International Journal of Managing Public Sector Information and Communication Technologies (IJMPICT)
Vol. 14, No.4 December 2023

EVALUATING CITIZENS' PERCEPTIONS AND ATTITUDES TOWARDS E-VOTING IN LOCAL GOVERNANCE: AN EMPIRICAL STUDY

Eleni Michalopoulou[1], Dimitris Folinas[1], Dimitris Mylonas[2], Zafeiro Fragkaki[3]

[1]Department of Supply Chain Management, International Hellenic University
[2]Department of Accounting and Information Systems, International Hellenic University
[3]Law School, Aristotle University of Thessaloniki

ABSTRACT

The implementation of Electronic Voting (eVoting) at the local level presents numerous advantages. It affords citizens the opportunity to participate in the planning and decision-making processes that directly affect their local communities. Furthermore, eVoting systems promote inclusivity and equality among the citizenry. Moreover, the adoption of eVoting can enhance transparency and subsequently bolster citizens' trust in their government. However, it is essential to underscore that the successful implementation of eVoting is a notably intricate endeavor. The primary objective of this paper is to investigate citizens' perceptions and attitudes regarding the implementation of eVoting in municipal elections. This research aims to ascertain the feasibility of introducing eVoting in municipal elections and to identify the key factors contributing to its successful implementation. To accomplish this, the findings of a study conducted between May and July of 2023, which involved the participation of residents of the Municipality of Thessaloniki are presented and analyzed. According to the findings, the eVoting paradigm, if all the necessary measures are taken and all the necessary conditions for its proper implementation are met, is an important and useful tool, which can promote e-Democracy and consequently democracy in local communities.

KEYWORDS:

Electronic Governance, Electronic Voting, Electronic Democracy

1. INTRODUCTION

The rapid development of Information and Communication Technologies (ICT), as well as the need for more effective, efficient and cost-effective organization and operation of the Public Administration, led to Digital Governance, both at national and local level [1]. An important parameter in Digital Governance is the enhancement of citizens' participation in public affairs. For this reason, governments and local administrations worldwide are increasingly relying on the use of ICTs to engage their citizens in public affairs. ICT and the Internet provide the opportunity for local administrations to increase initiatives to enhance citizens' participation and interaction with society. Thus, ICTs provide local government with the tools to disseminate information to local communities and enhance interactive communication with citizens, in order to share values and opinions between all parties (citizens, citizens' groups, businesses, etc.) involved in the participatory process with municipal authorities. In this way, a system of open and collaborative governance is developed, which improves transparency in municipalities, "revitalizes" local democracy and opens up a new space for political communication and participation. The political agenda of municipalities thus aims, through the mechanisms provided by Electronic Government

(eGoverment), to promote transparency and participation through their isotopes, using them as a repository of information and as interactive communication channels [2-4].

In the context of the new Public Administration in developing a strategy for local government, the digital transformation of cities is a key priority and therefore public and private investments in digital services, technologies, infrastructure and skills are being implemented. This will result in cities and communities achieving all their individual objectives and, in addition, will encourage citizen participation. In this new context Electronic Democracy (eDemocracy) in local government has a central place, as it promotes transparency, enhances citizen participation in policy making and therefore strengthens democratic processes in municipalities [4-6].

As technologies are constantly, developing, new tools are being added to strengthen democratic institutions and processes. One of the most useful tools for the promotion of democracy is the application of Electronic Voting (eVoting) at the international, national, and local levels. For this reason, worldwide, the eVoting process is gaining ground over other traditional voting processes. The term eVoting in a narrower sense describes the electoral process through the use of electronic means (at least for the registration of votes). A broader definition that can be given is that eVoting is defined as the process of casting a vote on any issue of local, national or supranational interest using electronic means via the internet, such as a computer or a mobile device. eVoting is conducted to involve citizens in the electoral process or to reflect public opinion on an issue of social, political or other interest. An eVoting system is defined as an information system designed to serve the requirements of conducting an e-vote [7, 8].

Although the existing literature has extensively examined the application of E-voting as an alternative way for the democratic electoral process at the national and not only level [9-11], there is not enough literature that examines the application of E-voting as a tool of local government for citizen participation in policy making. Most local governments, however, in modern democracies seek to innovate and change the way they interact with citizens. The tools of Public Consultation and eVoting are increasingly used in local government [12, 4, 6, 3].

This paper aims to examine eVoting in local government and contribute to filling this gap. In particular, the main objectives of the research are, to:

- Explore the perception and attitudes of citizens towards eVoting.
- Investigate whether its implementation in municipalities is feasible, and
- What, according to citizens, are the most critical factors for the success of its implementation.

For the needs of this study, a quantitative survey was conducted through sampling in the Municipality of Thessaloniki, which is the second most populous municipality in Greece. Data was collected using an electronic questionnaire followed by descriptive and inferential statistical analysis using SPSS statistical package. The paper is organized as follows: first, the concept of eVoting is defined and the main types of eVoting are identified. In addition, some initiatives in local government in Greece are briefly described. Then, the main dimensions of eVoting and the corresponding theoretical framework are identified. The research methodology is presented and the main results are analyzed. Finally, useful conclusions and administrative implications are drawn.

2. INTRODUCING E-VOTING IN GREECE

2.1 Concept and definition of Electronic Voting

EVoting is one of the most important applications of e-Democracy. As technologies are constantly developing, new tools are being added to enhance democratic institutions and processes. One of the most useful tools for the promotion of democracy is the application of E-voting at the international, national and local level. For this reason, worldwide, the E-voting process is gaining ground over other traditional voting processes. In Greece, on 12-11-2021, in Government Gazette B' 5244/12-11-2021, the new decision on Electronic Ballot "ZEUS" was published [12]. This is an information system, based on internationally recognized technological standards, through which it is possible to conduct secret ballots in an uninterrupted manner in a purely electronic way.

This information system is developed and operated by the company "National Network of Infrastructures for Research and Technology - Hellas and Research SA (EDYTE SA)" and supports multiple types of ballot papers and election systems, such as multiple-choice questions, ballots with a different ballot paper per combination and ballots for taxonomic voting. Both the preparation of the ballot by the Procuring Authority and the submission of the ballot by voters are done remotely via the Internet. Academic and research institutions, educational institutions of all levels, public, broader public and private sector bodies and any other legal entity under public or private law may use the ZEUS Digital Ballot as "Conducting Authorities", to whom EDYTE SA is able to provide network and computing services, in accordance with the legislation governing the purposes and operation of EDYTE SA and its statutes [12]. The fields of application of the Electronic Voting systems, in which voting can concern binding decisions and elections of representatives or polling and recording of trends, are: local government (primary and secondary), associations and unions (professional, scientific, parents' and guardians' associations, chambers of commerce, etc. etc.), political parties, universities (student elections, rectorial elections, etc.), and companies (shareholder votes, employee votes, etc.).

E-voting can be divided into two types depending on the purpose for which it is carried out:

- Formal eVoting, in which citizen voters have the opportunity through democratic procedures to elect their legal representatives using the electronic ballot box. In elections conducted in the traditional way, i.e. in specific locations (polling stations), the physical presence of voters is required, votes are collected in ballot boxes and counted manually. In contrast, advanced electronic elections enable citizens to vote via the Internet and do not require their physical presence, as their participation in this process is possible from any point of access to the Internet. Moreover, both the counting and the processing of the election results are carried out electronically. Many countries such as Switzerland, Canada, and Estonia etc. have successfully conducted eVoting for local, state or national elections. The reason for choosing eVoting is that the process is user-friendly, facilitates the participation of people with disabilities and is low cost in the long run. eVoting has also been used to conduct official referendums (national elections, European elections) [13, 8].
- Unofficial eVoting, which is conducted exclusively online and allows citizens to vote from home. These types of votes can express public opinion on key political, economic or social issues and can be conducted on a daily basis. Measuring public opinion on these issues is an important tool for public administrations, both because it makes them more democratic and because it minimizes the political costs in the event of social reactions [8].

2.2 eVoting in Greek local governance

Many cities around the world have started to use the tools of public consultation and eVoting to involve their citizens in decision-making. In Greece, a typical example is the Municipality of Trikala, which in 2021, when the question was raised as to whether or not a street in the city of Trikala should be designated as a pedestrian street, with the associated prohibitions, conducted an e-vote. Residents had to vote: a) whether it should be a pedestrian street (in which case no parking of any vehicle would be allowed) and b) whether it should be a normal street (in which case parking would be allowed and the Road Traffic Code would normally apply).

In fact, the Municipality has tried to take all measures to ensure that the electronic voting process is seamless. In order to avoid voting by residents of other areas or double voting or even multiple voting from the same house, the Municipality of Trikala accepted the applications of residents based on the supply number of the water meter of each house in the particular street. The reason was that each supply number was embedded in a specific platform, which allowed or disallowed the relevant vote. The voting was conducted through the general consultation platform of the Municipality of Trikala, at dialogos.trikalacity.gr. The user logged into the system with TAXISNET codes and could vote only once, with only one vote per supply, by entering the relevant supply number. In this way, the Municipality of Trikala aimed to make a decision with the participation of all residents, in order to achieve the best outcome for vehicle traffic and parking in the area [14].

Another example is the initiative taken by Greece during its presidency of the European Union to strengthen the participation of citizens in the European affairs. At that time, the first online referendum was held, in which all European citizens could take part, called "Vote for the Europe that You Want". The aim was to use the Internet and new technology to create an 'e-municipality', where citizens communicate online, vote and have the power to influence policy makers in the decision-making process. The evote.eu2003.gr website enabled citizens to participate in an online vote by giving their opinion on the functioning of the European Union, its role in the world, its prospects for the future, but also on issues such as migration, the environment, etc. More than 163,000 citizens from all over Europe participated in this project [15, 16, 8].

Moreover, in the framework of the European e-VOTE Project at local level, the Municipality of Maroussi used a model eVoting system, which aimed to test the system in real conditions and to check the response of the ordinary citizen on issues and questions related to eVoting systems. For this purpose, the Municipality of Maroussi held five votes, in which only citizens and residents of the Municipality participated, who were asked to express their opinion on various issues concerning the Municipality. The content of the votes was: Olympic Games and the Municipality of Maroussi, Quality of services provided by the Municipality, Problems and obligations of the business world, Urban planning, Quality of life.

For the successful conduct of the voting, it was necessary to carry out all the activities related to the information of citizens, the installation of computers that would facilitate the voting of citizens who did not have a computer, the creation of the ballot paper and the installation of the system itself.

With regard to the information of citizens, the actions related mainly to the publicity campaign and were as follows: Publication of a brochure (60,000 copies), Municipal website, Press announcement, Distribution of brochures, Registrations, Banners, and the publication of a brochure (60,000 copies). The most important of these was the brochure, which contained all the

information about the initiative of the Municipality of Maroussi. This brochure contained a short message from the Mayor of Maroussi, a description of the e-VOTE project, the voting issues, various information about the process, the necessary steps a citizen had to follow in order to take part in the voting and a participation form. The preparation of the voting process included: preparation of a ballot - questionnaire, selection of suitable locations that would serve as polling stations where citizens could vote, meetings with municipal organizations, voter registration (filling in a form), delivery of voter codes from the City Hall, from the polling stations and via e-mail [16].

3. CRITICAL SUCCESS FACTORS OF E-VOTING

The successful implementation of eVoting depends on many critical factors, which can be categorized in four dimensions. EVoting as part of e-Democracy is not only influenced by technology and regulations, but also by politics and civic communities [11, 17]. Figure 1 distinguishes the four dimensions of eVoting.

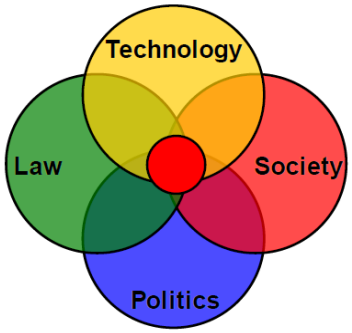

Figure 1. The four dimensions of eVoting (Krimmer & Schuster, 2008)

Politics: this dimension refers, inter alia, to the attitude of the Administration towards eVoting. The policy followed in the decision making process as well as the objective of the policy is very important. For the successful implementation of eVoting, the process must be based on transparency, broad participation and involvement of all stakeholders, so that there is as much political consensus as possible. Political consensus and technological support enhance citizens' confidence and motivate citizens to take part in such processes. Political consensus can be weakened by problems such as security and technology issues related to eVoting [18, 11, 17].
Law: refers to the existing legislation and how E-voting can be implemented within the current legal framework. It also concerns the changes that need to be made to ensure that eVoting is conducted smoothly, so that legal issues do not arise and the eVoting process complies with democratic principles [10, 18, 11, 17].

Technology: Undoubtedly, the appropriate technological infrastructure and the capabilities provided by information systems are key to the successful implementation of eVoting. Any technological weaknesses and technological problems pose a threat to the success of eVoting, as they are likely to discourage citizens from participating or may create obstacles during the voting process [18, 11, 17].

Society: the constraints commonly cited for E-Literacy are the digital divide and the resulting inequalities, mainly related to Internet access and technological illiteracy. This dimension, therefore, refers to the level of political participation and the degree of citizen involvement as well as the attitude of citizens towards new technologies and especially eVoting [18, 11, 17].

These four dimensions are not independent and completely distinct, but on the contrary, they are interrelated and interact with each other. Considering the aforementioned dimensions of E-voting, it should be emphasized that the design of the appropriate system environment to be used to conduct eVoting is a very important factor for its success. Otherwise, it will lose its credibility and therefore fail [10].

3.1 eVoting requirements

Certain requirements must be met in the design of the E-Voting system.
Security requirements: an electronic voting system according to [8] should be:

- Democrat: Only authorized voters are entitled to vote and no more than one. The system should distinguish between those who are eligible to vote and those who are not and exclude the latter. In addition, it should ensure that only one vote is counted.
- Accurate: It should ensure that in the final count no vote could be altered or deleted by an external or internal "enemy".
- Secret: No agent (either a voter or the conducting authority) should be able to link a vote to the voter, nor should the voter be able to prove that he/she voted in a particular way.
- Protected from coercion: No voter should be coerced by a third party about how to vote.
- Universally verifiable: Any outside observer can be convinced that the system is accurate and that the result of the vote reflects the true will of those who voted.
- Verifiable: Every voter at the individual level should be able to verify that their vote has been counted correctly.
- Durable: The system should be resilient to any error or malicious attack (e.g., DDoS attack).
- Easy to use: the system should be friendly to use by everyone, regardless of their knowledge and technological skills. In addition, it should not require specialized equipment for users to use it.
- Flexible: it should have the ability to conduct many different votes [8].

Legislative requirements: legislation should provide a framework of protection for the voter and ensure that the eVoting process complies with democratic principles, as provided by the country's Constitution, encourages citizen participation and ensures public scrutiny at each stage of the process [13, 16].Therefore, first, it must protect the voter from the leakage of his/her personal and third parties (i.e. used for purposes other than those for which the individual provided them) could misuse sensitive data, as this could have negative consequences for the individual or the data. The term "personal data" is used to define any information that refers to and describes an individual, such as full name, age, employment, physical characteristics, interests, financial situation, etc. The term "sensitive data" describes the personal data of an individual that refers to his or her love life, political, religious or philosophical beliefs, racial origin, trade union activities, health, criminal record and social welfare [13].

*Technical and operational requirements***:** in order to conduct an eVote, appropriate technical support must be available.

- Hardware requirements: The selection and maintenance of appropriate hardware is absolutely necessary. The hardware should be of good quality to ensure that there is no failure (unintentional or intentional) during the eVoting process.
- Software requirements: Equally important is the issue of the software to be used with a focus mainly on code transparency and cryptography. The code should be well structured, simple and understandable, so that it can be checked and its transparency

ensured, and it should also be easier to detect unwanted parts (e.g. Trojan horses, viruses, etc.). Encryption on the other hand is the most important tool for the integrity and confidentiality of votes as well as voter authentication.

- Interconnection requirements of computer systems: for the successful implementation of eVoting, a key requirement is that all computer systems involved in the process must be securely interconnected. The reason is that the greater the use of network technology, the greater the risks of security breaches in the process [16].

According to Beckert (2011) eVoting should safeguard democratic principles:

- Principle of universal suffrage: Every person has the right to vote and to be elected, provided he or she meets the legal requirements.
- The principle of equal voting: Each citizen is counted only one vote and all votes are equal. Each citizen therefore has an equal influence on the outcome of the vote.
- The principle of secrecy of the vote: This principle ensures that no one other than the voter knows how he or she voted.
- Principle of freedom to vote: This principle ensures that the process of electronic voting is conducted without the use of force, coercion, manipulation, pressure or any other attempt to influence. Voters should be free to form their opinion and free to express it through their vote.
- The principle of directness of the vote: This principle ensures that there is no interference in the time between the citizen casting his/her vote and the announcement of the result of the vote.
- Identification and Authentication: In order to ensure the principle of equality of voting, the system should have the ability to identify and authenticate the user to guarantee the uniqueness of the vote.
- Correctness of the result: It should be ensured that the vote count is accurate and that the result of the vote is correct [19].

3.2 Advantages and Risks of eVoting

The implementation of eVoting has many advantages. First, there is speed and accuracy in voting as well as in the process of counting the votes since the possibility of human error is eliminated. In addition, it is more user-friendly and in line with the modern needs of a society that is increasingly relying on new technologies. Another important advantage is that the risk of fraud in polling stations is minimized, both during voting and in the counting of votes, as there is no human intervention. It also enables participation by vulnerable groups, such as people with mobility problems and disabilities, and people who do not know the language of the country where the voting takes place as long as it has multi-language support. In addition, it allows economies of scale by reducing the number of polling stations and the costs of producing and distributing paper ballots. There is also an economic benefit for citizens, who do not have to travel from their homes to vote, which saves time. The most important advantage of eVoting is that it encourages greater citizen participation in public issues and therefore strengthens democratic processes and democratic institutions, ultimately strengthening democracy itself [13, 10].

The implementation of eVoting, however, has some risks. For citizens who are not familiar with technology, the eVoting process may be difficult or even incomprehensible to them and they may refrain from voting online. In addition, many citizens may not have the financial means to acquire the necessary equipment to enable them to participate. Furthermore, the violation of personal data and the confidentiality of the vote is a major issue, which may even lead to citizens abstaining from the eVoting process due to a lack of trust in the eVoting system. There is also the risk of manipulation of the vote by interference from within or from outside (hackers). In addition, we

should not ignore the high cost of purchasing and maintaining the electronic voting systems required, which can be a deterrent to the organization of eVoting by a public body. In addition, it should be noted that there is an absolute dependence on technology, which makes the process of eVoting vulnerable to various problems, such as the risk of problems with the electricity supply, or the risk of collapse of the system itself [10].

The new Legal Framework for the protection of Sensitive and Personal Data was implemented by the General Regulation of the European Union 2016/679 and the European Directive 2016/680 and was specified in the Greek territory by Law 4624/19. Personal Data is any information that can identify a natural or legal person in life (first name, surname, address of residence, e-mail address, telephone number, identity card, passport, VAT number, passport, etc.). Sensitive Personal Data is a sub-category of personal data that is particularly sensitive and relates to the fundamental rights and freedoms of the subject (racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, genetic and biometric data, health and sex life data, criminal record).

Organizations subject to the General Data Protection Regulation (Law 4624/2019) must conduct internal procedures to monitor the risk in relation to the personal data they manage and, based on this analysis, take appropriate organizational and technical measures to protect them. The controller of personal data should initially establish internal policies and implement measures that comply with data protection principles. In particular, it should: minimize the processing of personal data, provide adequate information to the data subject on how the data will be processed, including security standards, safeguards regarding the transfer of data, etc. Moreover, high security standards are in place from the beginning of the processing and documentation of the technical and organizational measures are required.

In order to achieve fair and secure eVoting, local government must provide citizens with guarantees of transparency and protection of procedures. Confidentiality, ethical, legal and professional obligations to protect information, as well as secrecy as to how the information provided in eVoting is collected and processed, are crucial to the credibility and trust of citizens in eVoting.

4. RESEARCH METHODOLOGY

A specific procedure for conducting a research was followed. First, the research problem was identified, which was the implementation of Electronic Voting in the Municipality of Thessaloniki using a questionnaire. Then the appropriate literature was searched for the conduct of the research. The questionnaire, which was designed to meet the requirements of this research, was created, through Google's on line forms. The survey was entirely online and the principles of online research were followed as outlined in Cohen et al (2007) [20]. The questionnaire was short and simple in appearance and format, so that it was easy to download to any device and respondents could complete it without it being tedious. In addition, the questions chosen were closed-ended, as it is more difficult for the respondent to have to type the answer while his/her eyes are focused on the screen, especially for someone who has little or no familiarity with this. In addition, the introductory note was short (no more than a page on the screen) and the instructions it contained were concise and clear, rather than a long list of instructions, which would tire and confuse the respondent.

For the needs of this research, the non-probability technique was chosen for sample selection, namely convenience (or opportunistic) sampling. The reason for this choice is that it is easy, convenient and has no cost. The questionnaire was shared in social networking groups

(Facebook). The online questionnaire was created through Google's online Forms and was divided into four sections. The first section is the introductory note, which briefly states the reasons and purpose of the research. In addition, the introductory note provided brief instructions for completing the questionnaire and an explanation of the term "eVoting". In the second section, respondents were asked to answer four questions on some demographic data that were deemed necessary for the needs of our research (gender, age, education, and occupation-qualification). In the third section, the questions were grouped into three groups, each consisting of three questions: a) Familiarity with the Internet, b) e-Government and c) e-Services.

Finally, the fourth section, which is the most important for the purpose of our research, was divided into four groups (legal issues, social issues, technology, security) after taking into account the four dimensions of eVoting (policy, legislation, technology, society). In this section, the respondents were asked to choose between some predefined options regarding the "Importance of eVoting Success Factors". Respondents were required to answer all the questions in the questionnaire, as there was no option to skip a question. The questions of the questionnaire were all closed questions, namely: dichotomous questions, questions of a graduated scale, in which the Likert scale with 5 grades was used, where 1 means "strongly disagree" and 5 means "strongly agree", as well as multiple-choice questions.

Another issue that was taken into account in the design and conduct of the research was the issue of ethics. According to Creswell (2012) and Bryman (2017) there are some ethical issues in data collection that should not be ignored. Firstly, all participants should be aware of the purpose of the research. In addition, participation in the research should be voluntary, participants should be informed of their rights, there should be mutual agreement and no pressure of any kind should be put on the participants. In addition, the anonymity and protection of personal data provided during participation in the research should be guaranteed and participants should retain the right to withdraw at any point in the research. As well as, the content of the questionnaire should not be offensive or harmful in any way to the individual [21, 22]. In this research, all of the above principles were adhered to, as the introductory note provided information to all potential participants about the purpose of the research and their rights.

Initially, the questionnaire, after its design and construction, was distributed via email to a small number of people (15 people), essentially acting as a pilot questionnaire. Then after the relevant testing, the questionnaire was distributed to the wider population of interest. Thus, the questionnaire was "uploaded" to various social networking groups (Facebook), which are relevant to Thessaloniki Municipality issues and consist of members of different ages, education and professions, and the citizens/residents of Thessaloniki were asked to complete it. The sharing of the questionnaire started on 25/4/2023 and ended on 10/7/2023. 582 fully completed questionnaires were collected, which is a satisfactory number for this type of survey. After data collection, the data was processed using the SPSS program and then the results were analyzed.

5. FINDINGS

The Cronbach's reliability coefficient α was found to be .860, while the α coefficients for the dimensions "Familiarity with the Internet" and "E-services" in which the Likert scale included in the questionnaire of the present study was used are .808 and 0.798 respectively. The table below shows the demographic data of the sample.

Table 1. Demographic characteristics of the sample

Gender	Men: 29.4% Women: 70.6%
Age group	18-29: 16.5% 30-39: 16.0% 40-49: 44.8% 50-59: 19.1% > 60:3. 6%
Highest level of education	Secondary school: 16.5% Bachelor: 59.3% Master/PhD degree: 24.2%
Occupation	Private sector: 48.5% Public sector: 32% Students: 8.8% Unemployment: 7.7% Retired: 3%

The second section of the questionnaire "Familiarity with the Internet/Electronic Governance/Electronic Services" was divided into 3 corresponding dimensions. Each dimension included questions related to its title. The aim of this section is to gather information about the subjects' familiarity with the internet, their experience, habits and opinion about the municipality's website as well as the electronic services of the Municipality. All questions in this section are graded and a 5-point Likert scale was used, where 1 means "strongly disagree" and 5 means "strongly agree". All frequency estimates for this section of the questionnaire are presented below (Table 2).

Table 2. Familiarization of the citizens with the Internet, their experience, habits and opinion about the Municipality's website

Dimension / Questions	**1**	**2**	**3**	**4**	**5**	**M/Sd**
Dimension "Familiarity with the Internet"						
Question A1: Do I have the necessary knowledge to surf the Internet with at least one of the following electronic devices: PC, laptop, tablet, mobile phone?	0	0	11.5	10.8	**87.6**	4.9/0.4
Question A2: Am I familiar with using the Internet (e.g. searching for information, entertainment, etc.)?	0	0	0.5	13.9	**85.6**	4.9/0.4
Question A3: Do I frequently transact online (e.g. shopping online, using ebanking, etc.)?	0	0	12.4	21.6	**66**	4.5/0.7
Dimension "eGovernment"						
Question A4: I find the website of the Municipality of Thessaloniki easy to use (navigation).	3.1	5.2	**36.1**	**30.9**	24.7	3.7/1
Question A5: I frequently visit the website of the Municipality of Thessaloniki.	24.2	18.6	**38.1**	13.9	5.2	2.6/1.2
Question A6: I feel safe when using the website of the Municipality of Thessaloniki.	5.2	5.7	**34**	**34.5**	**20.6**	3.6/1
Dimension "e-Services"						
Question A7: I use the electronic services of the Municipality of Thessaloniki (e.g. for electronic submission of applications for certificates to municipalities).	7.2	13.4	**28.4**	**27.3**	23.7	3.5/1.2
Question A8: I believe that the electronic	4.1	6.7	23.2	**39.2**	26.8	2.6/1.2

services provided by the Municipality of Thessaloniki contribute to the immediate processing of citizens' affairs towards the public.						
Question A9: The electronic services of the Municipality of Thessaloniki offer savings in terms of service time.	3.1	2.1	12.4	29.9	**52.6**	4.3/1

Chi-Square (x2) tests were conducted to investigate correlations between demographic characteristics and responses to questions regarding the importance of eVoting success factors with a 95% significance level. The results are as follows:

- Most male participants do not believe that having easy access to the City's website (Technology) is an important success factor for eVoting; in contrast, most female participants believe that it is an important success factor.
- While the opinions of male survey participants are divided, most women clearly believe that ensuring voter identification is not an important success factor for eVoting.
- Respondents aged 18-59 are more familiar with using the internet than respondents aged 60 and over.
- Participants aged 40 years and over had a higher average traffic to the website of the Municipality of Thessaloniki than participants aged 18-39 years. This means that older participants visit the Municipality of Thessaloniki's website more often than younger participants.
- The average number of participants is higher in the highest level of education to which they belong and correspondingly lower in the lowest level of education, which means that participants who hold a Master's/Doctoral degree make more frequent use of the online services of the Municipality of Thessaloniki, compared to participants who belong to lower educational levels.

The next section "Importance of eVoting success factors" of the questionnaire was based on the four (4) dimensions of eVoting. The purpose of this section is to examine which factors the citizens/residents of the Municipality of Thessaloniki consider most important for the successful implementation of eVoting by the Municipality. For this reason, it was divided into four sub-dimensions. Each dimension includes five success factors for eVoting, of which respondents must select the three most important in their opinion. The results are presented below where for each dimension the most important success factors are given in descending order (Table 3).

Table 4. Responses on the four dimensions of successful implementation of eVoting

Dimension / Critical success factors	**%**
Dimension "Law"	
1. "I believe that the freedom to vote (non-coercion) should be guaranteed".	**67**
2. "I believe that the procedure should follow the European legal-regulatory framework.	**64.4**
3. 'I believe that the principle of equality of votes must be guaranteed'.	59.8
4. "I believe that public scrutiny must be ensured at every stage of the process".	54.1
5. "I believe that the principle of majority voting must be ensured".	38.7
Dimension "Society"	
1. "I believe that transparency is necessary for the public life of the municipality when making decisions of general interest".	**73.7**
2. "I believe that the participation of people with special problems (e.g. impaired vision) should be ensured".	**68**
3. "I believe that municipal authorities should ensure that citizens can participate in making decisions of general interest".	58.8

4. "I believe that everyone living in the municipality should have the right to participate in eVoting, not just those who are eligible to vote in municipal elections".	47.4
5. "I believe that municipal authorities in the municipality should encourage popular participation in local affairs."	38.7
Dimension "Technology"	
1. "I believe that the voting process should be easy (no special qualifications required)."	**80.4**
2. "I believe that the City's website should be easy to access."	**60.3**
3. "I believe that there should be information on how to properly perform the process".	53.6
4. "I believe that the voting process should be short in duration (completed in a single action)".	50.5
5. "I believe that there should be information to successfully complete the process".	44.8
Dimension "Security"	
1. "I believe that the confidentiality of the vote must be guaranteed."	**77.3**
2. "I believe that the correctness of the results must be ensured".	**69.6**
3. "I believe that it should be ensured that the data I have filled in on the City's website is used only for the purpose for which it was submitted".	61.9
4. "I believe that the system must be resilient to withstand external threats and attacks e.g. denial of service (DDoS attacks)".	45.9
5. "I believe that voter identification must be ensured".	38.1

6. CONCLUSIONS

A number of 582 citizens/residents of Thessaloniki of different gender, age group, education and professional status participated in the survey, in order to investigate the perception and attitude of citizens regarding the implementation of eVoting in local government. Specifically, it was investigated which factors are considered by citizens as the most important for the successful implementation of the E-voting system. At the same time, the degree of their familiarity with the internet was investigated and questions were asked about eGovernment and eServices of the Municipality of Thessaloniki.

The results of the survey found that the majority of citizens (especially those under 60) are very familiar with the internet and use it frequently to carry out various transactions. To the questions about the Municipality's website, which were asked as part of the e-government survey, the answers were neutral regarding the ease of navigation on the Municipality's website and the frequency of visiting it. When asked whether they felt safe when navigating the Municipality's website, they responded positively. This indicates that the reason why citizens do not make frequent use of the Municipality's webpage is not that they do not feel safe, but other reasons that need further investigation. In the questions about the Municipality's e-services, it is noteworthy that although the majority of citizens believe that the e-services provided by the Municipality of Thessaloniki contribute to the direct handling of the citizen's affairs towards the public authorities. as well as that they offer savings in service time, the answer to the question whether they use the electronic services of the Municipality was neutral, which indicates that the Municipality, in order to upgrade its services to citizens, should investigate the reasons why this is the case.

From the results concerning the most important factors for the success of E-voting, it was found that for the dimension "Legal Issues", citizens believe that the freedom (non-coercion) of voting should be ensured, that the European legal - regulatory framework should be followed and finally that equality of voting should be ensured. For the "Social Issues" dimension, citizens believe that it is very important to ensure transparency in the decision-making of general interest by the municipality and the full participation of all citizens, including those with special problems. For the "Technology" dimension, citizens believe that it is very important that the voting process is easy - no special qualifications required, that the Municipality's website is easily accessible and

that there should be continuous information on the correct execution of the process. For the "Security" dimension, citizens attach particular importance to the confidentiality of the vote, the correctness of the voting results and the protection of their personal data.

The results of our exploratory hypotheses show that women believe to a greater extent than men that it should be easy to access the municipality's website, while men, on the contrary, believe to a greater extent than women that voter identification should be ensured. For the hypothesis that the degree of familiarity with the internet is influenced by age, as expected it appeared that the participants under 60 years old in the survey are more familiar, which should be taken into account by the Municipality to ensure that this group also participates in the eVoting system through some educational programs organized by the Municipality for the elderly. Also, younger age groups (18-39) are less likely to visit the Municipality's website than older ones. Finally, it was found that citizens belonging to the highest educational level make more use of the Municipality's online services. In this case too, the Municipality can organize educational programmes to educate the digitally illiterate.

In conclusion, the results of this study are quite useful and could be used by stakeholders to improve the quality of their services to citizens. Citizen participation in policy making at national and local levels is equally important as it strengthens democratic institutions and processes, thus promoting prosperity, cohesion and unity in society. The eVoting system, if all the necessary measures are taken and all the necessary conditions for its proper implementation are met, is an important and useful tool, which can promote e-Democracy and consequently democracy in general.

At this point, it is appropriate to mention some limitations of the research conducted in the context of completing this thesis. First, as is readily apparent, the sample of 582 responses collected helps to form a picture of the issues at stake, and to safely draw generalizable conclusions. In addition, the use of an electronic questionnaire is likely to exclude some groups of citizens who either do not have the knowledge or do not have access to the internet. It can thus be seen that some sub-groups were not sufficiently represented in the survey sample. Finally, the choice of convenience sampling is unlikely to give completely generalizable results although it does provide an initial understanding of the survey's scope. These limitations, however, are mainly the result of the limited time available to us.

The results of the survey showed that the majority of participants are very familiar with the internet and use the internet frequently for various reasons (transactions, entertainment, etc.). However, it seems that the majority answered neutrally to the questions about the frequency of visiting the website of the Municipality of Thessaloniki and the use of its online services. Nevertheless, the majority of respondents are positive about the provision of e-services by the Municipality, considering that e-services contribute to a better and faster service for citizens. Moreover, the most critical factors that seem to influence the success of the implementation of eVoting are ensuring freedom of voting, ensuring transparency in the decision-making process, the ease of the eVoting process and ensuring the confidentiality of the vote. In addition, it was found that some variation in the importance of factors based on gender is possible. Furthermore, it was found that familiarity with the Internet and the frequency of visiting the Municipality's website is influenced by the educational level to which one of the participants in the research process belongs.

These results are useful and can be used by the Municipality of Thessaloniki in order to improve the services provided to citizens and to strengthen democratic institutions, increasing the participation of citizens in policymaking and decision making, through the proper

implementation of the eVoting system. The Municipality should focus on informing citizens about the electronic services provided, in order to increase their use. In addition, for the successful implementation of eVoting, it should take into account its four dimensions (legal, political, social and technological) as well as the security issues that arise, so that citizens feel safe in using it and proper results are obtained. In addition, training programmes should be organized for those who do not have the necessary digital skills, either because of their age or their level of education. Finally, the municipality should ensure that the procedures required for eVoting are easy to understand for all participants and that the relevant European legislation is respected.

The study's constraints encompass, firstly, the sample size, which may be insufficient for extrapolating the findings to a wider population. Furthermore, conducting interviews with key individuals in local administrations could have enhanced the coverage of the paper's primary objectives.

The conclusions drawn from this research could be exploited by other Municipalities, which would like to adopt the system of E-voting as a means of encouraging and supporting citizens to increase their participation in the political events of their region. It is clear, however, that the above conclusions cannot be safely generalized to the wider population, because some subgroups of the population were not adequately represented in the survey sample and, in addition, the survey was limited to the boundaries of a single municipality. The issue of the implementation of eVoting in local government is, however, very important as it can be a useful tool for the improvement of citizens' lives and the proper functioning of the administration. For this reason, it is proposed to conduct further researches that will examine this subject in more municipalities, in larger samples of the population and with different methods of collecting material.

REFERENCES

[1] Apostolakis I, Loukis E, Halaris I, (2008*) Electronic public administration. Organization, technology and applications*, Society and Informatics Series, Papazisis Publications, Athens, Greece.

[2] Consultation Guide for OTAs, (2020) *Methodology and Techniques*, EETA. Retrieved 6/3/2023 from: https://www.eetaa.gr/odhgoi/22102020_odhgos_diavoulefshs_gia_OTA.pdf

[3] Tejedo-Romero, F., Ferraz Esteves Araujo, J.F, Tejada, A., Ramírez, Y., (2022) *E-government mechanisms to enhance the participation of citizens and society: Exploratory analysis through the dimension of municipalities*, Technology in Society, Volume 70, August 2022, 101978. Retrieved at 6/2/2023 from: Technology in Society 70 (2022) 101978

[4] Charalambidis, I., Lachana, Z., Theocharopoulou, H., Vogiatzis, N., (a), (2022) *Digital Governance in Local Government*, Institute of Local Government. Retrieved on 14/1/2023 from: Study_ITA_Digital_Government_in_TA_22.03.22-1.pdf (ita.org.gr)

[5] Digital Transformation Paper 2020-2025, (2021) *Government Gazette 2894/B/5-7-2021*, Ministry of Digital Governance. Retrieved on 20/1/2023 from: https://digitalstrategy.gov.gr/

[6] Charalambidis, I., Lahanas, Z., Theocharopoulou, H., Diakogiannis, I., (b), (2022) *Digital Governance in Local Government, Study of the Websites of the Municipalities of Greece*, Observatory of Regional Policies, AMKE. Retrieved on 6/3/2023 from: https://www.eliamep.gr/wpcontent/uploads/2022/11/Psifiaki_Diakyvernisi_OTA_FINAL.pdf

[7] Spirakis, G., Spiraki, C., Nikolopoulos, K., (2010) *The impact of electronic government on democracy: E-democracy through e-participation*. Retrieved at 15/2/2023 from: https://www.researchgate.net/publication/220082835_The_impact_of_electronic_government_on_democracy_E-democracy_through_e-participation

[8] Triantafyllou, V., (2015), *Democracy in the Information Society*, [Chapter], in Paraskevas, M., Asimakopoulos, G., & Triantafyllou, V., (2015), *Information Society* [Undergraduate textbook]. Kallipos, Open Academic Publications. Retrieved at 10/3/2023 from: https://www.openbook.gr/koinwnia-tis-pliroforias/

[9] Aikens, G. S., (1996) *A History of Minnesota Electronic Democracy 1994*, First Monday, Volume 1, Number 5 - 4 November 1996. Retrieved at 16/2/2023 from: https://firstmonday.org/ojs/index.php/fm/article/download/494/415
[10] International Institute for Democracy and Electoral Assistance (International IDEA), (2011) *Introducing Electronic Voting: Essential Considerations*, Policy Paper December 2011, International IDEA publications, Stockholm, Sweden. Retrieved at 16/3/2023 from: https://www.idea.int/publications/catalogue/introducing-electronic-voting-essential-considerations
[11] Krimmer, R., & Schuster, R., (2008) August 6th-9th, *The E-Voting Readiness Index*, 3rd International Conference on Electronic Voting 2008. Retrieved at 16/3/2023 from: https://www.researchgate.net/publication/220764765_The_E-Voting_Readiness_Index
[12] Ministry of Digital Governance, (2021) *(Government Gazette B 5244/12-11-2021), Electronic Ballot "ZEUS"* Retrieved at 3/3/2023 from: https://www.et.gr/api/DownloadFeksApi/?fek_pdf=20210205244
[13] Gakis, K., (2016) *KALIKRATIS e-Government in Local Government*, EETAA Publications, Athens.
[14] Central Union of Municipalities of Greece (KEDE), (2021) *Best Practices of Municipalities, 2021'Electronic Voting – Consultation at neibourhood level by the Municipality of Trikala*, LOCALIT. Retrieved at 8/3/2023 from: https://kede.gr/ilektroniki-psifoforia-diavoulefsi-se-epipedo-geitonias-apo-ton-dimo-trikkaion/
[15] National Documentation Centre (EKT), (2003) *Electronic Voting for the Citizens΄Europe*, Digital Content. Retrieved at 5/3/2023 from: https://www.ekt.gr/el/news/9645
[16] Katsikas S., Mitrou L., (2004) *Working Group F-4, Electronic Voting Systems*, ebusinessforum, July 2004, Athens, Greece.
[17] Prosser, A., & Krimmer, R., (2016) *The Dimensions of Electronic Voting*, GI-Edition, 21-28. Retrieved at 15/3/2023 from: http://www.academia.edu/download/11554287/proceeding.gi.47-3.pdf
[18] Trechsel A., H., Kucherenko, V., Silva, F., Gasser, U., (2016) *Potential and Challenges of E-Participation in the European Union*, European Council. Retrieved at 20/3/2023 from: https://www.europarl.europa.eu/RegData/etudes/STUD/2016/556949/IPOL_STU(2016)556949_EN.pdf
[19] Beckert, B., Lindner, R., Goos, K., Hennen, L., Aichholzer, G., Strauβ, S., (2011) *E-public, e-participation and eVoting in Europe - prospects and challenges*, Final Report, European Parliament, Science and Technology Options Assessment, S T O A. Retrieved at 16/3 2023 from: https://op.europa.eu/en/publication-detail/-/publication/dcb6b075-798b-4ef5-9c21-1711091ab1f6
[20] Cohen, L., Manion, L., Morrison, K., (2007) *Research Methods in Education*, Routledge Taylor & Francis e-Library. Retrieved at 12/4/2023 from: https://gtu.ge/Agro-Lib/RESEARCH%20METHOD%20COHEN%20ok.pdf
[21] Creswell, J. W., (2012) *Planning, Conducting, and Evaluating Quantitative and Qualitative Research*, 4th Edition, Pearson Education Inc, Boston.
[22] Bryman, A., (2017) *Social Research Methods*, Gutenberg, Athens.