

Explaining variations in the implementation and use of e-petitions in local government

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Abstract. E-petitions constitute a promising method of increasing public participation and engagement in government processes. However, there is a lack of knowledge of why some government entities implement e-petitions, while others do not. Moreover, it is unknown why some organizations may receive many e-petitions while others receive relatively few. Thus, in this paper, we aim to fill these gaps by investigating the implementation and use patterns of e-petitions based on data from Swedish local governments. Through statistical analysis of data related to demography, economy, technology, and democracy, our findings unveil variations in municipalities' implementation of e-petitions and citizens' use of them. The results reveal that municipalities with a relatively large population and established modes of local democracy are more inclined to implement e-petitions than smaller jurisdictions. However, we also found that the number of incoming e-petitions per capita is negatively correlated with population size. Thus, the presence of institutionalized work structures related to local democracy is an important precursor for the implementation of e-petitions, while previous experience with communication technologies had a positive effect on the number of incoming petitions. In addition to these findings, the novelty of our study lies in the use of several official data sources to seek explanations for the implementation and use of e-petitions in local government. By doing so, this study has paved the way for similar research in other contexts. The paper concludes with implications for both research and practice as well as suggestions for future studies.

Keywords: E-petitions, digital democracy, e-democracy, local government

Key points for practitioners:

- A formulated strategy for democratic work is positively associated with implementing e-petitions;
- E-petitions are more rarely implemented in less populated municipalities, but citizens in these areas are more inclined to use them;
- Using additional digital systems, such as digital post and social media, can increase the number of incoming e-petitions.

1. Introduction

Political participation in the periods between elections is frequently raised as a possible complement to representative democracy and as a remedy for some of its intrinsic problems (Dalton, 2008; Norris, 2002), including declining voter turnout, fading trust in institutions and politicians, and the trend toward a less vibrant civil society (Norris, 2011; Putnam, 2002). With the possibilities that digital technologies bring,

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the e-petition has emerged as an instrument that could potentially counteract the challenges mentioned above. The e-petition's unique formula for aggregating and channeling opinions from the citizenry and ultimately translating them into policy has made it increasingly popular in countries around the globe spanning various political tiers (Bochel, 2013; Bochel & Bochel, 2017). However, "relatively little attention by social scientists has been devoted to this quintessentially 21st-century form of political participation" (Harrison, 2016, p. 508) and more studies, therefore, could help us understand the e-petition and its role in democracy today. While significant amounts of research have been published on the topics of e-participation (Medaglia, 2012; Sæbø et al., 2008, 2011), e-democracy, and digital democracy (Åström et al., 2017; Päivärinta & Sæbø, 2006), systemized knowledge is lacking on both the distribution of e-petitions across societies and the patterns explaining the existence and scope of this instrument. While previous research (see Section 2) has investigated citizens' adoption of e-petitions, less attention has been focused on the supply side, for example, why government entities choose to implement these features in the first place. In a time characterized by democratic reversal (EIU, 2021; Foa & Mounk, 2016; Mechkova et al., 2017), we argue that it is of great importance to investigate factors that prompt government entities to invest time and fiscal funds in activities that can foster a more inclusive "advocacy democracy." Specifically, these factors refer to situations in which citizens may *influence* government decision-making in contrast to *direct democracy*, where decision-making power is shared with citizens (Cain et al., 2003). Similar drivers that are as frequent in associated fields can also be expected to influence e-petitions, counting the potential effect of factors originating from the spheres of demography, economy, democracy, and technology.

In this paper, we focus on the local political arena. The challenges identified above are not isolated from local repercussions. Quite the contrary: Scholars of local politics argue that, even at this political level in which relationships between citizens and decision-makers traditionally have been the closest, reduced discretion and increasing depoliticization are at stake (Bergström et al., 2021). This means that local governments face a troublesome combination of greater pressure from the central government paired with the processes of political exchange moving to arenas other than those they traditionally maintain. At the same time, promises are high, as scholars emphasize that the local arena represents an important "potential resource for democracy" (Sellers et al., 2020, p. 4).

While considerable research has focused on the "demand" side of e-petitions, for example, by exploring what makes citizens adopt or refrain from adopting them (Berg, 2017; Hagen et al., 2016; Lee et al., 2014; Panagiotopoulos et al., 2012; Sheppard, 2015; Ulo et al., 2019), in this paper, we focus on the "supply"-side factors that motivate municipalities to implement e-petitions. In this paper, we draw on a novel data set examining Swedish municipalities' implementation of e-petitions and citizens' use of them. Thus, we raise the following research questions (RQs):

- RQ1: *What patterns explain the variation in the implementation of e-petitions?*
- RQ2: *What patterns can explain the scope of the use of e-petitions?*

"Implementation" refers to the supply side, that is, when citizens can submit a petition via a municipality's website and signatures can be gathered via digital forms. "Use" refers to the number of incoming petitions per capita.

Our empirical focus on the local arena in Sweden is derived from several intertwined arguments. First, local governments represent the arena with the lowest barriers to civic engagement. How these governments choose to apply digital tools will influence citizens' abilities to participate in political processes. Second, Sweden could be regarded as an archetypal example of a modern democracy that is up to date with current technologies (Lidén & Larsson, 2016). From a global perspective, Sweden, together with other Western democracies, represents a case in which both democratic and technological

developments are at highly advanced stages. The first municipality in Sweden to introduce an e-petition was Malmö in 2008. While other countries have implemented e-petitions on the national level, Sweden has not yet done so. Instead, Sweden is seeing a growing implementation of the e-petition at the local level and, thus, presents positive preconditions for the development of online digital politics. To our knowledge, this is the first quantitative study of the local level in Sweden in terms of the research questions and research design; therefore, it takes an explorative approach.

This paper proceeds as follows: Section 2 presents the theoretical premises used to generate the hypotheses on the implementation and use of e-petitions, and Section 3 describes the materials and methods. In Section 4, the results and analysis are presented, and this is followed by the discussion in Section 5 and conclusions in Section 6.

2. Theoretical premises

The theoretical section of this study consists of two parts. First, we engage in a thorough discussion of the phenomenon of e-petitions and how they can be conceptualized and defined. Second, we turn to a discussion of the conditions that could explain the societal use of e-petitions. This part ends with the formulation of hypotheses that will lay the foundation for the empirical section.

However, before we continue with a closer look at e-petitions and their potential drivers, we aim to situate them in relation to democracy. The relationship between democracy and technology has been problematized by scholars for decades. As noted by Winner (1992, pp. 2), “Democratic revolution and industrial revolution were twins of a sort, but ones that from the very beginning lived with troubled relations.” On the one hand, when principles of equality are applied to the output of technology in society, this may lead to a fair distribution of these outputs. On the other hand, the inherent character of digital technology and its rapid advancements have led to the concentration of power and wealth in a small number of individuals (see, e.g., Hindman, 2009). Moreover, previous research suggests that government institutions tend to prioritize values other than democracy, such as efficiency, when they spend fiscal resources on digital technologies (see Ilshammar et al., 2005; Sundberg, 2019). Reviews from other contexts suggest that the use of digital technology by governments on a national level is more specifically aimed at supporting administrative reforms and new public management instead of formulating consultative and participatory concepts (Homburg 2008, pp. 103–104). Therefore, we argue that it is highly relevant to study the conditions under which digital technologies may support democratic work, as they are downplayed in comparison to other types of initiatives.

Meanwhile, it is important to note how representative democracy meets challenges such as legitimacy (Crouch, 2004; Dalton, 2004, 2008; Hay, 2007; Manin, 1997; Norris, 1999, 2011; Papadopoulos, 2013) and declining membership in political parties (Heidar & Wauters, 2019). One strategy for policymakers to increase the legitimacy of the democratic political system has been to engage in democratic innovations, that is, ways to increase and deepen citizen participation in the decision-making process (Smith, 2009). There are indications that the e-petition has been introduced by national parliaments and governments that are searching for legitimacy (Lindner & Riehm 2009). With that being said, we do not argue that digital technology constitutes a panacea that will solve democratic problems. However, as mentioned earlier, given the scarcity of the use of technology to support democratic work, it is important to achieve an understanding of the conditions in which these technologies become implemented and used. Exploiting fast-growing digital technologies has been a method for innovating with regard to democratic challenges. One consequence of this development is that the field of e-participation tends to rely on discourses of (linear) technological progress that promote direct democracy (Grönlund, 2009). However, in this paper

we argue that there are also more institutionalized forms of digital technology that particularly relate to the most central issue of democracy, namely, the decision-making process.

As the e-petition gives rise to a new form of political participation through digital tools, the question becomes how it should be understood in democratic terms. The three modes of democracy explained by Cain, Dalton, and Scarrow (2003) – representative, direct, and advocacy – can provide further insights into how the e-petition should be categorized. With advocacy democracy, citizens can “influence the process rather than make outright decisions” (Cain et al., 2003, p. 11) allowing for direct engagement in the political process (Ibid, 16) but reserving the final decision-making powers for political institutions (Carman, 2010). Such activities outside the realm of representative democracy, in which voters elect their representatives, have included new initiatives in the last half of the 20th century, including administrative reforms, decentralization and judicialization of politics, protests, and demonstrations (Cain et al., 2003, pp. 255–256). These build upon the general idea of launching strategies that can revitalize democracy and empower citizens or groups of citizens. Hence, the e-petition, a relatively new tool, could mean new opportunities and challenges for institutions in terms of advocacy democracy (Carman, 2010).

The framing of the character of this tool, though, is not without ambiguities. E-petitions are sometimes depicted as constituting a promising participatory technique (Bochel, 2013), because they enjoy a high degree of institutionalization among governments compared to initiatives of a more temporary nature (Lindner & Riehm, 2009). E-petitions may be used in combination with other initiatives, such as discussion forums, to facilitate dialogue on emerging issues (Adams et al., 2005). Additionally, they may have an educational function by informing petitioners about local democracy and decision-making (Bochel & Bochel, 2017).

While previous research has highlighted how e-petitions may enhance trust (Åström et al., 2017) and serve educational purposes (Bochel & Bochel, 2017), they also share similar challenges faced by other digital forms of participation, such as digital divides (Berg, 2017) and the risk of empowering already-active citizens (Berg, 2017; Hagen et al., 2016; Lee et al., 2014; Matthews, 2021; Panagiotopoulos et al., 2012; Sheppard, 2015; Ulo et al., 2019; Wright, 2012).

Consequently, more research is needed to investigate the use of digital tools for the benefit of democracy, to study new challenges and opportunities, and to generate an understanding of new democratic instruments in institutional settings. Against this backdrop, the study of e-petitions is likely to produce further insights into these topics.

2.1. What are e-petitions?

The e-petition is a digital version of an already-established participatory tool for citizens, namely, the petition. It is a tool for citizens to use paper and pen to collect signatures from other citizens who wish to influence politics, and it has a long historical background. For example, it was used in England in 1215, when barons were given the right to submit complaints to the royal house without risking reprisals through the Magna Carta, a treaty directing the king to share his power. It was also used successfully in the United States in opposition to slavery and in Sweden in 1913 for female (general) voting rights, where approximately 350,000 signatures were collected in support of the bill on universal suffrage (Carpenter, 2016; Heerma van Voss, 2001). The digital form, the e-petition, exists on the local, regional, national, and supra-national levels around the world. It is “one of the most prominent and widely used e-democracy tools” (Wright, 2012, p. 453). Essentially, an e-petition is a query or suggestion posed by a citizen to the local government through an electronic (or digital) form, usually posted on a website, which may then be supported by other citizens who digitally “sign” it. If e-petitions are signed by a certain number of

people, with levels of sufficient thresholds normally formulated in advance by the public authority, this indicates that the issue is of interest to a large group of people. If an e-petition passes such formulated criteria, it can be pushed forward in the democratic machinery and will constitute a suggestion to be decided by elected officials or to be addressed by the public administration. E-petitions are consultative (see, Arnstein, 1969), which means that politicians and officials can choose to either implement these proposals or not.

2.2. What can explain e-petitions?

To investigate factors that contribute to local governments' implementation of e-petitions and thereby generate our hypotheses, we have drawn upon literature from the information systems, e-government, political science, and public administration fields in an explorative manner. No established theoretical model exists, which means that explanations of possible relevance must be tested inductively. In the broader field of the implementation and use of participatory tools in government, we expected that we could learn why this occurs based on different types of research. In this study, implementation and use were examined by focusing on contextual factors. By doing so, we explored variables associated with demographic factors alongside features related to economy, technology, and democracy. Our null hypotheses were that there would be no relationship between these variables and the implementation and use of e-petitions, respectively. The theoretical background of the hypotheses is described in the following subsections.

2.2.1. Demographics

Previous research has indicated that population size is an important determinant for the implementation of digital technologies in government, as these initiatives often rely on engaging a critical mass of "users" (Lee et al., 2011; see also Norris & Moon, 2005; Weare et al., 1999). Lee et al. (2011, p. 448) further observe that "the citizen pressure model argues that governments will improve e-government and e-democracy when they experience public pressure from citizens". In addition, the composition of the local population can be relevant as well. To complement the notion that age has an influence on the uptake of digital technologies, we have also examined the degree of urbanization. This is based on the literature regarding smart cities that suggests urban areas as potential spaces for democratic development (Lim et al., 2019; Smith & Martín, 2021). To investigate the influence of demographic factors on the implementation of e-petitions in municipalities, we use the following variables:

- population size of the municipality,
- average age of the population, and
- degree of urbanization.

2.2.2. Economy

The financial resources of an organization are relevant for the implementation of digital technologies, as these initiatives are often associated with high costs. Norris and Moon (2005) found that a lack of funds is one of the most significant barriers to the implementation of e-government among local governments. Carrizales (2008) noticed that the performance of e-democracy in local government was positively related to the size of the municipality's information technology budget, while Lidén (2016) described how municipal finances in general were an important predictor. Reddick and Norris (2013) found that a lack of funding to support e-democracy initiatives was a major barrier to implementing such systems in local governments in the United States. Related to this are citizens' economic resources, specified through

income and, indirectly, through education levels. To complement the abovementioned idea of how citizens demand certain services, researchers have examined the resources among such populations. Lidén (2013) and Reddick and Norris (2013) have reached such findings when studying local governments' provision of digital channels. Accordingly, we include the following variables in our study:

- municipal solvency,
- average citizen income (median), and
- education level of citizens.

2.2.3. *Technology*

Previous research shows how organizations adopting shared national digital infrastructures may also be more prone to “conform to accepted standards,” such as e-petitions (Lee et al., 2011). One example of such an infrastructure in Sweden is a national infrastructure for secure messaging, known as digital post, which essentially replaces written mail from government organizations. While the Swedish government system consists of organizations with a relatively high degree of autonomy vis-a-vis the central government, few standardized infrastructures of this kind exist today. Moreover, the implementation of this infrastructure requires significant work regarding coordination and integration in the hosting organization. Therefore, we are interested in whether the experiences of adopting such an infrastructure lead to willingness and capacities to develop further communication technologies, such as e-petitions.

With the rise of Web 2.0 and social media, new digital platforms have become associated with the potential to enhance citizen participation and increase government responsiveness (Kim & Robinson, 2012), as government organizations and politicians use them to communicate with citizens. However, as noted by Andersen and Medaglia (2009), speculation about the transformation of politics and e-democracy may also be exaggerated. In their study of national election campaigns on social media, the researchers found that citizens tended to be passive recipients of information rather than active influencers of policy. Nevertheless, municipal use of websites and politicians' and government's use of social media continue to be important (Lidén & Larsson, 2016). Additionally, government use of social media may positively influence the use of other participatory tools (Arshad & Khurram, 2020; Pflughoeft & Schneider, 2020), such as e-petitions (Harrison et al., 2022). Taken together, we explore the following variables in this study:

- municipality integration with national infrastructure (digital post),
- municipality use of other forms of participatory (web) technologies, and
- municipality use of social media.

2.2.4. *Democracy*

As noted by Schuler (2018), “E-democracy won't save democracy. Democracy will save democracy.” Digital technologies have the potential to foster democracy, whereby governments can invite and obtain views from citizens (Henman, 2010, p. 8) and offer them a chance to raise their voices and be politically active (Homburg, 2008). However, other views are far more negative and significant research in this field has raised the question of whether digital technologies can strengthen democracy, and if so, how (Hindman, 2009; Vaccari, 2013). Nonetheless, to understand why some municipalities implement e-petitions and others do not, we examine factors associated with democratic stimulation in the municipalities, including strategies to develop local democracy and the allocation of funds for democratic work. An additional example is whether local governments pursue citizen dialogue as an instrument to capture citizen participation (Lund et al., 2022). As a general proxy for local political engagement, voter turnout should also be considered. In summary, we perceive that indicators of such democratic groundwork imply strong democratic engagement and illustrate a municipal ambition to further develop local democracy.

Rubrik	Slutdatum	Signaturer	Status
Asfalterad Pumptrack Kransmossen - Trandared	2023-10-19	28	Samlar underskrifter
Cykelväg	2023-06-20	19	Samlar underskrifter
mindre skräp vid badplatser	2022-11-19	8	Inlämnad för vidare hantering
Sovmorgon för högstadie och gymnasieelever	2022-11-19	8	Inlämnad för vidare hantering
Mer belysning i Gingri och sänkt hastighet	2023-03-07	7	Samlar underskrifter
Håll i vägen i trafiken!	2022-11-19	5	Inlämnad för vidare hantering
Lek ger hälsa	2022-12-08	5	Inlämnad för vidare hantering

Fig. 1. List of e-petitions from a Swedish municipality.

Previous research has also highlighted the role of the local government rule. Zapatero et al. (2020) highlighted how citizens who adhere to a left-wing ideology tend to sign e-petitions in greater numbers than those with other ideological leanings, while De Cindio and Peraboni (2009) did not find any significant differences between left-oriented and right-oriented local governments in their use of participatory tools.

To summarize, we use the following factors to study the presence of democratic functions in municipalities:

- the presence of strategic resources devoted to democratic work,
- the existence of citizen dialogues,
- voter turnout in the 2018 municipal election, and
- local government rule.

In the following section, we describe how these variables are used in our research design.

3. Research design

To explore the RQs via the variables proposed in Section 2, we use several data sources associated with Swedish municipalities. These public institutions ($n = 290$) enjoy relatively autonomous positions vis-a-vis the central government, with locally elected municipality councils (see, Ladner et al., 2021). Moreover, these institutions offer several services and contact points for citizens' daily lives, such as education, social and elderly care, and democratic functions. Thus, in the Swedish context, the municipalities constitute the arenas in which democratic tools such as e-petitions are implemented. The digital (or "e-") services (see, Lindgren & Jansson, 2013) provided by Swedish municipalities are somewhat standardized and are accessible via the organizations' websites. The e-petitions provided by the municipalities follow a similar structure, where a citizen may submit a petition via a digital form as well as read and sign petitions submitted by other citizens. Additionally, information is provided about what constitutes an e-petition and the associated procedures. Figure 1 is a screenshot from an e-petition system on a municipality's website where the topic, end date, number of signatures, and status of the petitions are displayed.

With the RQs as a point of departure, this study is divided into two parts. Our dependent variable is the concept of e-petitions, which we quantified in two alternative versions. The first indicates whether

municipalities apply e-petitions (yes/no), making it a dichotomous variable. The second step adds nuances by representing a quantification of the extent of e-petition use (number of incoming e-petitions per capita). Our explanatory variables reflect the hypotheses described in the theoretical section and are divided into four blocks, namely, demographic, economic, technological, and democratic explanations.

After presenting a descriptive overview of the distribution of e-petitions in Swedish municipalities, we proceed with answering the RQs. The data is described in more detail in Section 3.1, and our analytical procedure is outlined in Section 3.2.

3.1. Data description

The data underlying this study originated from official statistical data regarding Swedish municipalities (Statistics Sweden 2022: 1–11; Eurostat, 2022; Kolada, 2022; Swedish Agency for Digital Government, 2022; SALAR, 2022) as well as our own investigations of the use of e-petitions. Some of the variables are based on surveys of municipalities by Statistics Sweden, a national government agency, while others represent concrete facts such as economic and demographic variables. Taken together, our data set consists of a solid mix of official data combined with the results of investigations of municipal websites. The description of the data follows below and is summarized in Table 1.

To address the purpose of the paper, we use two dependent variables: (1) a categorical variable on whether municipalities have implemented e-petitions and (2) information about the use of e-petitions per capita among municipalities that have implemented e-petitions. The first dependent variable was used to answer RQ1 and consists of survey data collected from Statistics Sweden (2022:1) and data from a study by Karlström (2020). The second dependent variable was used to answer RQ2 and contains data from Statistics Sweden (2022:2) on the use of e-petitions regarding incoming e-petitions per 1,000 inhabitants in 2021.

The independent variables were divided into four mentioned categories: demographics (population size, average age, and level of urbanization), economy (average income, municipal solvency, and education level), technology (use of social media and web services related to democracy (see, Table 1) and information on whether the municipalities have integrated their systems with the national infrastructure for digital post), and democracy (a local democracy index, the presence of citizen dialogue, voter turnout in the 2018 municipal elections, and the local government rule).

3.2. Analytical procedure

To address RQ1, the dichotomous variable was estimated through a logistic regression (maximum likelihood estimation), making it possible to assess the effect of the independent variables and answer the first RQ. The independent variables were tested separately by following them from the four theoretical blocks they represent. Including all of them in the same model would create problems with limited degrees of freedom. However, to assess the most valid predictors, a final model included those independent variables that were reported to be of significance in the initial analyses.

To address RQ2 in a second round of analyses, the second version of the dependent variable, which was quantitative in nature, was approached through ordinary least squares (OLS) estimations. A subset of the independent variables used in RQ1 was explored here, since we expected they would have not only explanatory power over the implementation of e-petitions but also of the magnitude of how this tool was used. While the number of included observations was scarce, counting only those municipalities that have implemented e-petitions, a limited number of independent variables was included. This refers only to those variables that were significant in earlier models.

Table 1
Description of data

Variable	Description	Type	Source
<i>Dependent variables</i>			
e-petition	Information on whether a municipality has implemented e-petitions at the beginning of 2022	Categorical (yes/no)	Municipalities' websites and Statistics Sweden (2022:1)
Incoming e-petitions	Number of incoming e-petitions per 1,000 inhabitants in 2021	Quantitative	Statistics Sweden (2022:2)
<i>Independent variables</i>			
<i>Demographics</i>			
Population size	Number of inhabitants in the municipality (logarithmized) in 2021	Quantitative	Statistics Sweden (2022:3)
Average age	Average age of the population in 2020	Quantitative	Statistics Sweden (2022:4)
Level of urbanization	The degree of urbanization of the municipalities, based on the share of the population who lived in urban centers and rural grids in 2021	Ordinal (cities, towns and suburbs, rural areas)	Eurostat (2022)
<i>Economy</i>			
Average income	Average income (median) of the population in the municipalities in 2020	Quantitative	Statistics Sweden (2022:5)
Municipal solvency	Municipalities' equity in relation to total assets on the balance sheet for 2020	Quantitative	Kolada (2022)
Education level	Share of citizens with a high education (3+ years of higher education) in 2021	Quantitative	Statistics Sweden (2022:6)
<i>Technology</i>			
Social media index	Municipal usage of social media. Index reflecting whether municipalities used social media to inform their citizens, uphold contact with citizens, or enable them to influence political decision-making. An index was created that simply calculates the sum of the activities that municipalities say they used social media for in 2021.	Ordinal (0–4)	Statistics Sweden (2022:7)
Web index	Index reflecting whether municipalities provide the following on their website: open records, information about parties in the local rule, possibilities for sending messages to politicians, a system for collecting viewpoints, and airing of council meetings. An index was created to calculate the sum of the activities that municipalities used on their website in 2021.	Ordinal (0–5)	Statistics Sweden (2022:8)
Digital post	Information on whether the municipalities were connected to the national infrastructure for secure messaging in 2021	Categorical (yes/no)	Swedish Agency for Digital Government (2022)
<i>Democracy</i>			
Local democracy index	Information on whether the municipality have a body that works with democratic development, have a strategy for democratic development, or provide certain funds for democratic development for 2021	Ordinal (0–3)	Statistics Sweden (2022:9)
Citizen dialogue	Presence of citizen dialogues in 2021	Categorical (yes/no)	Statistics Sweden (2022:10)
Voter turnout	Share of the population who participated in the 2018 municipal election	Quantitative	Statistics Sweden (2022:11)
Local government rule	Parties making up the local government rule. The Social Democrats, the Green Party, and the Left Party are considered left-wing parties, while the Centre Party, the Liberals, the Christian Democrats, and the Moderate Party are treated as right-wing parties. A combination of parties from the left and right includes a mixed rule. Data is taken from 2021.	Categorical (left/right/mixed rule)	The Swedish Association of Local Authorities and Regions (SALAR, SKR 2022)

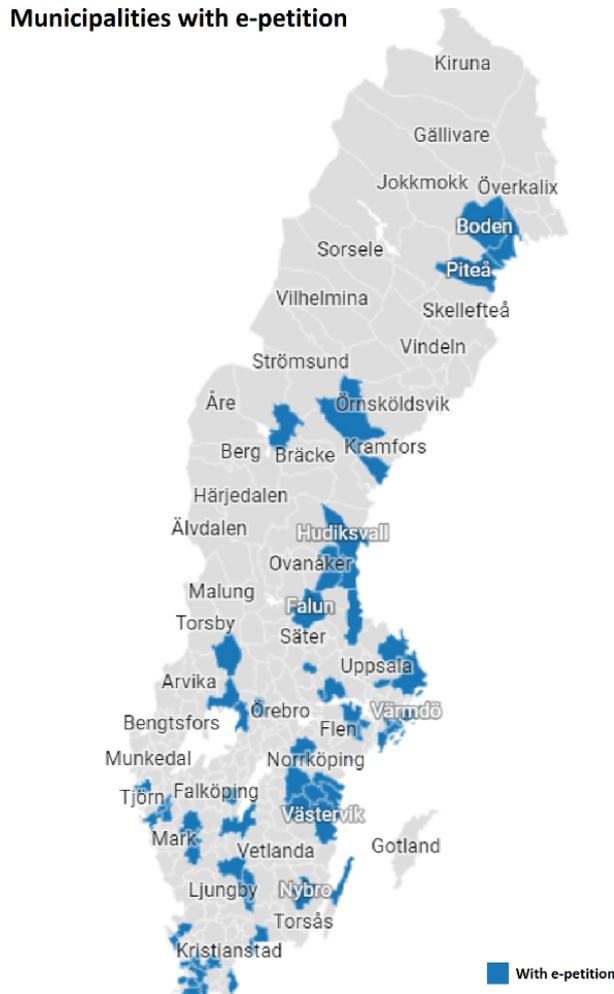


Fig. 2. Map of municipal distribution of e-petitions for 2022.

Throughout the analyses, we addressed the specifications of the models by ensuring that no multicollinearity was present in them.

4. Results and analysis

4.1. Descriptive findings

We started our empirical endeavor by providing descriptive and correlational statistics reflecting the distribution of our dependent variable. In Fig. 2, a map is presented that discloses the geographical distribution. This visualizes the general pattern that a majority (78%) of Swedish municipalities have refrained from introducing e-petitions. The proportion (22%) that used e-petitions in 2021 as instruments for their local democracy was scattered throughout Sweden. Any obvious geographical pattern is difficult to detect, other than e-petitions being more frequently implemented among municipalities in the middle

Table 2
Distribution of e-petitions by municipal type (in %)

	Rural areas	Towns and suburbs	Cities
E-petitions	14	27	52
No e-petitions	86	73	48
Total	100	100	100

and south of Sweden. Furthermore, a closer look into the population size reveals a similar pattern. While the average population in municipalities that lacked e-petitions is slightly below 30,000 inhabitants, the corresponding number for municipalities that implemented them is above 58,000. Hence, demographic conditions can be potentially important predictors; therefore, we take a closer look at how they relate to the dependent variables.

In Table 2, the characterizations of municipalities are displayed together with information about whether e-petitions were implemented. It is evident that this instrument is rare among rural municipalities, as the majority have not yet introduced it. Among the intermediate category, it is somewhat more common but is still not the most usual option. However, among the larger cities in Sweden, which constitute less than 10% of municipalities, it is somewhat more common to have implemented e-petitions than not. As is evident from these numbers, this variation is not random but is statistically significant.

Finally, among municipalities that have implemented e-petitions in Sweden, the average time in which they have been in use is approximately four years. A relatively large proportion of municipalities has recently implemented e-petitions while a few organizations have used them for more than a decade.

4.2. Explanatory findings: Variation in municipal implementation of e-petitions

Table 3 provides explanatory analyses of variation in municipalities' use of e-petitions. Several separate models are presented in the table, drawing on the categorization pursued in the theoretical section and dividing explanatory variables according to the aspects of demographics, economy, technology, and democracy.

In Model 1, demographic explanations were assessed in relation to the dependent variable. A convincing effect verifying the descriptive analyses above is the variable regarding population size, which reports a positive relationship with the dependent variable. However, average age and urbanization levels yield no importance for municipalities' implementation of e-petitions.

In the next estimation, Model 2, we examined the effect of economic circumstances. Measurements were collected that reflected resources among the citizens, income and education levels, and the municipalities' financial situation. The only noticed effect was the one targeting levels of education. An interpretation of the predictor disclosed that a 1 percentage unit increase in municipal education level strengthened the odds by about 6 percentage units that municipalities had implemented e-petitions.

In Model 3, we tested the effect of technological predictors. We applied our two indexes reflecting municipalities' evolution regarding both social media adoption and website use and included the variable reflecting whether or not municipalities apply digital post. The estimation revealed a positive effect from more developed social media usage and the use of digital post.

The final block of independent variables was represented by those measuring local democracy. They ranged from efforts to improve the local democracy, as captured by the applied index, to the occurrence of citizen dialogue and voter turnout as a general proxy. The index was transferred to three dummy variables for a more accurate estimation, and the distinction between partisan variations in local rule was included. Three of the variables yielded importance. A higher, albeit not the highest, level of the measurement of

Table 3
 Explanations of municipalities' implementation of e-petitions

	Dependent variable: implementation of e-petitions				
	Model 1	Model 2	Model 3	Model 4	Model 5
Demographics					
<i>Population size (log)</i>	6.868*** (0.555)				3.638** (0.570)
<i>Average age</i>	1.136 (0.081)				
<i>Level of urbanization</i>	0.694 (0.333)				
Economy					
<i>Average income (median)</i>		1.000 (0.000)			
<i>Municipal solvency</i>		0.999 (0.010)			
<i>Education level</i>		1.059** (0.027)			0.988 (0.026)
Technology					
<i>Social media index</i>			1.486* (0.233)		1.367 (0.249)
<i>Web index</i>			1.401 (0.208)		
<i>Digital post</i>			2.369*** (0.906)		1.722 (0.355)
Democracy					
<i>Local democracy index, dummy 1 (reference 0)</i>				1.357 (0.406)	1.156 (0.472)
<i>Local democracy index, dummy 2 (reference 0)</i>				3.923*** (0.432)	2.511** (0.459)
<i>Local democracy index, dummy 3 (reference 0)</i>				1.848 (0.603)	1.045 (0.639)
<i>Citizen dialogue</i>				2.570** (0.426)	1.948 (0.441)
<i>Voter turnout (municipal)</i>				1.081 (0.052)	
<i>Left rule (reference: right-wing rule)</i>				0.304* (0.672)	0.471 (0.686)
<i>Mixed rule (reference right-wing rule)</i>				1.258 (0.332)	1.406 (0.358)
Nagelkerke	0.155	0.042	0.100	0.139	0.220
N	290	290	245	242	245

Note: Entries are odds ratios, with standard errors in parentheses. The dependent variable is whether e-petitions were adapted. Multicollinearity was controlled for, not allowing a variance inflation factor (VIF) score > 5. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

local democracy appeared to be positively correlated with the implementation of e-petitions. Similarly, the adoption of citizen dialogue was also related to the dependent variable. Finally, where left rules were maintained, the odds of having implemented e-petitions were lower in relation to the reference category of right-wing rule.

In Model 5, we gathered all significant predictors in the analysis, where controls were made for those variables reporting importance in previous estimations. The model revealed a higher explanatory power, with Nagelkerke being above 20%, but with only two variables exhibiting an effect. We can conclude that more-populated municipalities have a greater chance of adopting e-petitions. In addition, the ambitions of local democracy were pronounced, at least up to a moderate level. Upon close examination of the items included in the index, it appeared that instituting a political unit targeting democracy issues and having a formulated strategy were particularly relevant to the dependent variable.

4.3. Explanatory findings: Variation in municipal usage of e-petitions

We turn to the second dependent variable, that is, the share of incoming suggestions among those municipalities that have implemented e-petitions. These models were limited by a lower number of cases, since only municipalities using e-petitions were included. To make comparisons possible, we used the number of incoming suggestions per 1,000 citizens.

Table 4
Explanations of citizens' use of e-petitions

	Dependent variable: incoming e-petitions	
	Model 6	Model 7
<i>Population size (log)</i>	−0.973** (0.460)	
<i>Education level</i>	−0.009 (0.022)	
<i>Social media index</i>	0.432* (0.234)	
<i>Digital post</i>	0.780** (0.315)	
<i>Local democracy, dummy 1 (reference 0)</i>		−0.460 (0.397)
<i>Local democracy, dummy 2 (reference 0)</i>		−0.202 (0.334)
<i>Local democracy, dummy 3 (reference 0)</i>		−0.401 (0.659)
<i>Citizen dialogue</i>		−0.616 (0.405)
<i>Left-wing rule (reference: right-wing rule)</i>		1.432 (0.982)
<i>Mixed rule (reference right-wing rule)</i>		−0.290 (0.294)
<i>Adj. R2</i>	0.188	0.087
<i>N</i>	39	39

Note: Entries are b-coefficients, with standard errors in parentheses. The dependent variable is the number of incoming suggestions through e-petitions per 1,000 citizens. Multicollinearity was controlled for, not allowing a VIF score > 5. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We derived this from the same number of variables that indicated relevance in previous models (1–5) and disregarded the others, as they were without an explanatory effect when the variation in municipalities' implementation of e-petitions was examined. As we encountered the general problem of too many variables and too few observations, we divided our analyses into two steps. Consequently, in Model 6, we included predictors originating from blocks of demography, economy, and technology. Somewhat surprisingly, higher populations were related here to lower levels of incoming suggestions. Two other independent variables yielded significant outcomes regarding the expected relationship. The first was that a more developed use of social media had a positive effect on the number of incoming suggestions through e-petitions, and the second was that municipalities that had implemented digital post disclosed a similar relationship. The explanatory power of the model indicates some importance but also hints that other circumstances have not been identified.

In Model 7, we examined the importance of variables measuring local democracy. However, none of the independent variables yielded significance, meaning that the model lacked the ability to explain the variation in the number of incoming suggestions.

Therefore, the explanation of municipal variation in the scope of incoming suggestions through e-petitions was influenced by a combination of demographic and technical aspects. In terms of population size, the effect was negative, while there were positive effects related to municipal work with digital tools, such as social media and digital post.

5. Discussion

Our findings in the previous section provide several insights about the implementation of e-petitions by municipalities and citizens' use of them on a local level in Sweden.

As mentioned, the use of digital technology for the purposes of democracy and political participation has been quite limited thus far (see, Ilshammar et al., 2005; Sundberg, 2019), and our results show that only one-fifth (22%) of the Swedish municipalities have implemented e-petitions.

By examining a range of variables from four overarching dimensions – demographics, economy, technology, and democracy – our final model highlights the influence of population size and established democratic structures to explain why some municipalities implement e-petitions while others do not.

Thus, the implementation of e-petitions is somewhat expectedly more likely in large municipalities with established functions responsible for democratic structures. However, the actual use of these systems, in the form of incoming e-petitions per capita, is negatively correlated with population size. While our results do not allow for causal explanations, we can speculate about them to pave the way for further research. Swedish municipalities vary greatly in size, from small areas of 3,000 citizens to large cities of several hundred thousand residents. To make effective use of e-petitions, a critical mass of involved citizens is needed to submit and sign petitions, which may explain why they are implemented more often in larger municipalities. In smaller municipalities, it may be easier to orchestrate other forms of (non-digital) democratic activities while e-petitions would have limited effects (Lidén, 2016). A reason why citizens' use of e-petitions seems to decline with population size may be that a saturation point exists, with only a certain number of topics relevant for citizens to target with petitions. The areas of responsibility among municipalities, such as education and social care, remain the same, independent of population size. Nevertheless, this variable deserves attention in further research. At the same time, finding casual explanations for citizens' use of e-petitions could mean diving deeper into other areas in future research, such as barriers established by municipalities. For example, if a signature threshold is set too high, this can reduce citizens' motivation to participate (Wright, 2015). Meanwhile, the use of other measures, such as authentication, could impede participation by becoming too complicated (Reid, 2014).

The number of incoming e-petitions is also positively correlated with municipalities' previous use of digital infrastructure such as digital post, as well as use of social media. Therefore, citizens seem to be stimulated to actively submit petitions if they have formed a habit of communicating with the government through other digital channels. While this study reinforces the notion that social media use by the government increases citizens' political participation through other digital tools (Arshad & Khurram, 2020; Lidén & Larsson, 2016; Pflughoeft & Schneider, 2020), the government's use of digital post tells us that employing other tools for digital communication could also be fruitful.

6. Conclusions

In this paper, we sought to explain the variations in implementation and use of e-petitions by posing two RQs and drawing on data from Swedish local governments. We took an explorative approach by combining open sets of official data from statistical databases with our own investigations. Our study provides insights into factors leading to municipal implementation and citizens' use of e-petitions and, thus, provides important knowledge for the fields of e-government, e-participation, and e-democracy.

Our findings revealed that e-petitions are implemented on a relatively modest scale by Swedish local governments, as they are implemented by only 22% of municipalities. Our results also revealed that e-petitions are more commonly implemented in municipalities with larger populations.

RQ1: What patterns explain the variation in the implementation of e-petitions?

Population size and a formulated strategy for democratic work are positively correlated with the presence of e-petitions. To some extent, this indicates a citizen pressure model in which municipalities of greater size appear to face requirements to develop additional democratic tools (Lee et al., 2011). Furthermore, it seems that municipalities that are already working actively with democratic measures do so using this instrument (see, Schuler, 2018). Although this represents positive information for citizens

residing in such communities, it also raises fears of unequal conditions based on a citizen's home district (Lidén, 2016). Since we know that widespread access of digital tools does not translate into equal participation (Berg, 2017; Matthews, 2021; Ulo et al., 2019), parallel risks of inequality should be highlighted, ranging from the municipal level to the individual level. Similar arguments are presented within the frame of advocacy democracy and its struggle to create political equality (Cain et al., 2003). The explanatory power of our estimations not only imply that they are important but also that they are indicative of other circumstances of potential relevance not captured in our models. As a consequence of the findings, one could ask whether e-petitions are implemented in areas where they could be the most useful.

RQ2: What patterns can explain the scope of the use of e-petitions?

Interestingly, among those municipalities that have implemented e-petitions, citizens in less populated communities are more inclined to use them. As population size is vital for the implementation of e-petitions, the actual citizen use of this innovation is more frequent in smaller municipalities. A democratic problem could arise if the e-petition is not implemented where it could be of greatest use in terms of advocacy, which could make the risk of the inequalities in RQ1 more severe. That this predictor can work both ways is an important finding of this study, and it calls for further research. More expected is that municipal engagement in other digital technologies for citizen relations reveals positive effects for the use of e-petitions. A more versatile battery of similar technologies appears to function as a strengthening agent (Lidén & Larsson, 2016).

Through these results, our study contributes to current literature with factors that can explain the implementation and use of e-petitions. Moreover, as we used several data sources and tested numerous variables, we also provide “negative” results, as several variables did not exhibit major or significant effects. By doing so, our study opens the possibilities for comparative analyses in additional contexts.

From the results, we can present implications for research as well as practice for municipalities that work with e-petitions. While our study reveals interesting patterns related to the implementation of e-petitions by municipalities and their use by citizens, we provide no answer to the actual potential effect of this instrument as a remedy for contemporary challenges for democracies (Heidar & Wauters, 2019; Papadopoulos, 2013; Norris, 2011; Putnam, 2002). Although we expect positive outcomes in how e-petitions can both motivate and channel citizen participation and influence legitimacy for the political system within the realm of advocacy democracy (Cain et al., 2003), we encourage future research on e-petitions to examine our constructs in depth. For example, doing so would generate a greater understanding of the relationships between strategic work, e-democracy, and prevailing democratic challenges.

The more e-petitions are used by citizens, the greater the chance of advocacy being beneficial for democracy. As our results reveal that smaller citizen communities may be more active in using e-petitions, we encourage practitioners to seek ways to test the viability of implementing these systems in less populated areas. Moreover, if municipalities seek to generate advocacy by encouraging more incoming e-petitions, they should consider using other tools for digital communication, such as digital post and social media.

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