Determinants of e-government implementation at the local level: An empirical model

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Abstract

Purpose: The empirical research of e-government at the local level has been the subject of many studies in the last two decades. The evidence collected by those studies constitutes a relevant opportunity towards the development of a theory of local e-government implementation. However, several synthesis efforts are needed before such a theory can be developed. This article contributes to that endeavour by proposing an empirical model of the determinants of e-government implementation by local governments.

Methodology: The empirical model results from the systematic revision of 59 primary studies published in scientific journals, between 2002 and 2018. As a starting point, a conceptual map relating concepts such as readiness, diffusion, adoption, implementation, and institutionalization is presented.

Findings: There is a common set of determinants that explains local e-government implementation in general, and three other sets of determinants that contribute to differentiate each one of three e-government dimensions: e-participation, e-transparency, and e-services.

Research implications: Because it was found that different determinants are associated with different e-government dimensions, future empirical studies should differentiate between those dimensions when studying local government.

Originality: This is the first study to attempt a *synthesis* effort on the determinants of e-government implementation by local governments.

Keywords: e-government; local government; public administration; diffusion of innovation; institutional theory

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1. Introduction

Local e-government refers to the use of “information and communication technologies to support government operations, engage citizens, and provide government services at the local level” (Dias, 2019a). In the past two decades, many empirical studies focused on identifying the determinants of local e-government implementation. However, despite the obvious relevance of the subject, there is a notorious absence of secondary studies that seek to synthesize the results of those studies.

One reason for this state of affairs is that, due to the different scopes, approaches and methods used in the different empirical studies, synthesizing results is not an easy task. On one hand, this is the consequence of the comprehensive nature of e-government (Relyea, 2002; Yiliz, 2007; Wirtz et al., 2015), with the possibility that different determinants may exist for different dimensions of the phenomenon (e.g. disclosing of information, provision of electronic services, allowing the participation of citizens). On the other hand, it is related to the different research approaches used (e.g. quantitative studies, qualitative studies, mixed methods), the different methods used to collect data (e.g. website content analysis, questionnaires, interviews, secondary data), and the different techniques applied to analyse data (e.g. correlation analysis, regression analysis, structural equation modelling, inductive reasoning).

Despite this diversity, a synthesis can be achieved by assuming that determinants can be identified using different research approaches and for different e-government dimensions. Thus, although not allowing a consolidated measure of the degree of association of each construct, such a strategy allows identifying which constructs were found to be associated with each local e-government dimension and how frequently those associations were observed by the various studies.

Taking that into consideration, this study uses a systematic literature review to build a consolidated view of the generic constructs that are described in empirical studies as being associated with local e-government implementation. The underlying research questions is: What are the determinants that have been empirically observed as being associated with e-government implementation by local governments? A subsidiary research question is: Which of those determinants have been observed as being associated with each e-government dimension?

The contribution of the study is straightforward: an empirical model of the determinants of e-government implementation by local governments. Such a model is useful for researchers studying local e-government as well as for practitioners involved in the definition and implementation of public policies and in the development of concrete local e-government applications.

The remaining of the article is organized as follows: the assumptions and theoretical references of the study are addressed in Section 2; the research design is described in Section 3; the resulting model is presented in Section 4; the discussion is addressed in Section 5; and the main conclusions are resumed in Section 6.

2. Theoretical references

In this section, the main assumptions and theoretical references of the study are addressed. First, the concept of e-government implementation is discussed in connection with related concepts such e-government readiness, e-government diffusion, e-government adoption, and e-government institutionalization. Then, the assessment of e-government implementation is discussed.

Following, the Diffusion of Innovation Theory and the Institutional Theory are briefly presented, since they provide useful conceptualizations of adoption and institutionalization of innovations by organizations.

2.1. Implementation

In this study, ‘e-government implementation’ (Dwivedi et al, 2009; Dwivedi et al, 2011; Rose & Grant, 2010) is conceptualized as part of a larger process. Five generic assumptions are made relating that process (see Figure 1). First, it is assumed that adoption precedes implementation, meaning that something is only implemented by an organization after an adoption decision has been made. Thus, ‘e-government implementation’ depends upon ‘e-government adoption’ (McNeal et al., 2003; Norris & Moon, 2005). Second, the process that leads to an adoption decision is influenced by several internal and external factors that are typically studied in the scope of diffusion studies. So, although indirectly, ‘e-government implementation’ is also related to ‘e-government diffusion’ (Azad et al, 2010; Zhang et al, 2014). Third, both the decision to adopt and the successful implementation of e-government depend upon the existence of some infrastructural and knowledge background, both in government and society. This background is generically referred to as ‘e-government readiness’ (Valdés et al, 2011; Khalil, 2011). Fourth, implementation can be followed by a process of ‘institutionalization of e-government’ (Fountain, 2001; Tolbert et al., 2008; Kim et al., 2009; Steinbach et al., 2019) that can influence the success of future implementations. Fifth and last, implementation is a process through which more sophisticated technologies or more sophisticated uses of those technologies are gradually incorporated into the organization, transforming the relationships with its stakeholders. Therefore, ‘e-government implementation’ cannot simply be assessed by means of a dichotomous variable (implemented / not implemented) but instead it must be assessed through some sort of

incremental scale or frame of reference that allows to value cumulative achievements. In this study, the valuation of implementation in each moment in time is conceptualized as the ‘degree of e-government implementation’. This concept supports many quantitative studies, namely those based on surveys and website content analyses. Some qualitative studies are based in frames of reference that also take the concept into consideration, either explicitly or implicitly.

Because of the interpenetration of concepts discussed above, the assessment of the degree of e-government implementation leads to capturing determinants that might be primarily bound with e-government implementation, e-government diffusion, e-government readiness, e-government adoption, and e-government institutionalization. Indeed, it is natural that e-government implementation is linked to all those factors, since it is only one step in a multistep and multicycle process. Moreover, since many empirical studies use statistical analysis to find association between the degree of e-government implementation and possible determinants, the original bindings of the determinants are rarely captured. Thus, the mixture of concepts is unavoidable in practice. This is clearly assumed in this study.

2.2. Assessing implementation

As presented in the previous section, qualitative studies aiming to study e-government implementation typically consider frames of reference that take into consideration the degree of e-government implementation. Usually, these frames of reference follow a maturity stages logic, thus being either explicitly or implicitly based in some sort of maturity model (e.g. Layne & Lee, 2001; Hiller & Bélanger 2001; Wescott, 2001). Concerning quantitative studies, they typically define indices in order to measure the degree of e-government implementation. Many of these indices are also originally inspired by maturity models (e.g. West, 2003; Wauters et al., 2007; Rorissa et al., 2011; Veljković, 2014).

In their essence, maturity models define a set of structured stages that are to be sequentially followed in order to achieve a high degree of sophistication in a specific process or organization, each maturity stage being characterized by set of partial achievements. Such models have become popular in several disciplines, including software engineering (Paulk et al., 1993), information systems (Holland & Light, 2001), and business engineering (Lockamy, 2004). In e-government, they gain popularity from the beginning of this century “as a tool for assessing, comparing, and benchmarking the progress and success of e-government implementations” (Andersen et al., 2011, 440). However, they are not exempt from criticism, namely because of being technology biased (Andersen & Henriksen, 2006); not being based on empirical evidence (Coursey & Norris, 2008; Klievink & Janssen, 2009), and not focusing all relevant e-government dimensions (Andersen et al., 2011).

When the assessment of e-government implementation is at stake, ‘traditional’ maturity models have two additional limitations: they often mix different e-government dimensions that can be implemented and measured independently (e.g. e-information, e-services, e-participation) (Dias & Costa, 2013); and they presuppose that development occurs in big leaps (from one maturity stage to another), whereas in reality improvements might be incremental and not necessarily achieved in a given order (West, 2004; Gil-Garcia & Martinez-Moyano, 2007; Klievink & Janssen, 2009).

To overcome the first of the mentioned limitations, both specialized models (e.g. Concha et al., 2012; Veljković et al., 2014; Veenstra et al., 2011) and multidimensional models (e.g. Dias, 2011; Dias & Costa, 2013) have been developed. Concerning the second limitation, two main approaches were taken: to assume the incremental nature of e-government implementation and, consequently, to value single simpler achievements (e.g. disclosure of mandatory information items; degree of interaction in specific services,

availability of a complaints book) regardless of their association to maturity stages (consequently defining quasi-continuous indices); and to define alternative assessment models, namely in the framework of service quality evaluation (e.g. Papadomichelaki & Mentzas, 2012; Sá et al., 2016).

As there is no standard instrument to assess e-government implementation and to restrict the analysis to primary studies using a single approach would result in a sample too small to allow any significant results (and might also limit the ability to capture different determinants since some approaches may be better suited to identify certain determinants than others), this study concentrates on what is being assessed (the adoption of increasingly sophisticated technologies or uses of those technologies by local governments in the scope of e-government) rather than on how it is being assessed, provided that a scientifically valid method is used. Therefore, determinants will be registered regardless of the methods used to assess e-government implementation and to identify its associated determinants. Whenever present, the specific e-government dimensions for which the determinants were identified will also be registered. The underlying assumptions are that different e-government dimensions can be observed independently, using variable methods, exhibiting different degrees of implementation, and being influenced by different determinants.

2.3. Diffusion of Innovation

E-government implementation can be seen as a succession of innovations that are adopted by organizational providers over time. Therefore, it makes sense to resort to theories that explain the diffusion of innovation in society in order to understand e-government implementation. The Roger's (2003) DOI Theory, initially published in 1962, stands out from this point of view.

The DOI Theory explains adoption as “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, 5). While applying his theory to organizations, Rogers (2003, 411) identifies three types of determinants of organizational innovativeness: attitude towards change of the so called champion, defined as “a charismatic individual who throws his or her weight behind an innovation, thus overcoming the indifference or resistance” (Rogers, 2003, 404); internal characteristics of organizational structure (including centralization, complexity, formalization, interconnectedness, organizational slack, and size); and external characteristics of the organization (system openness). Because e-government implementation can be seen as a succession of organizational innovations, it is relevant for the study presented in this article to assess to what extent these predicting factors were found relevant in the underlying studies.

Among the previously mentioned determinants, the size of the organization appears as being highly correlated with innovativeness in many studies. According to Rogers (2003, 411), this happens because size is easily measured and as such is included in almost every study and also because it is a “surrogate measure of several dimensions that lead to innovation”: total resources, slack resources, technical expertise, and organizational structure, amongst others. The consideration of this multifaceted nature of the size of the organization is relevant for this study since, as it will become clear, the size of local governments is one of the most frequently identified determinants of local e-government implementation.

2.4. Institutional Theory

Institutional theory defines three independent mechanisms that contribute to generate isomorphism within and across organizations over time: regulatory (political and legislative influences), mimetic (replication of other organization’s practices), and normative (motivated by norms that prevail in the domain to which the organizations belongs to) (DiMaggio &

Powell, 1983; Scott, 2001). In this context, “Information and Communication Technology is perceived, implemented, and used in virtue of pre-existing institutional arrangements (sociological, cultural, legal, and formal aspects) that grant stability”, being that “stability is necessary for organizations to operate” (Janssen et al., 2012). According to Kim et al. (2009, 44), “institutional theory can help identify challenges surrounding the implementation of e-government systems” and elucidate on “how an innovation or new system developed in an organization is diffused, adopted, or copied by others.”

Thus, considering the objective of this study, it is relevant to assess to what extent determinants of local e-government implementation are associated with the three mechanisms defined by the Institutional Theory. In other words, it is relevant to assess to what extent the Institutional Theory can be used to explain local e-government implementation, at least as observed by empirical studies.

3. Research design

This study uses a systematic literature review in order to identify and synthesize the main determinants of e-government implementation by local governments. This type of secondary study was selected because it is adequate to “identifying, evaluating and interpreting all available research relevant to a particular research question” (Kitchenham, 2004). The defined research question is directly related to the objective of the study: What are the determinants that have been empirically observed as being associated with e-government implementation by local governments? Besides the definition of the research question, the review protocol included four other sequential phases: data retrieval; selection of studies; information extraction; and synthesis of the information extracted. These phases are described in detail in the subsequent paragraphs.

The Scopus abstract database was used as the primary source for information. This database was selected because it follows high quality standards and provides better coverage of source titles associated with e-government research than other similar sources (Dias, 2019b). Indeed, contrary to what happens with Web of Science, Scopus indexes articles published in journals such as ‘Electronic Government’, ‘International Journal of Electronic Government Research’ and ‘International Journal of Electronic Governance’, for example. The search criteria included all documents having the expressions ‘e-government’, ‘m-government’, ‘digital government’, ‘smart government’, ‘e-governance’, ‘e-democracy’, or ‘e-participation’, or any of their common variations, in their title, abstract or keywords, combined with the co-occurrence of the expressions ‘local government’, ‘municipalities’ or ‘cities’ and of the expressions ‘determinants’ or ‘factors’ (see Expression 1). These criteria were defined after detailed tests and consideration in order to maximize the number of relevant documents retrieved.

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(TITLE-ABS-KEY("electronic government" OR "e-government"
OR "egovernment" OR "m-government" OR "digital government"
OR "smart government" OR "electronic governance" OR "e-governance"
OR "egovernance" OR "digital democracy" OR "e-democracy"
OR "edemocracy" OR "e-participation")
AND TITLE-ABS-KEY("local government" OR "municipalities" OR "cities")
AND TITLE-ABS-KEY("determinants" OR "factors"))
```

(1)

The search was run on the 25th September 2018 and retrieved a total of 432 documents. In order to assure the quality of the base studies, the list was then refined to include only published articles, published reviews and articles in press, thus excluding conference papers, conference reviews and book chapters. The resulting subset included 201 documents.

In the second phase of the review protocol, the abstracts of all 201 articles were reviewed in order to identify their relevance *vis-a-vis* the research question. The inclusion criteria included all documents (i) reporting primary studies; (ii) addressing local government; (iii) seeking to explain e-government implementation by providers (therefore excluding documents addressing, for example, e-government adoption by citizens); and (iv) identifying determinants of e-government implementation. In this phase, any duplicated studies produced by the same authors based on the same empirical data were also eliminated. In these cases, only the last published study was considered. Whenever needed, the full texts of the documents were reviewed in order to resolve ambiguities. A total of 59 documents met the inclusion criteria.

In the third phase, the full text of the documents was retrieved and reviewed in order to identify the determinants of e-government implementation that were found relevant in the reported studies. For each document, the original designations and descriptions of the identified determinants were registered, as well as information on the analysed e-government dimension, if any. For primary studies using multiple regression analysis, only the statistically significant determinants were considered.

In the fourth and final phase of the review protocol, the previously identified determinants were combined into a coherent set of categories that correspond to generic constructs associated with e-government implementation by local governments or, in other words, constitute a synthesis of the original determinants found in the primary studies. To ensure a robust model, only the determinants observed by at least two independent studies were considered.

4. Results

The following subsections present the results of the study by addressing, successively: the e-government dimensions addressed by the primary studies; the synthesis of the implementation determinants found relevant by those studies; and the model of determinants of local e-government implementation that results from depicting together the synthesized determinants with the applicable dimensions.

4.1. Dimensions

The selected primary studies were analysed to what concerns the e-government dimension addressed. As is shown in Table 1, three relevant dimensions were found:

- The e-participation dimension relates to the availability of means that support the participation of citizens in decision making. The most common platforms for this effect include the local government websites and social media. In this dimension, the assessment of implementation typically considers the participation tools that are available and the type of participation they allow.
- The e-transparency dimension relates to the provision of information by local governments, typically through their websites. Besides e-transparency, common expressions used in the primary studies to refer to this e-government dimension include e-information, e-reporting and e-disclosure. In this dimension, the assessment of implementation typically considers the nature, the relevance and the usefulness of the information provided.
- The e-services dimension refers to the provision of electronic services to citizens and businesses by the local governments. Besides the simple provision of services, this dimension also concerns with e-government integration (Scholl & Klischewski, 2007), since integration is especially relevant for the

provision of client-centered services (Kunstelj & Vintar, 2004; Dias & Rafael, 2007; Klievink & Janssen, 2009). In this dimension, the assessment of implementation typically considers the number of services provided and the degrees of interaction and integration offered in the provision of such services.

As shown in Table 1, the studies are distributed in a balanced way among the three dimensions considered, with about one quarter of the studies addressing each dimension. The fourth quarter includes studies that address more than one e-government dimension simultaneously (not distinguishing between the determinants of the different dimensions) or that analyse e-government implementation in general (not referring to specific dimensions). Because, in these last two groups, determinants cannot be associated with specific e-government dimensions, those studies were only considered for synthesizing general e-government determinants (determinants that are not associated with a specific e-government dimension).

4.2. Determinants

Table 2 includes the generic constructs that resulted from the synthesis of the determinants originally referred to in the primary studies. Only the determinants that were found significant for at least a given e-government dimension by at least two independent primary studies were considered. Regardless of the dimensions, all the listed constructs were found relevant by at least four independent studies.

As is shown, some constructs are more frequent than others. Nonetheless, no considerations are made concerning the relative importance of the different determinants based on frequency of observation since that frequency may be related to other factors such as the number of studies, availability of indicators, and ease of measurement.

Table 3 shows the description of each construct and, when applicable, the rationale behind its formulation. As in any generalization effort, each synthesized construct encompasses some finer different concepts which, although related, are not necessarily coincidental. In any case, the proximity of concepts and, whenever applicable, the possible binding with constructs resulting from the DOI and Institutional theories (See Section 2) were taken into careful consideration in order to synthesize the general determinants.

4.3. The resulting model

Figure 2 depicts the model that is obtained by associating the synthesized determinants (see Tables 2 and 3) to the dimensions they are applicable to (see Table 1). The determinants are combined into four categories: the internal determinants category, which groups the constructs that correspond to internal characteristics of the local governments; the local socioeconomic determinants category, which groups the constructs that correspond to socioeconomic characteristics of the territorial jurisdiction of the local government; the local political determinants category, which groups the constructs that are associated with the local political sphere; and, finally, the other environmental determinants category, which groups the constructs associated with external factors that do not necessarily depend on the local scope.

As visible in Figure 2, internal determinants and local socioeconomic determinants are transversally associated with e-government implementation by local governments. That is, all of them were observed to be relevant for all three dimensions of e-government (e-participation, e-transparency, and e-services). On the contrary, local political determinants and other environmental determinants differ on the dimensions they are associated with. Figure 2 also depicts an association between five of the constructs that act as determinants: demography, size of local government, financial capacity, management capacity, and

technical capacity. In effect, local governments whose territorial jurisdictions are more populous tend to have larger budgets and, consequently, more capacity to attract and retain qualified human resources. They are, thus, associated with the ‘size of the local government’ that, as has been previously referred in connection with the DOI theory, ‘is a surrogate measure of several dimensions that lead to innovation’ (see Section 2.3). In Figure 2, this association between the five constructs is represented with a dotted line.

As previously mentioned, there is a substrate that is relevant to the implementation of local e-government in general (regardless of the dimension considered). Besides this substrate, differences between dimensions are all resulting from external determinants. Indeed, e-participation implementation is bound to local political determinants while e-services implementation, not being linked to those, is influenced by the regulatory framework and the stakeholders’ pressure (including civil society and non-governmental stakeholders influence). e-Transparency implementation, on the other hand, is associated with both the participation of citizens and the regulatory framework.

5. Discussion

The model is discussed in this Section. Specifically, plausible explanations for differences between e-government dimensions are explored; the bindings to theory are examined; the opportunities for further studies are presented; and the utility and limitations of the study are addressed.

5.1. Differences between dimensions

The most interesting conclusion of the study is that, besides a common substrate related to the internal characteristics of the local government and to the dynamism of its territorial jurisdiction, e-services, e-transparency and e-participation have different external

determinants. Looking closely at these determinants, there are plausible explanations why they appear as being relevant for the different dimensions.

First, the political orientation and the political environment are relevant for the e-participation dimension. This is coherent with e-participation implementation being driven either by the political orientation of the local government (therefore being ideologically motivated) or by a reaction of the local government to political competition (probably motivated by a quest for reinforced legitimacy). As could be expected, e-participation is also associated with the citizens' willingness to participate.

Second, besides e-participation, the participation of citizens is also relevant for e-transparency. This is not unexpected, since the participation of citizens depends on the availability of the information that allows them to participate. So, more involved citizens demand more transparent local governments. Aside from that, e-transparency is also being driven by the existence of transparency laws that oblige local governments to publish certain documents online (e.g. procurement notices, budgets, annual plans, annual reports, staffing lists).

Third, laws, regulations and directives are relevant for e-services implementation. This is consistent with the provision of e-services (and, more importantly, their integration) being subject to several technical and normative constraints. The relevance of the external stakeholders' pressure for e-services implementation could be a manifestation of the software providers influence on the decisions to adopt.

5.2. Bindings to theory

Looking at the internal characteristics of the local government, and except for 'experience', all determinants have a binding with constructs predicted by the DOI Theory

(See Table 4). Consequently, this Theory seems adequate to explain the determinants associated with structural characteristics of the local government. Relating the local socioeconomic determinants, no direct coincidence exists between the identified determinants and any constructs of the DOI Theory. However, some of these may be related to the social system through which the innovation diffuses, namely to system openness (degree to which the members of a system are linked to other individuals who are external to the system). That might also be the case with the ‘stakeholders’ pressure’ determinant.

While not being explained by the DOI Theory, the ‘experience’ determinant may be linked to the ‘institutionalization of e-government’. Indeed, it might be a manifestation of the influence that a previous process of e-government institutionalization had on posterior implementation initiatives, as was discussed in Section 2.1. The Institutional Theory also explains the ‘organizational form and culture’ determinant, namely through its normative mechanism. Concerning the local political determinants and other environmental determinants, some can also be explained by the Institutional Theory: the ‘political orientation’ may be a manifestation of the regulatory mechanism, while ‘laws, regulations, directives’ is bound to both the regulatory and the normative mechanisms. As was the case with the ‘social system’ for the DOI Theory, the model does not capture the ‘mimetic’ mechanism of the Institutional Theory.

5.3. Opportunities for further studies

The model confirms the relevance of the DOI and Institutional theories to explain e-government implementation at the local level. Nevertheless, on one hand, it does not include (or does not directly include) determinants associated with all the mechanisms predicted by those theories (namely with the channels through which innovation is diffused and with the mimetic effect between institutions). On the other hand, it includes determinants that are not

predicted by those theories (including the local socioeconomic determinants, the political environment, the citizens' participation and the stakeholders' pressure). In the first case, it constitutes a call for further studies that try to identify those mechanisms in the case of local e-government implementation. In the second case, it is a challenge to expand the mentioned theories or identify other theories that can better explain the phenomena. As previously addressed, it could also be the case that some of the 'non-explained' determinants are related to the 'non-captured' mechanisms. Nevertheless, if that is the case, more studies and theorization are needed in order to clearly demonstrate those relations.

As previously discussed, the 'demography' determinant may be captured because of its association with the size of local government. However, it cannot be excluded that it may also be associated with e-government demand. The same can be argued for Internet penetration. Socio-economic dynamism, on the other hand, may be associated with both e-government demand and the availability of technical know-how in the society and the economy. In any case, further studies are needed in order to better understand these influences. Amongst them, the study of the mutual influence between e-government implementation and e-government demand (or effective e-government use by citizens) would be of great value.

5.4. Utility and limitations

The model presented in this article is synthesized from primary studies. It is, consequently, an empirical model. It is not a closed model in the sense that additional primary studies can contribute to its evolution, by identifying new determinants and adjusting and clarifying the influence of the determinants already identified. Despite this dynamic nature, the model is useful 'as is' for both practitioners and researchers. For practitioners, it can be used to understand the factors that influence e-government implementation by local

governments and thus to be prepared for maximizing the advantages and mitigating the disadvantages in each specific case. It can also be useful to define development policies and instruments that can take into consideration, and act upon the determinants that are relevant to the phenomenon. For researchers, it can be used as a synthesis of the current knowledge that can be further validated, deepened, probed, and challenged by future studies.

There are some limitations that are inherent to the methodology used to synthesize the model. First, only works published in journals were reviewed, therefore excluding, for example, book chapters and conference papers. Although this was made with quality in mind, some relevant works may have been excluded from the study. In addition, the search criteria for journal articles may have inadvertently determined the exclusion of some relevant works, despite the efforts to use the broadest possible criteria. Second, the model constructs are generalizations that encompasses some finer different concepts which, although related, are not necessarily coincidental. Although this is intrinsic to any generalization process, it is largely dependent upon human interpretation. Hence, it cannot be excluded that better generalizations could have been found in order to build the model. Third, since the model is agnostic to how the degree of implementation is assessed, it does not capture any differences that may exist between early e-government implementation and more advanced phases of the process. Indeed, it cannot be excluded that different determinants be associated with different phases of the implementation process. Fourth, there is an implicit bias in the sample, since existent studies tend to focus on certain geographic areas to the detriment of others. Indeed, although more than 100 countries from all the five continents are represented in the empirical studies, most of those studies address countries in Europe (52%) and in North American (28.3%). Moreover, about 90% of the studies address local e-government implementation in democratic countries. This is a direct consequence of the scarcity of results for some regions

of the globe, which further stresses the need to develop additional empirical studies and to evolve the empirical model. Although these limitations were essentially unavoidable (in the sense that without them the presented synthesis would become impossible or impractical), they cannot be overlooked when the model is used or further developed.

6. Conclusions

This article proposes an empirical model for the determinants of e-government implementation by local governments. The model shows that determinants related to the internal characteristics of the local government (size, financial capacity, management capacity, technical capacity, leadership, organizational culture, and experience) and to the specific territory (demography, socioeconomic dynamism, and Internet use) constitute a substrate that is relevant to the implementation of e-government in general. Different implementation determinants are then associated with different e-government dimensions: e-participation is associated with the political orientation of local government, the political environment, and citizens' participation; e-transparency is associated with citizens' participation and existing laws, regulations and directives; and e-services is associated with stakeholders' pressure and the existing laws, regulations and directives.

The model is partially bound to the DOI and the Institutional theories. However, there are determinants identified in the model that are not predicted by those theories and there are mechanisms predicted in those theories that are not captured by the model. This calls for further research, namely by developing additional primary studies and by further theorizing on the mechanisms that lead to e-government implementation by local governments. Because it was found that different determinants are associated with different e-government dimensions, future studies should differentiate between those dimensions when studying local

government. Other studies could demonstrate that this might also be relevant for e-government in general and not only for the local sphere.

References

Ahn, M. J. (2011), "Adoption of e-communication applications in U.S. municipalities: The role of political environment, bureaucratic structure, and the nature of applications", *American Review of Public Administration*, Vol. 41, No.4, pp. 428-452.

<https://doi.org/10.1177/0275074010377654>

Alcaraz-Quiles, F. J., Navarro-Galera, A. and Ortiz-Rodríguez, D. (2015), "Factors determining online sustainability reporting by local governments, *International Review of Administrative Sciences*, Vol. 81, No. 1, pp. 79-109.

<https://doi.org/10.1177/0020852314541564>

Andersen, K. N., Medaglia, R., Vatrapu, R., Helle Zinner Henriksen, H. Z. and Gauld, R. (2011), "The forgotten promise of e-government maturity: Assessing responsiveness in the digital public sector", *Government Information Quarterly*, Vol. 28, No. 4, pp. 439-445.

<https://doi.org/10.1016/j.giq.2010.12.006>

Andersen, K. V. and Henriksen, H. Z. (2006), "E-government maturity models: extension of the Layne and Lee model", *Government Information Quarterly*, Vol. 23, No. 2, pp. 236-248.

<https://doi.org/10.1016/j.giq.2005.11.008>

Arduini, D., Denni, M., Lucchese, M., Nurra, A. and Zanfei, A. (2013), "The role of technology, organization and contextual factors in the development of e-government services: An empirical analysis on italian local public administrations", *Structural Change and Economic Dynamics*, Vol. 27, pp. 177-189. <https://doi.org/10.1016/j.strueco.2013.06.007>

Azad, B, Faraj, S, Goh, J. M. and Feghali, T. (2010), “What shapes Global diffusion of e-government: Comparing the influence of national governance institutions”, *Journal of Global Information Management*, Vol. 18, No. 2, pp. 85-104.

<https://doi.org/10.4018/jgim.2010040104>

Baldersheim, H. and Øgård, M. (2008), “Innovation in E-government: Analysis of municipal web pages in the nordic countries”, *Information Polity*, Vol 13, No. 3-4, pp. 125-137.

Bigdeli, A. Z., Kamal, M. M. and De Cesare, S. (2013), “Electronic information sharing in local government authorities: Factors influencing the decision-making process”, *International Journal of Information Management*, Vol. 33, No. 5, pp. 816-830.

<https://doi.org/10.1016/j.ijinfomgt.2013.05.008>

Bolívar, M. P. R. (2017), “Governance models for the delivery of public services through the web 2.0 technologies: A political view in large spanish municipalities”, *Social Science Computer Review*, Vol. 35, No. 2, pp. 203-225. <https://doi.org/10.1177/0894439315609919>

Bonsón, E., Torres, L., Royo, S. and Flores, F. (2012), “Local e-government 2.0: Social media and corporate transparency in municipalities”, *Government Information Quarterly*, Vol. 29, No. 2, 123-132. <https://doi.org/10.1016/j.giq.2011.10.001>

Budding, T., Faber, B. and Gradus, R. (2018), “Assessing electronic service delivery in municipalities: Determinants and financial consequences of e-government implementation”, *Local Government Studies*, Vol. 44, No. 5, pp. 697-718.

<https://doi.org/10.1080/03003930.2018.1473768>

Chen, Y. (2010), “Citizen-centric E-government services: Understanding integrated citizen service information systems”, *Social Science Computer Review*, Vol. 28, No. 4, pp. 427-442.

<https://doi.org/10.1177/0894439309359050>

Concha, G., Astudillo, H., Porrúa, M. and Pimenta, C. (2012), “E-Government procurement observatory, maturity model and early measurements”, *Government Information Quarterly*, Vol. 29, No. 1, pp. S43-S50. <https://doi.org/10.1016/j.giq.2011.08.005>

Conroy, M. M. and Evans-Cowley, J. (2006), “E-participation in planning: An analysis of cities adopting on-line citizen participation tools”, *Environment and Planning C: Government and Policy*, Vol. 24, No. 3, pp. 371-384. <https://doi.org/10.1068/c1k>

Coursey, D. & Norris, D. F. (2008), “Models of e-government: Are they correct? An empirical assessment”, *Public Administration Review*, Vol. 68, No. 3, pp. 523-536. <https://doi.org/10.1111/j.1540-6210.2008.00888.x>

Criado, J. I., Rojas-Martín, F. and Gil-Garcia, J. R. (2017), “Enacting social media success in local public administrations: An empirical analysis of organizational, institutional, and contextual factors”, *International Journal of Public Sector Management*, Vol. 30, No. 1, pp. 31-47. <https://doi.org/10.1108/IJPSM-03-2016-0053>

Dias, G. P. (2019a), “Are smart cities reshaping local e-government research?”, in 14th Iberian Conference on Information Systems and Technologies (CISTI), Coimbra, Portugal, pp. 1-4. <https://doi.org/10.23919/CISTI.2019.8760778>

Dias, G. P. (2019b), “Fifteen years of e-government research in Ibero-America: A bibliometric analysis”, *Government Information Quarterly*, Vol. 36, No. 3, pp. 400-411. <https://doi.org/10.1016/j.giq.2019.05.008>

Dias, G. P. (2011), “Q-Model: A two-dimensional maturity model for e-government [Q-Model: Um modelo bidimensional de maturidade para o e-government]”, *RISTI - Revista Iberica de Sistemas e Tecnologias de Informacao*, Vol. 7, No. 1, pp. 33-46.

Dias, G. P. and Costa, M. (2013), “Significant socio-economic factors for local e-government development in Portugal”, *Electronic Government*, Vol. 10, No. 3-4, pp. 284-309.

<https://doi.org/10.1504/EG.2013.058785>

Dias, G. P. and Rafael, J. A. (2007), “A simple model and a distributed architecture for realizing one-stop e-government”, *Electronic Commerce Research and Applications*, Vol. 6, No. 1, pp. 81-90. <https://doi.org/10.1016/j.elerap.2006.02.001>

DiMaggio, P. J. and Powell, W. W. (1983), “The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields”, *Advances in Strategic Management*, Vol. 17, pp. 143-166. [https://doi.org/10.1016/S0742-3322\(00\)17011-1](https://doi.org/10.1016/S0742-3322(00)17011-1)

Dolson, J. and Young, R. (2012), “Explaining variation in the e-government features of municipal websites: An analysis of e-content, e-participation, and social media features in canadian municipal websites”, *Canadian Journal of Urban Research*, Vol. 21, No. 2, pp. 1-24.

Dwivedi, Y. K., Weerakkody, V. and Williams, M. D. (2009), “Guest editorial: From implementation to adoption: Challenges to successful E-Government diffusion”, *Government Information Quarterly*, Vol. 26, No. 1, pp. 3-4. <https://doi.org/10.1016/j.giq.2008.09.001>

Dwivedi, Y. K., Weerakkody, V. and Janssen, M. (2011), “Moving towards maturity: Challenges to successful e-government implementation and diffusion”, *Data Base for Advances in Information Systems*, Vol. 42, No. 4, pp. 11-22.

<https://doi.org/10.1145/2096140.2096142>

- Fan, B. (2013), "Achieving horizontal integration of municipal e-government in china: Assessment of managerial mechanisms", *Information Development*, Vol. 29, No. 4, pp. 333-348. <https://doi.org/10.1177/0266666912465873>
- Fan, Q. (2011), "An evaluation analysis of E-government development by local authorities in australia", *International Journal of Public Administration*, Vol. 34, No. 14, pp. 926-934. <https://doi.org/10.1080/01900692.2011.615550>
- Fontain, E. F. (2001), *Building the Virtual State, Information Technology and Institutional Change*, Brookings Institution Press, Washington D. C.
- Frías-Aceituno, J., García-Sánchez, I. and Rodríguez-Domínguez, L. (2014), "Electronic administration styles and their determinants. Evidence from spanish local governments", *Transylvanian Review of Administrative Sciences*, Vol. 41, pp. 90-108.
- Gallego-Álvarez, I., Rodríguez-Domínguez, L. and García-Sánchez, I. (2010), "Are determining factors of municipal E-government common to a worldwide municipal view? An intra-country comparison", *Government Information Quarterly*, Vol. 27, No. 4, pp. 423-430. <https://doi.org/10.1016/j.giq.2009.12.011>
- García, A. C. and García, J. G. (2008), "Determinants of internet financial disclosure by local governments [Determinantes de la divulgación de información contable a través de Internet por parte de los gobiernos locales]", *Revista Espanola De Financiacion y Contabilidad*, Vol. 37, No. 137, pp. 63-84. <https://doi.org/10.1080/02102412.2008.10779639>
- Gaule, E. and Žilinskas, G. (2013), "E-governance in lithuanian municipalities: External factors analysis of the websites development", *Public Policy and Administration*, Vol. 12, No. 1, pp. 80-93. <https://doi.org/10.5755/j01.ppaa.12.1.3854>

Gesuele, B., Metallo, C. and Longobardi, S. (2018), “The determinants of E-disclosure attitude: Empirical evidences from italian and spanish municipalities”, *International Journal of Public Administration*, Vol. 41, No. 11, pp. 921-934.

<https://doi.org/10.1080/01900692.2017.1300917>

Gil-Garcia, J. R. and Martinez-Moyano, I. J. (2007), “Understanding the evolution of e-government: The influence of systems of rules on public sector dynamics”, *Government Information Quarterly*, Vol. 24, No. 2, pp. 266-290. <https://doi.org/10.1016/j.giq.2006.04.005>

Guillamón, M., Ríos, A., Gesuele, B. and Metallo, C. (2016), “Factors influencing social media use in local governments: The case of italy and spain”, *Government Information Quarterly*, Vol. 33, No. 3, pp. 460-471. <https://doi.org/10.1016/j.giq.2016.06.005>

Hiller, J. S. and Bélanger, F. (2001), *Privacy strategies for electronic government*, PricewaterhouseCoopers, Arlington.

<http://www.businessofgovernment.org/sites/default/files/PrivacyStrategies.pdf> Accessed January 31, 2019.

Ho, A. T. (2002), “Reinventing local governments and the E-government initiative”, *Public Administration Review*, Vol. 62, No. 4, pp. 434-443.

Holland, C. P. and Light, B. (2001), “A Stage Maturity Model for Enterprise Resource Planning Systems Use”, *Data Base for Advances in Information Systems*, Vol. 32, No. 2, 34-45. <https://doi.org/10.1145/506732.506737>

Huang, Z. (2007), “A comprehensive analysis of U.S. counties' e-government portals: Development status and functionalities”, *European Journal of Information Systems*, Vol. 16, No. 2, pp. 149-164. <https://doi.org/10.1057/palgrave.ejis.3000675>

Jans, W., Denters, B., Need, A. and Van Gerven, M. (2016), "Mandatory innovation in a decentralised system: The adoption of an e-government innovation in dutch municipalities", *Acta Politica*, Vol. 51, No. 1, pp. 36-60. <https://doi.org/10.1057/ap.2014.36>

Janssen, M., Charalabidis, Y. and Zuiderwijk, A. (2012), "Benefits, Adoption Barriers and Myths of Open Data and Open Government", *Information Systems Management*, Vol. 29, No. 4, pp. 258-268. <https://doi.org/10.1080/10580530.2012.716740>

Jun, K. and Weare, C. (2011), "Institutional motivations in the adoption of innovations: The case of e-government", *Journal of Public Administration Research and Theory*, Vol. 21, No. 3, pp. 495-519. <https://doi.org/10.1093/jopart/muq020>

Kamal, M., Weerakkody, V. and Irani, Z. (2011), "Analyzing the role of stakeholders in the adoption of technology integration solutions in UK local government: An exploratory study", *Government Information Quarterly*, Vol. 28, No. 2, pp. 200-210. <https://doi.org/10.1016/j.giq.2010.08.003>

Kamal, M. M., Bigdeli, A. Z., Themistocleous, M. and Morabito, V. (2015), "Investigating factors influencing local government decision makers while adopting integration technologies (IntTech)", *Information and Management*, Vol. 52, No. 2, pp. 135-150. <https://doi.org/10.1016/j.im.2014.06.007>

Khalil, O. E. M. (2011), "e-Government readiness: Does national culture matter?", *Government Information Quarterly*, Vol. 28, No. 3, pp. 388-399. <https://doi.org/10.1016/j.giq.2010.06.011>

Kim, S., Kim, H. J. and Lee, H. (2009), "An institutional analysis of an e-government system for anti-corruption: The case of OPEN", *Government Information Quarterly*, Vol. 26, No. 1, pp. 42-50. <https://doi.org/10.1016/j.giq.2008.09.002>

Kitchenham, B. (2004), *Procedures for Undertaking Systematic Reviews*, Joint Technical Report, Computer Science Department, Keele University (TR/SE-0401) and National ICT Australia Ltd (0400011T.1). <http://www.inf.ufsc.br/~aldo.vw/kitchenham.pdf> Accessed January 17, 2019.

Klievink, B. and Janssen, M. (2009), “Realizing joined-up government — Dynamic capabilities and stage models for transformation”, *Government Information Quarterly*, Vol. 26. No. 2, pp. 275-284. <https://doi.org/10.1016/j.giq.2008.12.007>

Koh, C. E., Prybutok, V. R., Ryan, S. and Ibragimova, B. (2006), “The importance of strategic readiness in an emerging e-government environment”, *Business Process Management Journal*, Vol. 12, No. 1 SPEC. ISS., pp. 22-33. <https://doi.org/10.1108/14637150610643733>

Kunstelj, M. and Vintar, M. (2004), “Evaluating the progress of e-government development: A critical analysis”, *Information Polity*, Vol. 9, No. 3-4, pp. 131-148.

Lai, Y. and Yang, T. (2017), “Exploring the factors influencing agencies' engagement in open data: A case study of taichung city government”, *Journal of Educational Media and Library Sciences*, Vol. 54, No. 2, pp. 185-219. <https://doi.org/10.6120/JoEMLS.2017.542/0026.RS.BM>

Layne, K. and Lee, J. (2001), “Developing fully functional e-government: a four stage model”, *Government Information Quarterly*, Vol 18, No. 2, pp. 122-136. [https://doi.org/10.1016/S0740-624X\(01\)00066-1](https://doi.org/10.1016/S0740-624X(01)00066-1)

Li, M. and Feeney, M. K. (2014), “Adoption of electronic technologies in local U.S. governments: Distinguishing between E-services and communication technologies”,

American Review of Public Administration, Vol. 44, No. 1, pp. 75-91.

<https://doi.org/10.1177/0275074012460910>

Lidén, G. (2013), “Supply of and demand for e-democracy: A study of the Swedish case”, *Information Polity*, Vol. 18, No. 3, pp. 217-232. <https://doi.org/10.3233/IP-130308>

Lidén, G. and Larsson, A. O. (2016), “From 1.0 to 2.0: Swedish municipalities online”, *Journal of Information Technology and Politics*, Vol. 13, No. 4, pp. 339-351.

<https://doi.org/10.1080/19331681.2016.1169242>

Lockamy, A. (2004), “The development of a supply chain management process maturity model using the concepts of business process orientation”, *Supply Chain Management: An International Journal*, Vol. 9, No. 4, pp. 272-278.

<https://doi.org/10.1108/13598540410550019>

Manes Rossi, F., Brusca, I. and Aversano, N. (2018), “Financial sustainability as a driver for transparency and E-democracy: A comparative study in Italian and Spanish local governments”, *International Journal of Public Administration*, Vol. 41, No. 1, pp. 22-33.

<https://doi.org/10.1080/01900692.2016.1242623>

Manoharan, A. P., Zheng, Y. and Melitski, J. (2017), Global comparative municipal e-governance: Factors and trends, *International Review of Public Administration*, Vol. 22, No. 1, pp. 14-31. <https://doi.org/10.1080/12294659.2017.1292031>

Martani, D., Fitriyanti, D. and Annisa (2014), “Financial and performance transparency on the local government websites in Indonesia”, *Journal of Theoretical and Applied Information Technology*, Vol. 60, No. 3, pp. 504-516.

McNeal, R. S., Tolbert, C. J., Mossberger, K. and Dotterweich, L. J. (2003), Innovating in digital government in the American States, *Social Science Quarterly*, Vol. 84, No. 1, pp. 52-70. <https://doi.org/10.1111/1540-6237.00140>

Medaglia, R. (2007), "Measuring the diffusion of eParticipation: A survey on italian local government", *Information Polity*, Vol. 12, No. 4, pp. 265-280.

Moon, M. J. (2002), The evolution of e-government among municipalities: rhetoric or reality?", *Public Administration Review*, Vol. 62, No. 4, pp. 424-433.
<https://doi.org/10.1111/0033-3352.00196>

Moon, M. J. and Norris, D. F. (2005), "Does managerial orientation matter? the adoption of reinventing government and e-government at the municipal level", *Information Systems Journal*, Vol. 15, No. 1, pp. 43-60. <https://doi.org/10.1111/j.1365-2575.2005.00185.x>

Muhtar, M., Sutaryo, S. and Suryanto, M. (2018), "Towards regional sustainable development via government financial transparency: Evidence from indonesia", *Journal of Security and Sustainability Issues*, Vol. 7, No. 4, pp. 753-767.

Nasi, G., Frosini, F. and Cristofoli, D. (2011), O'nline service provision: Are municipalities really innovative? The case of larger municipalities in Italy", *Public Administration*, Vol. 89, No. 3, pp. 821-839. <https://doi.org/10.1111/j.1467-9299.2010.01865.x>

Navarro-Galera, A., Alcaraz-Quiles, F. J. and Ortiz-Rodriguez, D. (2018), "Enhancing sustainability transparency in local governments-an empirical research in europe", *Sustainability*, Vol. 10, No. 7, p. 2161. <https://doi.org/10.3390/su10072161>

Norris, D. F. and Moon, M. J. (2005), “Advancing E-government at the grassroots: Tortoise or hare?”, *Public Administration Review*, Vol. 65, No. 1, pp. 64-75.

<https://doi.org/10.1111/j.1540-6210.2005.00431.x>

Oliveira, G. H. M. and Welch, E. W. (2013), “Social media use in local government: Linkage of technology, task, and organizational context”, *Government Information Quarterly*, Vol. 30, No. 4, pp. 397-405. <https://doi.org/10.1016/j.giq.2013.05.019>

Panagiotopoulos, P., Moody, C. and Elliman, T. (2012), “Institutional diffusion of eParticipation in the english local government: Is central policy the way forward?”, *Information Systems Management*, Vol. 29, No. 4, pp. 295-304.

<https://doi.org/10.1080/10580530.2012.716991>

Papadomichelaki, X. and Mentzas, G. (2012), “E-GovQual: A multiple-item scale for assessing e-government service quality”, *Government Information Quarterly*, Vol. 29, No. 1, pp. 98-109. <https://doi.org/10.1016/j.giq.2011.08.011>

Paulk, M. C., Curtis, B. and Chrissis, M. B. (1993), “Capability Maturity Model, Version 1.1”, *IEEE Software*, Vol. 10, No. 4, pp. 18-27. <https://doi.org/10.1109/52.219617>

Perdał, R. (2016), “Factors of local E-government development in poland: The case of the poznań agglomeration”, *Quaestiones Geographicae*, Vol. 35, No. 2, pp. 115-129.

<https://doi.org/10.1515/quageo-2016-0020>

Pérez, C. C., Bolívar, M. P. R. and Hernández, A. M. L. (2008), “E-government process and incentives for online public financial information”, *Online Information Review*, Vol. 32, No. 3, pp. 379-400. <https://doi.org/10.1108/14684520810889682>

- Pina, V., Torres, L. and Royo, S. (2007), “Are ICTs improving transparency and accountability in the EU regional and local governments? An empirical study”, *Public Administration*, Vol. 85, No. 2, pp. 449-472. <https://doi.org/10.1111/j.1467-9299.2007.00654.x>
- Pina, V., Torres, L. and Royo, S. (2009), “E-government evolution in EU local governments: A comparative perspective”, *Online Information Review*, Vol. 33, No. 6, pp. 1137-1168. <https://doi.org/10.1108/14684520911011052>
- Pina, V., Torres, L. and Royo, S. (2010), “Is e-government promoting convergence towards more accountable local governments?”, *International Public Management Journal*, Vol. 13, No. 4, pp. 350-380. <https://doi.org/10.1080/10967494.2010.524834>
- Piñeiro-Naval, V., Serra, P. and Mangana, R. (2017), “Local development and tourism. the socio-economic impact of digital communication in Portugal [Desarrollo local y turismo. El impacto socioeconómico de la comunicación digital en Portugal]”, *Revista Latina de Comunicacion Social*, Vol. 72, pp. 1515-1535. <https://doi.org/10.4185/RLCS-2017-1232>
- Relyea, H. C. (2002), “E-gov: introduction and overview”, *Government Information Quarterly*, Vol. 19, No. 1, pp. 9-35. [https://doi.org/10.1016/S0740-624X\(01\)00096-X](https://doi.org/10.1016/S0740-624X(01)00096-X)
- Rogers, E. M. (2003), *Diffusion of Innovations*, 5th Edition, Free Press, New York.
- Rorissa, A., Demissie, D. and Pardo, T. (2011), “Benchmarking e-Government: A comparison of frameworks for computing e-Government index and ranking”, *Government Information Quarterly*, Vol. 28, No. 3, pp. 354-362. <https://doi.org/10.1016/j.giq.2010.09.006>

Rose, W. R. and Grant, G. G. (2010), “Critical issues pertaining to the planning and implementation of E-Government initiatives”, *Government Information Quarterly*, Vol. 27, No. 1, pp. 26-33. <https://doi.org/10.1016/j.giq.2009.06.002>

Sá, F., Rocha, Á. and Pérez Cota, M. (2016), “From the quality of traditional services to the quality of local e-Government online services: A literature review”, *Government Information Quarterly*, Vol. 33, No. 1, pp. 149-160. <https://doi.org/10.1016/j.giq.2015.07.004>

Schlæger, J. and Stepan, M. (2017), “Exploring the sustainability of E-government innovation in china: A comparative case study on 22 prefectural-level cities’ websites”, *Journal of Chinese Political Science*, Vol. 22, No. 4, pp. 625-649. <https://doi.org/10.1007/s11366-017-9501-z>

Scholl, H. J. and Klischewski, R. (2007), “E-government integration and interoperability: Framing the research agenda”, *International Journal of Public Administration*, Vol. 30, No. 8-9, pp. 889-920. <https://doi.org/10.1080/01900690701402668>

Scott, W. R. (2001), *Institutions and organizations*, Sage Publications, London.

Serrano-Cinca, C., Rueda-Tomás, M. and Portillo-Tarragona, P. (2009), “Determinants of e-government extension”, *Online Information Review*, Vol. 33, No. 3, pp. 476-498. <https://doi.org/10.1108/14684520910969916>

Sobaci, M. Z. and Eryigit, K. Y. (2015), “Determinants of E-democracy adoption in turkish municipalities: An analysis for spatial diffusion effect”, *Local Government Studies*, Vol. 41, No. 3, pp. 445-469. <https://doi.org/10.1080/03003930.2014.995296>

Steinbach, M., Sieweke, J. and Süß, S. (2019), “The diffusion of e-participation in public administrations: A systematic literature review”, *Journal of*

Organizational Computing and Electronic Commerce, Vol. 29, No. 2, pp. 61-95.

<https://doi.org/10.1080/10919392.2019.1552749>

Tolbert, C. J., Mossberger, K. and McNeal, R. (2008), “Institutions, policy innovation, and e-government in the American States”, *Public Administration Review*, Vol. 68, No. 3, pp. 549-563. <https://doi.org/10.1111/j.1540-6210.2008.00890.x>

Valdés, G., Solar, M. Astudillo, H., Iribarren, M., Concha, G. and Visconti, M. (2011), “Conception, development and implementation of an e-Government maturity model in public agencies”, *Government Information Quarterly*, Vol. 28, No. 2, pp. 176-187.

<https://doi.org/10.1016/j.giq.2010.04.007>

van Veenstra A.F., Janssen M. and Boon A. (2011), “Measure to Improve: A Study of eParticipation in Frontrunner Dutch Municipalities”, in Tambouris E., Macintosh A., de Bruijn H. (Eds), *Electronic Participation, ePart 2011*, LNCS, Vol. 6847, Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-23333-3_14

Veljković, N., Bogdanović-Dinić, S. and Stoimenov, L. (2014), “Benchmarking open government: An open data perspective”, *Government Information Quarterly*, Vol. 31, No. 2, pp. 278-290. <https://doi.org/10.1016/j.giq.2013.10.011>

Wang, S. and Feeney, M. K. (2016), “Determinants of information and communication technology adoption in municipalities”, *American Review of Public Administration*, Vol. 46, No. 3, pp. 292-313. <https://doi.org/10.1177/0275074014553462>

Wauters, P., Nijskens, M. and Tiebout, J. (2007), *The user challenge benchmarking the supply of online public services, 7th measurement*, Capgemini, Diegen.

<https://publications.europa.eu/en/publication-detail/-/publication/9b1d1b48-9c1d-453a-86a6-9e1caf7b6d98/language-en> Accessed January 31, 2019.

Welch, E. W., Feeney, M. K. and Park, C. H. (2016), “Determinants of data sharing in U.S. city governments”, *Government Information Quarterly*, Vol. 33, No. 3, pp. 393-403.

<https://doi.org/10.1016/j.giq.2016.07.002>

Wescott, C. G. (2001), “E-Government in the Asia-Pacific Region”, *Asian Journal of Political Science*, Vol. 9, No. 2, pp. 1-24.

West D. M. (2003), *Global e-government, 2003*, Center for Public Policy, Brown University, Providence. <http://www.insidepolitics.org/egovt03int.pdf> Accessed October 9, 2019.

West, D. M. (2004), “E-Government and the transformation of service delivery and citizen attitudes”, *Public Administration Review*, Vol. 64, No. 1, pp. 15-26.

<https://doi.org/10.1111/j.1540-6210.2004.00343.x>

Wirtz, B. W., Weyerer, J. C., Thomas, M. J. and Möller, A. (2015), “E-government implementation: theoretical aspects and empirical evidence”, *Public Organization Review*, Vol. 17, No. 1, pp. 101-120. <http://dx.doi.org/10.1007/s11115-015-0330-2>

Wohlers, T. E. (2009), “The digital world of local government: A comparative analysis of the United States and Germany”, *Journal of Information Technology and Politics*, Vol. 6, No. 2, pp. 111-126. <https://doi.org/10.1080/19331680902821593>

Yildiz, M. (2007), “E-government research: reviewing the literature, limitations, and ways forward”, *Government Information Quarterly*, Vol. 24, No. 3, pp. 646–665.

<http://dx.doi.org/10.1016/j.giq.2007.01.002>

Zhang, H., Xu, X. and Xiao, J. (2014), “Diffusion of e-government: A literature review and directions for future directions”, *Government Information Quarterly*, Vol. 31, No. 4, pp. 631-636. <https://doi.org/10.1016/j.giq.2013.10.013>

Zhang, N., Lu, Z. and Shou, Y. (2017), “The dominant role of governing structure in cross-sector collaboration in developing China: Two case studies of information integration in local government one-stop services”, *Information Technology for Development*, Vol. 23, No. 3, pp. 554-578. <https://doi.org/10.1080/02681102.2017.1363030>

Zheng, Y. and Schachter, H. L. (2018), “The impact of administrator willingness on website E-participation: Some evidence from municipalities”, *Public Performance and Management Review*, Vol. 41, No. 1, pp. 1-21. <https://doi.org/10.1080/15309576.2017.1400988>

Zheng, Y., Schachter, H. L. and Holzer, M. (2014), “The impact of government form on e-participation: A study of New Jersey municipalities”, *Government Information Quarterly*, Vol. 31, No. 4, pp. 653-659. <https://doi.org/10.1016/j.giq.2014.06.004>

Table 1. The three dimension of e-government and the number and percentage of primary studies that address them.

Dimension	Freq.	Percent.	Primary studies
e-participation	15	25%	Ahn, 2011; Bolívar, 2017; Conroy & Evans-Cowley, 2006; Criado et al., 2017; Dolson & Young, 2012; Frías-Aceituno et al., 2014; Lidén, 2013; Lidén & Larsson, 2016; Manes Rossi et al., 2018; Megdaglia, 2007; Oliveira & Welch, 2013; Panagiotopoulos et al., 2012; Sobaci & Eryigit, 2015; Zheng et al., 2014; Zheng & Schachter, 2018
e-transparency	15	25%	Alcaraz-Quiles et al., 2015; Bonsón et al., 2012; García & García, 2008; Gesuele et al., 2018; Guillamón et al., 2016; Ho, 2002; Koh et al., 2006; Lay & Yang, 2017; Martani et al., 2014; Muhtar et al., 2018; Navarro-Galera et al., 2018; Pérez et al., 2008; Pina et al., 2010; Piñeiro-Naval et al., 2017; Welch et al., 2016;
e-services	13	22%	Arduini et al., 2013; Bigdeli et al., 2013; Budding et al., 2018; Chen, 2010; Fan, 2013; Jans et al., 2016; Jun & Weare, 2011; Kamal et al., 2011; Kamal et al., 2015; Norris & Moon, 2005; Perdał, 2016; Wang & Feeney, 2016; Zhang et al., 2017
multiple dimensions	11	19%	Baldersheim & Øgård, 2008; Dias & Costa, 2013; Fan, 2011; Gallego-Álvarez et al., 2010; Gaule & Žilinskas, 2013; Huang, 2007; Li & Feeney, 2014; Manoharan et al., 2017; Pina et al., 2007; Pina et al., 2009; Wohlers, 2009
no dimensions	5	8%	Moon, 2002; Moon & Norris, 2005; Nasi et al., 2011; Schlæger & Stepan, 2017; Serrano-Cinca et al., 2009;

Table 2. The main constructs associated with local e-government implementation and the number and percentage of primary studies that contributed to their identification.

Determinants	Freq.	Perc.	Primary studies
Demography	24	41%	Ahn, 2011; Alcaraz-Quiles et al., 2015; Budding et al., 2018; Chen, 2010; Conroy & Evans-Cowley, 2006; Criado et al., 2017; Dolson & Young, 2012; Frías-Aceituno et al., 2014; García & García, 2008; Gaule & Žilinskas, 2013; Guillamón et al., 2016; Jun & Weare, 2011; Lidén, 2013; Lidén & Larsson, 2016; Megdaglia, 2007; Navarro-Galera et al., 2018; Norris & Moon, 2005; Panagiotopoulos et al., 2012; Pina et al., 2007; Pina et al., 2009; Pina et al., 2010; Serrano-Cinca et al., 2009; Wohlers, 2009; Zheng & Schachter, 2018
Socioeconomic dynamism	27	46%	Ahn, 2011; Arduini et al., 2013; Baldersheim & Øgård, 2008; Budding et al., 2018; Conroy & Evans-Cowley, 2006; Criado et al., 2017; Dias & Costa, 2013; Dolson & Young, 2012; Gallego-Álvarez et al., 2010; Gaule & Žilinskas, 2013; Gesuele et al., 2018; Guillamón et al., 2016; Ho, 2002; Huang, 2007; Jun & Weare, 2011; Lidén, 2013; Lidén & Larsson, 2016; Manes Rossi et al., 2018; Manoharan et al., 2017; Martani et al., 2014; Megdaglia, 2007; Navarro-Galera et al., 2018; Panagiotopoulos et al., 2012; Perdał, 2016; Piñeiro-Naval et al., 2017; Serrano-Cinca et al., 2009; Wohlers, 2009
Internet use	6	10%	Manoharan et al., 2017; Perdał, 2016; Pérez et al., 2008; Pina et al., 2007; Pina et al., 2009; Sobaci & Eryigit, 2015
Size of local government	10	17%	Arduini et al., 2013; Gallego-Álvarez et al., 2010; Manes Rossi et al., 2018; Martani et al., 2014; Moon, 2002; Moon & Norris, 2005; Muhtar et al., 2018; Perdał, 2016; Sobaci & Eryigit, 2015; Wohlers, 2009
Financial capacity	13	22%	Ahn, 2011; Alcaraz-Quiles et al., 2015; Bigdeli et al., 2013; Gallego-Álvarez et al., 2010; García & García, 2008; Ho, 2002; Jun & Weare, 2011; Perdał, 2016; Pérez et al., 2008; Piñeiro-Naval et al., 2017; Serrano-Cinca et al., 2009; Sobaci & Eryigit, 2015; Zheng & Schachter, 2018
Management capacity	14	24%	Bigdeli et al., 2013; Chen, 2010; Criado et al., 2017; Fan, 2011; Fan, 2013; Kamal et al., 2011; Koh et al., 2006; Lidén & Larsson, 2016; Nasi et al., 2011; Perdał, 2016; Schlæger & Stepan, 2017; Wohlers, 2009; Zhang et al., 2017; Zheng & Schachter, 2018
Technical capacity	11	19%	Arduini et al., 2013; Bigdeli et al., 2013; Ho, 2002; Jun & Weare, 2011; Kamal et al., 2011; Moon & Norris, 2005; Nasi et al., 2011; Oliveira & Welch, 2013; Perdał, 2016; Welch et al., 2016; Zheng & Schachter, 2018
Leadership	6	10%	Criado et al., 2017; Fan, 2011; Kamal et al., 2011; Lay & Yang, 2017; Perdał, 2016; Zheng & Schachter, 2018

Organizational form and culture	16	27%	Baldersheim & Øgård, 2008; Bolívar, 2017; Chen, 2010; Criado et al., 2017; Jun & Weare, 2011; Kamal et al., 2011; Kamal et al., 2015; Li & Feeney, 2014; Martani et al., 2014; Moon, 2002; Oliveira & Welch, 2013; Perdał, 2016; Pina et al., 2009; Pina et al., 2010; Schlæger & Stepan, 2017; Zheng et al., 2014
Experience	8	14%	Bonsón et al., 2012; Chen, 2010; Ho, 2002; Jans et al., 2016; Muhtar et al., 2018; Panagiotopoulos et al., 2012; Serrano-Cinca et al., 2009; Zheng et al., 2014
Political orientation	5	8%	Criado et al., 2017; Frías-Aceituno et al., 2014; Jans et al., 2016; Megdaglia, 2007; Panagiotopoulos et al., 2012
Political environment	4	7%	Ahn, 2011; Bigdeli et al., 2013; Bolívar, 2017; Lidén, 2013
Citizens' participation	4	7%	Guillamón et al., 2016; Manes Rossi et al., 2018; Oliveira & Welch, 2013; Welch et al., 2016
Stakeholders' pressure	4	7%	Kamal et al., 2011; Li & Feeney, 2014; Oliveira & Welch, 2013; Wang & Feeney, 2016
Laws, regulations, directives	4	7%	Bigdeli et al., 2013; Fan, 2013; Lay & Yang, 2017; Navarro-Galera et al., 2018

Table 3. Description of the synthesized constructs.

Construct	Description
Demography	Captures demographic factors of the territorial division governed by the local government, measured either by the total population or the population density. The rationale for the inclusion of these two different indicators in the same general construct is that they tend to be highly correlated when local territorial divisions are at stake.
Socioeconomic dynamism	Captures the socioeconomic dynamism in the territorial division governed by the local government. It can be measured by using various different socioeconomic indicators (usually available from national statistical institutes) such as percentage of young people, percentage of educated people, white population, human development, average income, level of social welfare, employment rate, spending capacity in cultural and leisure, and economic activity.
Internet use	Captures the degree of Internet use in the territorial division governed by the local government, typically measured through Internet penetration or Internet access in households.
Size of local government	Captures the size of the organization, typically measured by the number of employees, the total budget, or the resident population.
Financial capacity	Captures the capacity of a local government to invest in e-government. It may be measured using different associated constructs such as the investment budget; the budget allocated to e-government development; the fiscal capacity; and the relative debt.
Management capacity	Captures the management capacity and the strategic readiness of the local government. It is usually associated with the critical mass in the sense that bigger organizations tend to have more capacity to attract and retain qualified human resources.
Technical capacity	Captures the technical capacity of the local government, usually measured through the number of ICT staff. It is usually associated with the critical mass in the sense that bigger organizations tend to have more capacity to attract and retain qualified human resources.
Leadership	Captures the existence of political leadership and top management support.
Organizational form and culture	Captures internal factors related to the organizational culture, such as administrative centralization, propensity to innovation, commitment to service improvement, culture of transparency, attitude towards risk, and managerial innovation orientation.
Experience	Captures the previous experience of the local government in the adoption of technology, typically measured by the existence of previous experiences, past performance in e-government, or number of years of implementation.
Political orientation	Captures the political orientation of local government and its alignment with central government.
Political environment	Captures different characteristics of the local political environment such as political competition, party sensitivity, and voter turnout in local elections.
Citizens' participation	Captures the level of participation of citizens.

Stakeholders' pressure	Captures the stakeholders' pressure typically by measuring social pressure, civil society influence, and non-governmental stakeholder influence.
Laws, regulations, directives	Captures the existence of laws, regulations and directives that are applicable to e-government, both in technical and administrative aspects.

Table 4. Binding between the internal determinants of the generic model and the constructs predicted by the DOI Theory.

Generic model	DOI Theory
Size of local government	Size
Financial capacity	Organizational slack
Management capacity	Complexity
Technical capacity	Complexity
Leadership	Champion
Organizational form and culture	Centralization; Formalization

Figure 1. Concept map relating e-government implementation with other relevant concepts, as assumed in the study.

Figure 2. Model of determinants of local e-government implementation including the relevant constructs and their association with the three e-government dimensions.