begum I, and S. Vali Y, "Cloud Database Security in E-Voting System using Blockchain Technology," *International Journal of Recent Technology and Engineering (IJRTE*), vol. 8, no. 5, pp. 1361-1370, doi: 10.35940/IJRTE.E6292.018520, 2020.

[21]   A. Shankar, P. Pandiaraja, K. Sumathi, T. Stephan, and P. Sharma, "*Privacy preserving E-voting cloud system based on ID based encryption*," Peer-to-Peer Networking and Applications, 2020.

[22]   R. Bhuvanapriya, S. Rozil Banu, P. Sivapriya, and V. K. G. Kalaiselvi, "Smart voting," Proceedings of the 2017 *2nd International Conference on Computing and Communications Technologies*, ICCCT 2017, pp. 143-147, doi: 10.1109/ICCCT2.2017.7972261, 2017.

[23]   Cisa, "*Critical Infrastructure Security and Resilience Note Election Infrastructure Cyber Risk Assessment*," pp. 1-16, https://www.cisecurity.org/spotlight/ei-isac-cybersecurity-spotlight-cia-triad/, 2020.

[24]   L. S. Alsaleem, S. A. Alqahtani, S. F. Alharbi, and R. Agrouba, "Cloud computing based attacks and countermeasures: A survey," *Journal of Theoretical and Applied Information Technology*, vol. 97, no. 19, pp. 5185-5203, 2019.