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Additional Information

Critical factors in the institutionalization of e-participation in e-government in Europe: Technology or leadership?

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A B S T R A C T

This article examines citizen participation as a key factor for the sustainable development of democracy and public institutions. The purpose of this study is to offer a theoretical and empirical description of the status of civic engagement in e-participation in Europe. The article examines the necessary yet challenging goal of engaging citizens so that they participate in and improve our advanced society in a sustainable manner. Two research methods are used: a critical literature review and quantitative data analysis. The findings contribute to the development of civic engagement in public decision making.

1. Introduction

The ongoing socio-technical transition driven by digital innovations and ICT technology is becoming one of the major transitions of human development (R.B. Scholz, 2001), as influential as the discovery of fire, the development of civilization, and the Industrial Revolution (Takács-Sánta, 2004). Digitalization is changing society by increasing interoperability and connectivity (Linkov, et al. 2018) among public and private organizations and creating new patterns of interactions and interdependencies between technology and citizens, organizations and citizens, and technology and organizations (Barbosa, et al. 2019). Accordingly, it is necessary to develop a field of research focusing on sustainable digital societies and environments (R.B. Scholz, 2001). Digital technology is the catalyst for an essential social transition and economic growth and is linked to coordinated changes on the socio-cultural and material-biophysical levels (R.B. Scholz, 2001).

The establishment of partnerships with different stakeholders and the subsequent impact analysis are essential to identify the best governance strategies in the ongoing socio-technical transition motivated by digital technologies. At the organizational level, ideas and sustainable practices exist, but the long development times, market uncertainty, social gains, and the need for change at different levels—organization, technology, infrastructure, and social and institutional context—create barriers in the transition to a new socio-technical system (Kemp, Schot, & Hoogma, 1998). Therefore, the creation of a e-governance pathway in the ongoing socio-technical transition (Köhler, et al., 2019) guarantees that the potential of digitalization is useful for addressing today's

political, economic, and social challenges. In these types of technological transitions, both the technology and the system in which it exists have to change through a joint process of mutual adaptation (Kemp, et al. 1998) because technological innovation directly influences the organization of society (Caruso, 2018).

The technology and the innovations around citizen participation are the starting point of this research, which is based on the multi-level perspective (MLP) analytical method. This multi-dimensional approach makes it possible to follow innovation trajectories (Geels, 2018) in the current democratic model in Europe.

In this context, the study aims at identifying the current path of ICT influence in the institutionalization of citizen participation around Europe within the “society in the making” Callon, 1987 as a key process to understand institutional structures of socio-technical systems (Markard et al., 2016). This research focuses on the fourth phase of the innovation trajectory, seeking to encourage and institutionalize e-participation policy as part of a strong e-government program in Europe. The aim is to build a strong and advanced institutional structure to exploit all the benefits of ICTs. The term “e-participation” can be defined as technology-mediated interaction between the civil society sphere and the formal politics sphere or administration sphere with the purpose of increasing citizen participation in public decision-making processes (Sæbø et al., 2008) and strengthening the mechanisms of representative democracy (Macintosh, 2004). The assumption here is that the concept of e-participation has reached maturity as a well-developed tool and policy in Europe. There is a need to investigate the path to institutionalize it and to engage citizens to use it. Thus, the

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main research questions are expressed as follows:

- Which factors influence the usage of e-participation by citizens and governments across Europe?
- What are the most likely pathways for implementing e-participation in Europe to improve the role of citizens in current public governance aimed at a democratic transition toward sustainability?

The objective of this research is to analyze the factors affecting the potential to speed up citizens' e-participation and to explore the causality among these factors. This study also analyzes how the interaction among ICT readiness, usage, and governance institutions influences e-participation and how the magnitude of this effect differs for countries with different levels of democracy across Europe. The significance of these analyses is that they highlight the variables that directly affect e-participation, revealing a quantitative relationship among them. In the next section, the literature on technical and institutional variables that affect citizen e-participation is reviewed. The method and models used for the quantitative analysis of these variables and the causality among them are then described. In the conclusions, the results of the quantitative analysis are presented.

2. Theoretical framework and hypothesis development

2.1. Participative, imperative, and democratic governance values and e-participation

The use of ICT has direct effects on the policymaking process because it extends participatory opportunities to average citizens, empowering them (Jho, 2015). A number of interlaced transitions materialized as a multilevel, multiphase, and cross-scale process can be identified (Gell-Mann, 2010) to generate a sustainable transformation of the existing system: (1) a demographic transition, (2) a technological transition, (3) a social transition, (4) an institutional transition, (5) an informational transition, and (6) an ideological transition (Olsson et al., 2014). Therefore, analyzing the socio-technical change encouraged by ICT applied to e-participation requires analysis of the complexity of the process in an environment with a large number of connected parts or factors that create a network of information and procedures (Olsson et al., 2014). In view of the above, technological factors and political institutions have interactive effects (Pérez-Morote et al., 2020). When there are digital participatory innovations, individual citizen engagement in the policymaking process increases (Jho, 2015). Developing a partner relationship between government and society is one of the challenges of the current Western political model to advance the values of democratic governance, namely effectiveness, legitimacy, and social justice (Fung A., 2015) using the potential of ICT. The weaknesses of representative democracy (Dunleavy, 2006) and the current socio-technical regime (Köhler, 2019) are changing the model of democracy. A new government-citizen relationship can be created by emphasizing the efficiency of function-oriented technologies, and e-governance can offer an alternative to the current representative democracy and hierarchical governments (Jho, W., and Song, K. J., 2015) (Perri, 2004) (Chadwick, 2003). In this context, e-participation is an emerging research area, which involves the transformation of the democratic model and consultative processes, mediated by information and communication technologies (ICTs) (Sanford, C., and Rose, J., 2007). Civil participation in political decision making can be a potent means to achieve key democratic values such as legitimacy and effectiveness in governance (Bennett, 2009). From this perspective, public actors view citizen participation as a potential solution to democratic challenges (Fung, 2015, Thomas, 2013, Boulianne, 2009).

2.1.1. Representative democracy

Representative democracy is an efficient procedure in which elites compete with each other to reach power through the vote of the masses.

The electoral mechanism combines aristocratic and democratic elements, allowing the selection of the best candidates for legislative and executive positions (Schumpeter, 1976) and allowing voters to control their management by voting as a way to force them to meet popular demands (Motos, 2018). An improved political process based on ICT is expected to solve the problems inherent in representative democracy (Jho, 2015). The problem of political representation is highly complex. It is expected that ICT will expand the political participation or mobilize new participation from citizens who are not used to participating in political matters (Fraser et al., 2008).

The e-participation model is based on the model of participation designed by (Arnstein, 1969), describing the stage of citizen influence over policy based on direct democracy. It is unrelated to ICT but has great potential for the analysis of e-participation cases (Grönlund, 2009). The role of citizen participation is defined differently in a range of theories of democracy. The existence of many types of democracies explains the existence of different democratic models (Sartori, 1988; Dahl, 1993; Habermas, 1994). For both reasons, the analysis in this paper is neutral toward different democratic models due to the e-participation projects currently taking place within representative democracy. This model offers the basis of the analysis as the "provisioning" regime (Ropke, 2016), which is questioned due to a deficit of legitimacy in the governance institutions. Given the need for a high level of democracy to institutionalize e-participation, the following hypothesis is proposed:

Hypothesis 1: A high level of democracy in a country is positively correlated with the level of e-participation.

2.1.2. Legitimacy

In a democratic society, citizens have an intrinsic right to participate in the creation and execution of public policy (Sanford et al., 2007), which is the cornerstone of democracy (Roberts, 2014). In other words, citizens have the right to decide what is important to them and how they can best achieve their objectives (Bingham, 2005). Citizen discontent regarding institutions and actors in representative democracies is increasing all over the Western world, calling for an expansion of direct democratic options (Geißel et al., 2019) to improve or to change the system.

The role of citizens in the transition to a more sustainable socio-economic and democratic system has been broadly recognized (Tomor et al., 2019; Aichholzer et al., 2016; J. R. Gil-Garcia et al., 2015; Bolívar et al., 2016; H. Chourabi et al., 2012). Involving citizens in governance processes through the collective use of ICT instruments has multiple benefits, with the knowledge acquired by the governance actors being the most crucial added value (Tomor et al., 2019; Pelzer et al., 2016). This fosters sustainable process management, increasing the effectiveness of public policies (Paskaleva, 2013). Nevertheless, a deficit of legitimacy in representative democracies creates opportunities for legitimacy-enhancing forms of citizen participation (Fung A., 2015). Thus, developed countries can take advantage of the digital transition (R.B. Scholz, 2001) to improve direct citizen participation as the core of democracy, increasing citizens' support of and trust in institutions and public management. The strongest driver of participatory innovation has been the pursuit of increasing legitimacy by introducing forms of direct citizen participation in current policymaking processes (Archon, 2015). The following hypothesis is proposed:

Hypothesis 2: A high level of legitimacy in a country is positively correlated with the level of e-participation.

2.1.3. Government effectiveness

A third value that participatory innovation pursues is effective and efficient governance as a way to improve the efficacy of regulation, improve the provision of public goods and services, and straddle the boundaries between governance and citizens (Archon, 2015). Citizen

engagement in the decision-making process encourages more democratic and legitimated public institutions (Masters, 2004; Mossberger et al., 2017; Bennett, 2009). Also, it is a powerful intelligence-gathering tool for the use of local knowledge and expertise to define political priorities, allocate resources more efficiently in public service delivery, and enhance transparency in the governance process (Tomor et al., 2019; W. H. Voorberg et al., 2015; Y. Charalabidis et al., 2012; Rossel et al., 2011).

The literature establishes that use of ICT does not automatically foster more e-participation, nor does it grant good governance (Bertot et al., 2010). Discussions of the subject of developing e-participation are determined not only by the technical infrastructure, but also by aspects of governance. Contemporary theorizing suggests that developing an e-democracy requires educated and skilled citizens (Lidén, 2012). This means that openness to electronic tools increases with education level (Kapsa, *Citizen e-Participation as an Important Factor for Sustainable Development*, 2019). Focusing on political organization, it requires economic resources (Andersen et al., 2007) and well-developed institutions. Jho et al. (2015) report that nations with low levels of democracy could scarcely accomplish high levels of e-participation even if there are high levels of ICT. Given the governmental organizational context and the need for a high level of government effectiveness to institutionalize e-participation, the following hypothesis is proposed:

Hypothesis 3: Solid democracy based on a high level of government effectiveness in a country is positively correlated with the level of e-participation.

2.2. Acceptance and use of technology: readiness and usage of infrastructure

2.2.1. Technological infrastructure and e-participation

Electronic government is described as the use of the Internet and related information technologies (ITs) to improve the efficiency, accessibility, effectiveness, accountability, and transparency of public services (Ilfinedo, 2012). Researchers report that the more technologically advanced a country is, the more likely it is for the country to advance its e-government initiatives, projects, and agenda (Azad et al., 2010) (Moon et al., 2005) (Singh, 2007). Similarly, Jho et al. (2015) confirm that the development of high technology in a country is a mechanism for expanding the range and level of e-participation. Technological innovations have an essential role in accelerating development and growth in any country (Ilfinedo, 2012). Hence, countries with a more enhanced capability for using ICT innovation tend to have higher ratings on indices used to measure achievement of digital governance technology and on indices used to measure the capability to promote that technology (Ilfinedo, 2012; Norris 2001; Torres et al., 2005; West, 2007; Lau et al., 2018; Schuppan, 2009). Current research on e-participation involves two theses: the mobilization thesis and the reinforcement thesis (Jho, 2015). The role of ICT in e-participation is debatable because it may strengthen the existing pattern in political participation or create new types of civic participation (Glyptis et al., 2020). Many researchers criticize the view that ICT has the potential to improve citizen participation (Jho et al., 2015; Bimber, 2003; Salter, 2004; Lunat, 2008). On the other hand, other researchers are positioned in the mobilization thesis, stating that ICT has the power to increase participation by citizens who are not represented in the current political system (Jho et al., 2015; Coleman et al. 2008). Given the importance of developing the ICT infrastructure and the need to use it in the government's vision of digital governance, the following hypotheses are proposed:

Hypothesis 4: The greater the level of technological infrastructure in a country is, the higher the e-participation maturity in that country will be.

Hypothesis 5: A high level of government usage of ICT in a country is positively correlated with the level of e-participation.

2.2.2. Citizen empowerment through technology and e-participation

The UNITED Nations e-Government Survey report (United Nations, 2014) includes e-participation as one of e-government's core components and describes a three-level e-participation model: e-information, e-consultation, and e-decision making, from passive to active engagement with citizens (Naranjo-Zolotov, 2018; Kassen, 2017). This model requires the active engagement and involvement of citizens for institutionalization, which means that citizens should be highly motivated to contribute to political activities such as deliberation, decision making, and voting using ICTs (Naranjo-Zolotov, 2018). Schaupp et al. (2010) found that adoption of e-participation is very challenging if trust in government is lost, at the same level as other important barriers such as a lack of skills, limited access to infrastructures and an Internet connection, and other political factors (Oni et al., 2017) such as a lack of political awareness, political efficacy, and political culture. Naranjo-Zolotov (2018) incorporated the unified theory of acceptance and use of technology (UTAUT) and the citizen empowerment theory in their research model, revealing that performance expectancy is the strongest predictor of intention to use e-participation. The findings of Naranjo-Zolotov (2018) imply that when citizens perceive that their productivity intensifies by participating in e-participation, they are more enthusiastic to adopt it. Furthermore, facilitating conditions also have a significant influence on intention to use, indicating that if citizens have the ICT resources, they will use e-participation (Rodrigues et al., 2016; Naranjo-Zolotov, 2018). Competence was also analyzed, indicating that the more skills users have, the greater their intentions to use e-participation will be. In another study (Abu-Shanab, E., & Haddad, E., 2015), empowerment was evaluated as the first-order construct in the context of open government, meaning that if citizens perceive a possibility of empowerment with e-participation, it will positively affect their intention to use e-participation (Naranjo-Zolotov, 2018). Given that performance expectancy, facilitating conditions, and skills are strong drivers to use e-participation, the following hypotheses are proposed:

Hypothesis 6: A high level of individual usage of ICT in a country is positively correlated with the level of e-participation.

Hypothesis 7: A high level of digital skills of citizens is positively correlated with the level of e-participation.

3. Research method

3.1. Theoretical model

This study presents a research model of e-participation by analyzing the main drivers identified in the literature review. The variables/drivers are grouped at the macro, *meso*, and micro levels based on the analytical strategy of the multi-level perspective (MLP) as a multi-dimensional approach to follow innovation trajectories. To quantify the drivers/variables, the Networked Readiness Index (NRI) 2016, the Economist Index of Democracy 2016, and the Fragile Index State 2016 were used.

First, the NRI is the most influential and complete evaluation of how ICT impacts developing competitiveness and the well-being of nations, measuring countries' propensity to exploit the opportunities offered by ICT. The analysis in this study explores how these drivers impact e-participation. The NRI 2016 covers 129 economies, accounting for 98.1% of world GDP, shedding light on two major questions: (1) What is the level of ICT access and use in a country? (2) What is the impact of digital technologies once there is access? Both questions are in line with our research questions. Therefore, this index was used as a critical data source for measuring the impact of those drivers on e-participation. Also, the NRI aggregates data from 53 indicators from international organizations grouped within four subindices: environment, readiness, usage, and impact.

The dependent variable of this study is e-participation, defined as "ICT supported participation in processes involved in government and

governance” (OECD, 2003). We used data from the NRI 2016, whose source is the e-participation index developed by the United Nations. According to the UN (2016), the e-participation Index measures the quality and effectiveness of information and services offered by a country for the purpose of engaging citizens in public policymaking through the use of e-government programs. Within this index, countries are benchmarked in three areas: e-information, e-consultation, and e-decision making (World Economic Forum, 2016). Thus, the index indicates both the capacity and the willingness of a country to encourage citizens by promoting deliberative, participatory decision making in public policy and the reach of its inclusive governance program (World Economic Forum, 2016). The UN data is considered a legitimate index because it enumerates the levels of the e-participation activity of civic participation in a meaningful way (Norris, 2011). Based on the literature analysis and the NRI, we propose the following model to analyze the most important drivers in institutionalizing e-participation in Europe: Fig. 1

The first group, which measures the technological infrastructure at the *meso* level, is divided into several variables. The first independent variable to consider the level of infrastructure in a country is the infrastructure subindex of the NRI Index (World Economic Forum, 2016), calculated with four indicators: electricity production (kWh per capita); mobile network coverage rate; secure Internet servers and Internet bandwidth. The second independent variable of this group is the affordability subindex provided by the NRI Index (World Economic Forum, 2016), including three indicators: prepaid mobile cellular tariffs; fixed broadband Internet tariffs; and Internet and telephony sectors competition index. The third independent variable is the ICT usage by government subindex provided by the NRI Index (World Economic Forum, 2016) to analyze the following indicators: importance of ICT to government vision of the future; government online service index; and government success in ICT promotion.

The second group of variables measures citizen empowerment and usage of ICT to influence or participate in the governance process. The fourth independent variable is ICT usage by individuals, for which the data are also provided by the NRI Index (World Economic Forum, 2016), measuring seven indicators: mobile telephone subscriptions; Internet users; households with a personal computer; households with Internet access; fixed broadband Internet subscriptions; mobile broadband Internet subscriptions; and use of virtual social networks. The fifth independent variable used in this research is skills, consisting of the subindex provided by the NRI Index (World Economic Forum, 2016), which analyzes the following indicators: quality of the education system; quality of math and science education; secondary education enrolment rate; and adult literacy rate. The last independent variable is the impact of ICT on access to basic services by citizens, also provided by the NRI Index (World Economic Forum, 2016). It is based on an executive opinion survey performed by the World Economic Forum (2014 and 2015 editions).

The second group of variables seeks to measure the macro level of e-government and e-participation in the democratic environment. The main variable is the democracy index. Research shows that the level of democracy exercises a strong influence on e-participation ((Jho, W., and Song, K. J., 2015). The data used are from the Economic Intelligence Unit (EIU, 2016), which analyzes the level of democracy for 163 independent states, covering almost the entire world population. The index is based on five indicators: electoral process and pluralism; civil liberties; the functioning of government; political participation; and political culture (EIU, 2016).

Likewise, we analyze government effectiveness and state legitimacy using data from the Fragile States annual report by Freedom House to quantitatively reflect these two variables. Table 1

3.2. Quantitative analysis

Multiple regressions and ANOVA analyses of data from 41 European

countries were used to analyze the causality between the selected variables and e-participation as the dependent variable.¹ E-participation was carefully analyzed using variables on technology and political development with the intention of defining which variables influence the institutionalization of e-participation. Two groups of countries were selected based on the grouping used for the Government Artificial Intelligence Readiness Index by Oxford Insights: Eastern Europe and Western Europe. Microstates such as Liechtenstein, Monaco, Andorra, and San Marino were excluded. SPSS software was used for the analysis.

Principal component analysis was the method used for the analysis. The result was exposed to varimax rotation. The factors that did not exceed Kaiser’s criteria were excluded and were not considered in the interpretation of saturation components below 0.45. Three factors explained 88.837% of the total variance. Table 2

To assess whether the factor model (or the extraction of the factors) was significant, the Kaiser-Meyer-Olkin (KMO) test and Bartlett’s sphericity test were used. The KMO test relates the correlation coefficients observed among the variables. The closer to 1 the value of the KMO test is, the stronger the relationship between the variables is considered to be (KMO \geq 0.9 very good; KMO \geq 0.8 good; KMO \geq 0.7 medium; KMO \geq 0.6 low; KMO $<$ 0.5 very low).

Bartlett’s sphericity test evaluates the applicability of the factor analysis of the variables. The model is significant when factor analysis can be applied. In Table 3, the results are presented.

In Table 4, the score of each variable is presented for each of these three factors:

First, Factor 1 accounts for 68.57% of the variance explained and saturates Variables 1, 3, 4, 6, 7, and 9. Second, Factor 2 explains 11.63% of the variance and is composed of Variables 5, 8, and 10. Finally, Factor 2 explains 8.62% of the variance and is composed of Variable 2.

For the study of the relationship among the three factors influencing e-participation institutionalization, linear regression analysis was performed to estimate the coefficients of the linear equation, with independent variables to predict the value of the dependent variable. In this study, the three factors for e-participation were taken as independent variables. Table 5

The following model is based on multiple regression analysis of e-participation and the three groups of variables.

The results of the ANOVA analysis of the interaction effects between all variables are as follows: Table 6

4. Results

Based on the regression analysis, the partial regression coefficients shown in Table 7 provide the information necessary to construct the least squares regression equation. This equation determines the strength of causality between e-participation and the independent variables in the research model.

Governance dynamics, mediated through multiscale variables and moderated by contextual characteristics of the country setting, are captured by the quadratic regression equation. These dynamics offer the most likely pathway to the implementation of e-participation in Europe. The following quadratic regression equation reflects the most important drivers/variables in this pathway.

¹ Estonia, Poland, Russian Federation, Czech Republic, Latvia, Lithuania, Slovenia, Slovak Republic, Bulgaria, Hungary, Romania, Serbia, Croatia, Ukraine, Azerbaijan, Montenegro, Georgia, Armenia, Albania, Moldova, France and Herzegovina, United Kingdom, Germany, Finland, Sweden, France, Denmark, Norway, Netherlands, Italy, Austria, Switzerland, Belgium, Luxembourg, Iceland, Portugal, Ireland, Spain, Malta, Greece, and Cyprus.

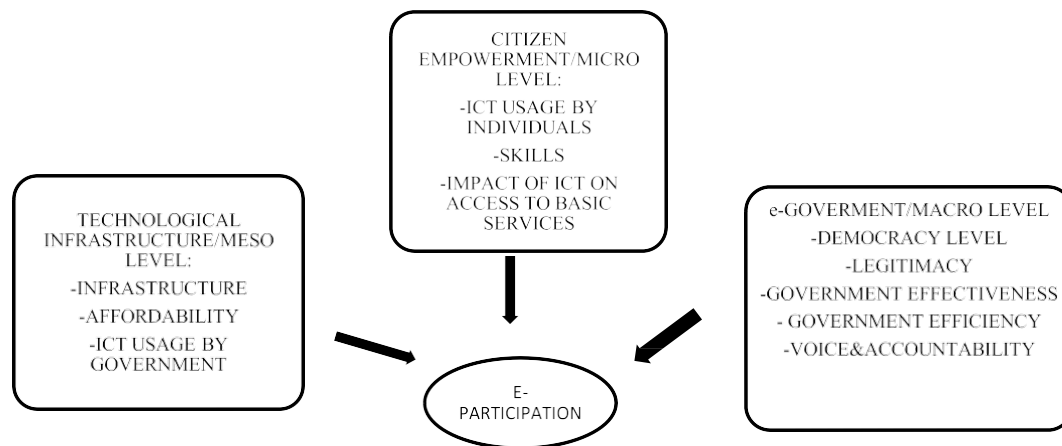


Fig. 1. Theoretical model (developed by the authors).

Table 1
Variables. Source: Authors.

VARIABLE	GROUP	SOURCE
VAR00001	INFRASTRUCTURE	TECHNOLOGICAL MESO LEVEL
VAR00002	AFFORDABILITY	TECHNOLOGICAL MESO LEVEL
VAR00003	SKILLS	CITIZEN EMPOWERMENT
VAR00004	INDIVIDUAL ICT USAGE	CITIZEN EMPOWERMENT
VAR00005	GOVERNMENT ICT USAGE	TECHNOLOGICAL MESO LEVEL
VAR00006	GOVERNMENT EFFECTIVENESS	E-GOVERNMENT MACRO LEVEL
VAR00007	LEGITIMACY	E-GOVERNMENT MACRO LEVEL
VAR00008	IMPACT OF ICT ON ACCESS TO BASIC SERVICES	CITIZEN EMPOWERMENT
VAR00009	DEMOCRACY LEVEL	E-GOVERNMENT MACRO LEVEL
VAR00010	GOVERNMENT EFFICIENCY	E-GOVERNMENT MACRO LEVEL
VAR00011	e-PARTICIPATION	DEPENDENT VARIABLE

WEF-GITR-NRI Index (2016)
WEF-GITR-NRI Index (2016)
WEF-GITR-NRI Index (2016)
WEF-GITR-NRI Index (2016)
WEF-GITR-NRI Index (2016)
FRAGILE STATES Index (2016)
FRAGILE STATES Index (2016)
WEF-GITR-NRI Index (2016)
THE ECONOMIST (2016)
FRAGILE STATES INDEX (2016)
WEF-GITR-NRI Index (2016)
based on UN Index

$$[V11(E-PARTICIPATION) = 3.858V5(GOVERNMENTICTUSAGE) - 0.390V7(LEGITIMACY) + 0.551V9(DEMOCRACYLEVEL) - 2.2V10(GOVERNMENTEFFICIENCY)]$$

Based on the above equation provided by our analysis, the results indicate the drivers/variables that influence the usage of e-participation by citizens and governments across Europe. These drivers/variables are now discussed.

Variable 5 (government ICT usage) is the most important driver. This result indicates that the leadership and digital vision of a country are key

Table 2
Total Variance Explained. Source: Authors. Extraction method: Principal component analysis.

Component	Initial values			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative%	Total	% of variance	Cumulative%	Total	% of variance	Cumulative%
1	6.857	68.574	68.574	6.857	68.574	68.574	4.968	49.684	49.684
2	1.164	11.638	80.212	1.164	80.212	80.212	2.893	28.931	78.616
3	.862	8.625	88.837	.862	88.837	88.837	1.022	10.221	88.837

elements in the institutionalization of e-participation. The importance of ICTs to the government vision of the future refers to whether the government has a clear ICT implementation plan to improve e-participation and e-government institutionalization, including the government's

Table 3
KMO and Bartlett tests. Source: Authors.

Kaiser-Meyer-Olkin sample adequacy measure.		.880
Bartlett's Test of Sphericity	Approx. Chi-Square df	450.492
	Sig.	.000

Table 4
Matrix of rotated components. Source: Authors.

	Components		
	1	2	3
INFRASTRUCTURE	.866	.315	.070
AFFORDABILITY	.002	.080	.996
SKILLS	.741	.356	.028
INDIVIDUAL ICT USAGE	.797	.480	.032
GOVERNMENT ICT USAGE	.363	.890	.068
GOVERNMENT EFFECTIVENESS	.845	.425	-0.006
LEGITIMACY	.900	.306	.011
IMPACT OF ICT ON ACCESS TO BASIC SERVICES	.655	.686	.119
DEMOCRACY LEVEL	.933	.137	-0.057
GOVERNMENT EFFICIENCY	.283	.935	.045

Extraction method: Principal component analysis.
Rotation method: Varimax normalization with Kaiser. Rotation converged in 4 interactions.

Table 5
E-participation regression model summary. Source: Authors.

Model	R	R square	Adjusted R-squared	Std. error of the estimate
1	.902a	.813	.751	.093559014

a. Predictors: (Constant), VAR00010, VAR00002, VAR00009, VAR00003, VAR00004, VAR00001, VAR00007, VAR00005, VAR00006, VAR00008.
b. Dependent variable: VAR00011.

Table 6
ANOVA^b. Source: Authors.

Model		Sum of squares	df	Mean square	F-value	Sig.
1	Regression	1.142	10	.114	13.041	.000 ^a
	Residual	.263	30	.009		
	Total	1.404	40			

a Predictors: (Constant), VAR00010, VAR00002, VAR00009, VAR00003, VAR00004, VAR00001, VAR00007, VAR00005, VAR00006, VAR00008.

b Dependent variable: VAR00011.

Table 7
Coefficients. Source: Authors.

Model	Non-standardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error.			
(Constant)	.168	.339		.496	.623
INFRASTRUCTURE V1	-0.104	.275	-0.075	-0.378	.708
AFFORDABILITY V2	-0.207	.163	-0.106	-1.272	.213
SKILLS V3	-0.311	.444	-0.095	-0.700	.489
INDIVIDUAL ICT USAGE V4	-0.399	.322	-0.271	-1.240	.225
GOVERNMENT ICT USAGE V5	3.858	.409	2.149	9.430	.000
GOVERNMENT EFFECTIVENESS V6	.111	.226	.115	.490	.628
LEGITIMACY V7	-0.390	.174	-0.528	-2.237	.033
IMPACT OF ICT ON ACCESS TO BASIC SERVICES V8	.070	.386	.047	.181	.857
DEMOCRACY LEVEL V9	.551	.226	.489	2.440	.021
GOVERNMENT EFFICIENCY V10	-2.287	.432	-1.287	-5.301	.000

a Dependent variable: e-participation.

performance in delivering online services to citizens. The promotion of ICT by the government must be successful to achieve e-participation institutionalization.

Variable 7 shows that the correlation between legitimation and e-participation is negative, indicating that the citizens who are most involved in e-participation are those in countries where the government is less legitimate and has lower levels of public approval. Weaker governments may be committed to new technologies to improve their socioeconomic status using tools such as e-participation. The results thus explain that citizens with greater frustration and fewer tools of direct democracy use e-participation to protest in an attempt to improve the legitimacy of their country.

Variable 9, which measures the level of democracy, is positive because the political model must be democratic to allow citizens to express themselves through electronic tools.

Finally, Variable 10 is negative. This result implies that in order for citizens to use e-participation tools, there must be a reason such as government inefficiency in decision making.

5. Discussion and conclusions: technology or leadership?

The regression analysis shows that the factors affecting e-participation have stronger causality with the macro-level variables (legitimacy, democracy, and government efficiency) than with the meso- and micro-level variables (related to ICT and citizen empowerment). The results show that the most important meso- and micro-level variable is government ICT usage. The results can spark an important academic discussion because the legitimacy and democracy variables are negative in the equation. This finding confirms the academic literature and government reports that state that the digitalization of government and the institutionalization of democracy must advance at the same time (UN,

2002). Also, the results contradict the statement that e-participation has strong positive causality with a country's level of ICT and level of democracy (Jho et al., 2015).

The quantitative analysis indicates that technology (e.g., infrastructure) is less relevant in encouraging e-participation than government leadership is in driving ICT policies. The first hypothesis (*A high level of democracy in a country is positively correlated with the level of e-participation*) is not supported by the results. Our analysis shows that a low level of democracy in a country is positively correlated with the level of e-participation, meaning that there should be a democratic system but that it should be in development.

The second hypothesis (*A high level of legitimacy in a country is positively correlated with the level of e-participation*), the third hypothesis (*Solid democracy based on a high level of government effectiveness in a country is positively correlated with the level of e-participation*), the fourth hypothesis (*The greater the level of technological infrastructure in a country is, the higher the e-participation maturity in that country will be*), the sixth hypothesis (*A high level of individual usage of ICT in a country is positively correlated with the level of e-participation*), and the seventh hypothesis (*A high level of digital skills of citizens is positively correlated with the level of e-*

participation) were not supported. Only the fifth hypothesis (*A high level of government usage of ICT in a country is positively correlated with the level of e-participation*) received empirical support.

An example of that hypothesis and a country where our equation applies is Estonia. Estonia is a post-Soviet country that transformed its depressed economy through, among other approaches, a clear commitment to ICT policy and the digitalization of the economy from 1994 onward (e-Estonia, 2020). In February 2000, the Estonian Riigikogu (parliament) passed the new Telecommunications Act, adding Internet access to its list of universal services as a citizen's universal right. With this Telecommunications Act, the Estonian government became legally obliged to promote Internet access in all areas of Estonia, even the most sparsely populated and rural. Therefore, with a clear government commitment to digital transformation policies, in addition to a legally binding constitutional requirement, digital and infrastructure development will occur faster than otherwise. In addition, our equation also explains why Estonian citizens adopted e-participation tools so quickly. In the equation, the legitimacy and democracy variables are negative, explaining why electronic democracy policies were established so quickly and were used by the Estonian citizens after years of being unable to participate directly in public decision making. During the 1990s, Estonia installed democracy as the new political regime and at the beginning of the process, democracy could not be established completely. Hence, the democracy variable has a negative coefficient. At the same time, the digitalization process driven by the government created a wave that allowed citizens to participate in decision-making processes using ICT tools. The government thereby institutionalized both democracy and digital transformation.

In conclusion, the best path for encouraging e-participation as an e-government policy is for there to be an important reason for citizens to use e-participation (e.g., a government with low legitimacy or low efficiency in government management). Also, the country must have a democratic system (that is under development). Above all, the government must have a vision and a strategic plan to implement new technologies in its policies.

6. Future research areas

In recent years, ICTs have been considered a way of improving representative democracy and a way of advancing in democratic governance by improving the effectiveness and legitimacy of public decision making and social justice. Our research provides implications for many Eastern and Western European countries, which are currently trying to encourage civil participation by developing e-government policies or investing in infrastructure, without a clear pathway between these two methods and the government's main macro-, micro-, and

meso-level objectives.

In this context, our quantitative analysis presents limitations, which can be addressed by future research. For example, the perspective adopted by the governments of Western European countries in implementing e-participation is to improve their already established democratic systems. However, they find that their rates of e-participation are still low due to a lack of a civic culture or a lack of motivation by citizens to participate in public decision making. On the other hand, the e-participation perspective adopted by the governments of Eastern European countries is to give some tools and voice to citizens who fervently request it, due to corruption or the low legitimacy of the current government, but without a clear pathway to improving structural problems. This article does not analyze the objectives of both groups of countries, so the paths to institutionalization through e-government policies may be different in each country. The variable that can indicate the clearest path in both groups is leadership expressed as government ICT usage in our analysis. Based on that variable, it is necessary to analyze the policies from a selection of case studies from both groups of countries in order to carry out a comparative micro analysis of their objectives and thus propose a specific pathway for each group. Digital transformation and e-government policies, adopted massively by citizens, may help Eastern European countries to institutionalize democratic systems and strengthen their rule of law. However, Western European countries will need to invest in education and a participatory civic culture to motivate their citizens to participate in public decision making, establishing a new model of democracy that may help to solve the current sustainability problems facing representative democracy.

This study is important in that it identifies causality between e-participation and political variables more than technological variables. It thus expands our knowledge and understanding of civil participation and democracy, while also demonstrating that more research is needed in this area in order to establish clear conclusions.

Authorship statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication before its appearance in the Journal Technological Forecasting and Social Change

Authorship contributions

Doina Stratu-Strelet, M.D: Conceptualization, Methodology, Investigation, Validation Writing - Original Draft.

Dr. Hermenegildo Gil-Gomez, PHD: Review, Resources. Dr. Raul Oltra-Badenes, PHD: Software, Formal analysis. Dr. Juan Vicente Oltra-Gutierrez, PHD: Software, Formal analysis.

References

- Abu-Shanab, E., Haddad, E., 2015. The influence of smart phones on human health and behavior: Jordanians' Perceptions. *International Journal of Computer Networks and Applications* 2 (2), 52–56.
- Aichholzer, H.K., 2016. *Evaluating e-Participation. Frameworks, Practice, Evidence*. Springer International, Basel.
- Andersen, K.V., 2007. Costs of e-participation: the management challenges. *Transforming Government: People, Process and Policy*. 29–43.
- Archon, F., 2015. Putting the Public Back into Governance: the Challenges of Citizen Participation and Its Future. *Public Adm Rev* 513–522.
- Arnstein, S., 1969. A ladder of citizen participation. *J Am Inst Plann* 35 (4), 216–224.
- Azad, B.F., 2010. Hat Shapes Global Diffusion of e-Government: comparing the influence of national governance institutions. *J Global Information Management (JGIM)* 85–104.

- Barbosa, A.M.C., Saisse, M.C.P., 2019. Hybrid project management for sociotechnical digital transformation context. *Brazilian J Operations & Production Management* 16 (2), 316–332.
- Bennett, W.W., 2009. Young citizens and civic learning: two paradigms of citizenship in the digital age. *Citizensh Stud* 105–120.
- Bertot, J.C., 2010. Using ICTs to create a culture of transparency: e-government and social media as openness and anti-corruption tools for societies. *Gov Inf Q* 27 (3), 264–271.
- Bingham, L.B., 2005. The new governance: practices and processes for stakeholder and citizen participation in the work of government. *Public Adm Rev* 65 (5), 547–558.
- Bimber, B. (2003). *Information and American democracy: technology in the evolution of political power*. Cambridge University Press.
- Bolivar, A.M., 2016. Governing the Smart City: a Review of The Literature on Smart Governance. *International Review of Administrative Sciences* 392–408.
- Boulianne, S., 2009. Does Internet use affect engagement? A meta-analysis of research. *Political communication* 26 (2), 193–211.
- Callon, M., 1987. Society in the making: the study of technology as a tool for sociological analysis. *The social construction of technological systems: New directions in the sociology and history of technology* 83–103.
- Chadwick, A., 2003. Bringing e-democracy back in: why it matters for future research on e-governance. *Social science computer review* 21 (4), 443–455.
- Coleman, R., Lieber, P., Mendelson, A.L., Kurpius, D.D., 2008. Public life and the internet: if you build a better website, will citizens become engaged? *New media & society* 10 (2), 179–201.
- Dunleavy, P.M., 2006. New public management is dead—Long live digital-era governance. *J public administration research and theory* 467–494.
- Forum, W.E., 2016. *Global Information Technology Report. Innovating in the Digital Economy*.
- Fraser, M.&, 2008. *Throwing Sheep in the Bedroom*. Wiley, Cornwall, UK.
- Fung, A., 2015. Putting the public back into governance: the challenges of citizen participation and its future. *Public Adm Rev* 75 (4), 513–522.
- Geels, F.W., 2018. Socio-technical transitions to sustainability. *Oxford Research Encyclopedia of Environmental Science* 39, 187–201.
- Gell-Mann, M. (2010). *Transformations of the twenty-first century: transitions to greater sustainability*. *Global Sustainability—A Nobel Cause*, 1–7.
- Geißel, B.K., 2019. It depends... different direct democratic instruments and equality in Europe from 1990 to 2015. *Politics and Governance* 7 (2), 365–379.
- Glyptis, L., Christofi, M., Vrontis, D., Del Giudice, M., Dimitriou, S., Michael, P., 2020. E-Government implementation challenges in small countries: the project manager's perspective. *Technol Forecast Soc Change* 152, 119880.
- Grönlund, Å., 2009. ICT is not participation is not democracy—e-Participation development models revisited. In *International Conference On Electronic Participation*. Springer, Berlin, pp. 12–23.
- H. Chourabi, T.N.-G., 2012. Understanding Smart Cities: An Integrative Framework. 45th Hawaii International Conference on System Sciences, Hawaii.
- Ilfinedo, P., 2012. Factors influencing e-government maturity in transition economies and developing countries: a longitudinal perspective. *ACM SigMIS Database: The DATABASE for advances in information systems* 42 (4), 98–116.
- Index, D. (2016). *Democracy under Stress. A Report from the Economist Intelligence Unit*.
- Index, N.R. (2016). *World Economic Forum.—http.reports.weforum.org/global-information-technology-report-2016/networked-readiness-index*.
- J. R. Gil-Garcia, T.A., 2015. *Smarter As the New Urban Agenda: A Comprehensive View of the 21st Century City*. Springer, Berlin Heidelberg.
- Jho, W.&, 2015. Institutional and technological determinants of civil e-Participation: solo or duet? *Gov Inf Q* 32 (4), 488–495.
- Jho, W., Song, K.J., 2015. Institutional and technological determinants of civil e-Participation: solo or duet? *Gov Inf Q* 32 (4), 488–495.
- Köhler, J.K. (2019). *An agenda for sustainability transitions research: state of the art and future directions*. *Environmental Innovation and Societal Transitions*.
- Kapsa, I.&-K., 2019. Citizen e-Participation as an important factor for sustainable development. *European J Sustainable Development* 8 (3), 210–220.
- Lidén, G., 2012. Is e-democracy more than democratic?: an examination of the implementation of socially sustainable values in e-democratic processes. *Electronic J e-Government* 10 (1), 84–94.
- Lunat, Z., 2008. The Internet and the public sphere: evidence from civil society in developing countries. *The Electronic J Information Systems in Developing Countries* 35 (1), 1–12.
- Macintosh, A., 2004. Characterizing e-participation in policy-making. In 37th Annual Hawaii International Conference On System Sciences, 2004. *Proceedings of the IEEE*, pp. 10–pp.
- Markard, J.S., 2016. Socio-technical transitions and policy change—Advocacy coalitions in Swiss energy policy. *Environmental Innovation and Societal Transitions* 18, 215–237.
- Masters, Z.M. (2004). *Young people and e-democracy: creating a culture of participation*. In *International Conference On Electronic Government*, 15–22.
- Moon, M.W., 2005. What drives global e-Governance? An Exploratory Study at Macro Level. 38th Hawaii International Conference On System Sciences. IEEE, p. 131.
- Mossberger, K., Wu, Y., & Jimenez, B.S. (2017). *Developments and challenges in e-participation in major US cities*. *Routledge Handbook on Information Technology in Government*, 219.
- Motos, C.R., 2018. Representación, participación y modelos de democrACIA. *Revista general de derecho constitucional* 26 (3).
- Naranjo-Zolotov, M.O., 2018. Citizens' intention to use and recommend eparticipation. *Information Technology & People* 364–386.

- Norris, P., 2001. Digital divide: Civic engagement, Information poverty, and the Internet worldwide. Cambridge university press.
- Norris, P., 2011. Democratic deficit: Critical citizens Revisited. Cambridge University Press.
- Oni, A.A., Oni, S., Mbarika, V. and Ayo, C.K. (2017), "Empirical study of user acceptance of online political participation: integrating civic voluntarism model and theory of reasoned action", *Government Information Quarterly*, No. 1.
- OECD, 2003. Problems of e-democracy. Challenges of Online Citizen Engagement. OECD, Paris.
- Olsson, P., Galaz, V., Boonstra, W.J., 2014. Sustainability transformations: a resilience perspective. *Ecology and Society* 19 (4).
- P. Pelzer, S.G., 2016. A Comparison of the perceived added value of PSS applications in group settings. *Comput Environ Urban Syst* 56, 25–35.
- Paskaleva, K.A., 2013. E-Governance As An Enabler Of The Smart City. Routledge, Smart Cities.
- Pérez-Morote, R., Pontones-Rosa, C., Núñez-Chicharro, M., 2020. The effects of e-government evaluation, trust and the digital divide in the levels of e-government use in European countries. *Technol Forecast Soc Change* 154, 119973.
- Perri, P., 2004. e-Governance: Styles of Political Judgment in the Information Age Polity. Springer.
- Roberts, N., 2014. Public deliberation in an age of direct citizen participation. *The American review of public administration* 34 (4), 315–353.
- Ropke, I., 2016. Complementary system perspectives in ecological macroeconomics- the example of transition investments during the crisis. *Ecological Economics* 121, 237–245.
- Rossel, G.M., 2011. "Measuring and Meta-Measuring: in Search of New Pathways for Modelling Impacts of ICT-Enabled Services On the Information Society. e Government Conference. Delft, pp. 126–139.
- Sæbø, Ø., Rose, J., Flak, L.S., 2008. The shape of eParticipation: characterizing an emerging research area. *Gov Inf Q* 25 (3), 400–428.
- Sanford, C., Rose, J., 2007. Characterizing eparticipation. Sanford, C., & Rose, J. (2007). Characterizing eparticipation. *Int J Inf Manage* 27 (6), 406–421.
- Salter, L., 2004. Structure and forms of use. *Information, Communication & Society* 7 (2), 185–206.
- Sartori, G., 1988. Teoría de la democracia. El Debate Contemporáneo. Alianza, Madrid.
- Scholz, R.B., 2001. Unintended side effects of the digital transition: european scientists' messages from a proposition-based expert round table. *Sustainability* 10 (06).
- Schumpeter, J., 1976. Capitalism, Socialism and Democracy. Harper and Row, New York.
- Schuppan, T., 2009. E-Government in developing countries: experiences from sub-Saharan Africa. *Gov Inf Q* 26 (1), 118–127.
- Singh, H.D., 2007. Country-level determinants of e-government maturity. *Communications of the Association for Information Systems* 20 (1), 40.
- Thomas, J.C., 2013. The new face of government: citizen initiated contacts in the era of E Government. *Journal of public administration research and theory* 83–102.
- Tomor, Z.M., 2019. Smart Governance For Sustainable Cities: findings from a Systematic Literature Review. *J Urban Technology* 26 (4), 3–27.
- Torres, L., Pina, V., Acerete, B., 2005. E-government developments on delivering public services among EU cities. *Gov Inf Q* 22 (2), 217–238.
- UN. (2014). e-Government Survey 2014. Retrieved from: <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2014>.
- W. H. Voorberg, V.J., 2015. A Systematic Review of Co-Creation and Co-Production: embarking on the Social Innovation Journey. *Public Management Review* 17 (9), 1333–1357.
- Y. Charalabidis, S.K., 2012. "ICT for Governance and Policy Modelling: visionary Directions and Research Paths. In: Charalabidis, Y., Koussouris, S. (Eds.), Empowering Open and Collaborative Governance. Springer, Berlin Heidelberg.
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