

MODELING A CITIZEN-CENTRIC EVALUATION FRAMEWORK FOR LOCAL E-GOVERNMENT AND E-DEMOCRACY

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Abstract—This paper aims to develop a citizen-centric framework for the evaluation of local e-government projects. Hence, the demand-side of e-government is taken into consideration. The proposed model consists of four categories (i.e., information, transaction, interaction-participation, and integration), 14 factors/indices and 83 criteria. The framework incorporates the different aspects of e-government as well as e-democracy such as e-consultation, e-deliberation, e-discourse, e-petition, e-voting, and e-polling. This model will be of value to researchers and e-government managers for the evaluation of local government websites. In addition, part of the proposed model is applied to Greek local municipal governments through a quantitative website analysis that focuses on e-democracy features. Results suggest that Greek municipal websites have still a long way to go towards offering citizens opportunities to actively interact with local governments and participate in the issues that affect their municipalities.

Keywords—Citizen-centric model, e-democracy, e-government, evaluation, local governments, municipalities.

I. INTRODUCTION

PUBLIC authorities around the globe, at the local as well as at the national level are utilizing ICTs in order to communicate and interact with their stakeholders (e.g., citizens, businesses). The main challenge for e-government

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managers is to design and implement citizen-centric applications [1] through which citizens are treated as customers. Hence, it is important that public authorities better understand the needs and desires of their citizens so as to develop effective e-government applications that will satisfy them.

However, e-government implementation requires a large amount of funds [2]. Hence, it becomes imperative for e-government managers to monitor and evaluate the performance of their projects in order to be able to measure the return of e-government investment [1]. Given that the primary goal of e-government is to provide online services friendly to citizens that enhance their participation and engagement [3], the value benefits accruing to citizens should be a main concern of any e-government evaluation exercise. The value for the citizen could be financial (i.e., efficient tax payment system), political (i.e., increased political involvement), social (i.e., opportunities for interaction with other citizens), and cognitive (i.e., perceptions of trust towards public authorities [4]).

As [5] note there is a lack of studies that evaluate e-government projects based on the public value derived from citizens. Hence, the main purpose of the present study is to propose a framework for the evaluation of e-government at the local level that is based on citizens' preferences.

II. ISSUES AND CHALLENGES OF E-GOVERNMENT EVALUATION MODELS

In the past years a number of studies have focused on the evaluation of e-government initiatives. However, as [6] argue most of these evaluation frameworks have proven to be immature due to the complex task of assessing the performance of e-government projects.

A limitation of the current evaluation models is their emphasis on the supply side of e-government [7]. Specifically, these models assess performance based on the features incorporated in the portals of public authorities without paying attention to the demand side; that is the expectations and needs of citizens who are the primary users of online public services. As [8], suggest e-government evaluation "need to address the notion of benefit to citizens".

Another methodological shortcoming that stems from the non-adoption of a citizen-centric approach is the fact that most models rely on the subjective judgments of researchers. For example, in the study of [7], the evaluation framework was based on a set of criteria in which researchers' assigned

weights based on their experiences. [9] tried to address this issue of subjectivity by recruiting ten website users to indicate the relative importance of the criteria included in the evaluation framework. However, again the number of users who rated the criteria was small and thus non-representative of the majority of e-government users. It is therefore suggested, that researchers assign weights to criteria set for evaluating portals taking into consideration the opinion of citizens.

Another challenge in evaluating e-government projects is related to the missing component of e-democracy. Although, most evaluation frameworks assess performance in terms of information dissemination and other available online transactions, they fail to incorporate e-democracy or e-participation metrics [7]. The framework proposed by [10] included metrics that evaluated the level of citizen participation. These metrics tested whether municipal websites incorporated features that enable citizens' engagement (i.e., comment boxes, newsletters, chat rooms, online discussion forums, scheduled e-meetings, online polls, synchronous videos, etc). E-democracy aspects were included in the study of [11] which evaluated websites of European cities. Their instrument measured e-democracy in a rather simplistic way by examining whether citizens could (a) contact the mayor and council members, and (b) submit their comments and complaints via the websites.

[7] also incorporated in their evaluation model an e-participation category that included three sub-factors namely, information, consultation and active participation. Specifically, information factor assessed whether portals publish documents regarding local policies. The consultation factor examined if websites included applications that allowed online consultations about important local issues. The active participation factor included metrics that assessed whether a local government portal (a) incorporates chat-room, blog, and e-forum, (b) enables online polls pertaining local issues, (c) allows citizens to create a new discussion topic on the portal's forum, and (d) provides citizens with the opportunity to propose new agenda topics to be discussed in the upcoming council meetings.

[12] measured the channels of e-participation offered by municipalities in Mexico. Specifically, e-participation was evaluated by examining if websites included (a) the names of officials and their contact information, (b) discussion fora, (c) blogs, (d) discussion tables, (e) online surveys, (f) e-voting tools, and (g) reports of consultations and discussions.

In a similar vein, [5] included in their evaluation framework a citizen engagement factor that measured whether local government portals incorporate online tools for (a) online submission of citizens' proposals about local services enhancement, (b) online surveys concerning citizens' satisfaction, (c) live broadcasts of council meetings, and (d) direct communication with mayor and members of council meetings.

Based on the preceding analysis, it can be argued that the few e-government evaluation schemes which include e-participation measures are not consistent in the way they evaluate e-participation. Some of the measures include several criteria to assess e-participation [10, 11] while others treat e-

participation as a multi-dimensional construct [7]. However, e-participation by its nature is a multi-faceted construct [13], thus e-government models should take into account the different aspects that comprise e-participation.

Given the above deficiencies found in the e-government evaluation models it becomes evident that a more holistic assessment of e-government is needed. Hence, the present study introduces an integrative evaluation scheme for the assessment of e-government at the local government level which takes into account the demand side and the views of different stakeholders (i.e., citizens, businesses), (b) minimizes the bias caused by the subjectivity of researchers when rating the importance of the different attributes of e-government, and (c) incorporates e-democracy features resulting from the multiple and different aspects of e-participation. Part of the proposed model will be then applied to the Greek municipal sector in order to evaluate the level of e-democracy sophistication of local government websites.

III. RESEARCH METHODOLOGY

In order to develop and validate our proposed evaluation model we took the following steps.

First we conducted a literature review in order to identify the criteria-metrics that will comprise our model. Hence, most of the metrics included in the model were extracted from prior academic studies [10] [14] [12] [15] [16] [17] to ensure that the criteria used are theoretically sound [9]. Moreover, the proposed model included items that originated from an analysis of several municipal websites in Greece in order to assure that the model was adjusted to the local government context.

The identified criteria were then grouped into factors. Special care was taken to develop the e-participation factors. These factors and their metrics were based on the studies of [18] [19] [20] that outline the different modes of e-participation. It should be noted that the derived factors were organized around four main categories based on the various stages of e-government [21].

A. The Proposed Model

The proposed model consisted of four categories namely: informational, transactional, interaction-participation, and integration. Specifically, informational category captures the provision of information through one-way communication by municipal websites. This category includes the following factors: (1) information for citizens which refers to whether a municipal website includes general information about municipality, municipal agencies, events, priorities and new jobs; downloadable documents and forms; press releases; searchable databases; registration to RSS feed, newsletters and etc, (2) information about tourists where information about public transportation options, museums, attractions, restaurants and major locations is provided through the municipal website, (3) information about mayor and members of the city council which evaluates whether a municipal website discloses information about the current activities, duties and contact details of council members, mayor's biography,

accomplishments to date, financial statements, and contact details, (4) information about municipal projects that assesses the extent to which details about the current state of municipal projects, and descriptions of the next/new projects, as well as the completed ones are being provided via the municipal webpage, and (5) information about city council meetings which refers to whether a municipal website invites citizens to participate in the upcoming meetings, informs them about the agendas and the decisions of meetings and enables citizens to watch meetings through videos and live broadcasts. This factor is closely related to the transparency factor proposed by [5] that enhances the level of public trust and the legitimacy of mayor and council members.

The transactional category refers to the way municipalities utilize ICTs to help citizens as well as businesses to complete several transactions online [22]. This category is divided in two factors: (1) Transactions for citizens which is related to online transactions oriented to citizens such as online payments of taxes and fines, online application for licenses and permits, online issuance of certificates, online application for a job, online tracking system of applications, etc, and (2) transactions for businesses that refers to the provision of online services to businesses such as online debt payments, online application for issuance of permits, e-procurement system, etc.

The third category is named interaction-participation and is a combination of the two e-government stages - two-way communication and political participation - proposed by [22]. This category is intended to capture the mechanisms and applications used by municipalities to enhance e-democracy. The factors of this category are based on several modes of e-participation found in the literature [18] [19] [20]. E-participation modes can be used as proxies for capturing e-democracy features [23]. Hence, the interaction-participation category includes the following factors: (1) e-consultation where ICTs (i.e., use of social media, contact forms, suggestion-comment boxes, e-complaining, e-requesting, submission of questions for upcoming council meetings, etc) are used to help citizens submit online their opinions about local government issues. (2) e-deliberation which refers to applications that allow citizens to deliberate and debate around local government issues and policies through discussion fora, video-conferences, and scheduled e-meetings. (3) e-discourse that is related to online mechanisms such as chat rooms which enable citizens to talk with other citizens around municipal issues. (4) E-petition that allows citizens to sign for petitions. (5) E-voting that refers to online voting systems that encourage citizens to add their ballot on a predefined voting subject regarding local government policies or elections, and (6) e-polling that includes online mechanisms through which citizens participate in opinion surveys conducted by their municipalities.

Finally, the fourth category - integration - is similar to transformation stage of e-government proposed by the Gartner Group [24] where local governments use their webpage to provide personalized information and services to citizens. This category is not divided in other factors and is related to applications that allow registration of users to the webpage,

personalization of content, and customization of the homepage.

In total our instrument consisted of 83 criteria and 14 factors/indices. Specifically, the informational category included five indices-factors: information for citizens (24 criteria), information for tourists (7 criteria), information about mayor and council members (8 criteria), information about municipal projects (5 criteria), and information about council meetings (8 criteria). The transactional category was comprised of two indices-factors, namely transactions for citizens (6 criteria) and transactions for businesses (4 criteria). In a similar way, the interaction-participation category included 2 factors and 4 single-criteria, namely: e-consultation (11 criteria), e-deliberation (3 criteria), e-discourse (1 criterion), e-petition (1 criterion), e-voting (1 criterion) and e-polling (1 criterion). When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

B. Testing Reliability and Assigning Weights

The next step in the development process of our evaluation model was to assign relative weights to each criterion, factor, and category. As already noted, in order to retain objectivity in weighting the factors and adopt a citizen-centric approach, an online survey was conducted to assess citizens' perceived importance of the 83 criteria. This way, weighting was based on citizens' perceptions regarding the importance they attribute to each criterion.

The online survey took place from April to May of 2015 using the snowballing sampling technique. Snowball sampling is a "chain referral approach" where subjects recruit their friends, family members and acquaintances by using their social network contacts. The initial "seed" sampling units were students of a Technological Education Institute of Western Macedonia in Greece who registered for two courses namely, strategic public relations and management of corporate image and branding. It should be noted that students were to receive extra credit for the course if they forwarded the online questionnaire to their social network contacts. Students were strongly advised to forward the online survey to individuals who were not students.

The online questionnaire consisted of the 83 criteria/items of our instrument. Respondents were prompted to indicate how important they perceived each of the 83 items to be included in a municipal website. Responses to all items were obtained using 5 point scales ranging from 1: not important at all to 5: very important.

In total, 395 respondents answered the online questionnaire. Regarding the characteristics of the sample, 57.5% were females and 42.5% were males. Most of them aged between 18 to 35 years old (65%) and were single (60.8%). 27.8% of the respondents had completed secondary education while 33.9% had a bachelor's degree. Only, 16.7% were students. Moreover, 27.6% were private sector employees, 16.2% were freelancers and 16.5% were unemployed. 71.6% of participants had visited a municipal website at least one time in the past while 26.4% had not visited a municipal website before. Of the 283 users of

municipal websites, 147 (51.9%) visit municipal websites at least 1 time during a month, 105 (37.1%) 2 or 3 times a month and 31 (11%) of them are regarded as frequent users of municipal websites since they reported that they visit these websites more than 4 times a month.

To examine the validity of the instrument, the reliability of the scales/factors was assessed using Cronbach's alpha coefficient. All of the 10 multi-item factors exhibited adequate internal reliability since the values of Cronbach's alpha coefficient exceeded the 0.70 criterion. Thus, the proposed model can be regarded as reliable.

For each of the 83 criteria the mean scores were calculated. These mean scores served as the basis for the calculation of weights of each item. Specifically, the weight for each criterion was calculated by dividing the mean score of the criterion by the sum of the mean scores from all criteria and multiplying it with 100. The factors of the model were also given weights based on the sum of the weights of the criteria that comprise them. The same was done for the model categories. As a consequence each local government website was given a score that ranged from 0 to 100. Our weighting procedure differs from studies which first assign weights to the categories or factors of the model and then distribute the weights of the factor to the criteria/metric that comprise them [7] [25] [16]. This way we avoided the pitfall of treating the attributes that comprise each factor equally since citizens assign different levels of importance to the different criteria even though they belong to the same factor.

In the following analysis the weights assigned to each criterion, factor, and category are presented.

IV. QUANTIFYING THE MODEL

A. Information Regarding the Citizens Factor

Table I shows the mean scores and the importance weights for the items that comprise the information for citizens' factor. Based on the findings, respondents believe that it is very important for a municipal website to disclose information about (a) new jobs, (b) requirements needed for applications, (c) contact information with agencies and employees, (d) instructions on how to complete forms, (e) local agencies, and (f) events and priorities of the municipality. Moreover, they want accessibility options for disabled persons as well as downloadable forms for applications in a municipal website.

Table I. Mean Scores and Importance Weights For Information for Citizens Items

Information for Citizens		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>
Information about new jobs	4.56	1.514
Disabled persons accessibility	4.47	1.484
Explanations of requirements and documentation needed for applications	4.25	1.411
Downloadable documents and forms.	4.20	1.394

Information for Citizens		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>
Contact information (i.e., telephone numbers, addresses) of municipal agencies, departments, and employees	4.20	1.394
Instructions on how to complete forms..	4.19	1.391
Information of the municipal agencies (i.e., "help at home" programme, open care center for elderly, citizen service centers)	4.08	1.354
Information about actions, events and priorities of municipality (i.e., society, education, environment, health, culture).	4.06	1.348
General information about the municipality	3.83	1.271
Information and links of local organizations, businesses, cultural and athletic organizations, media, non-governmental agencies.	3.71	1.232
Frequently asked questions	3.67	1.218
Press releases	3.63	1.205
Downloadable publications and reports	3.61	1.198
Information about policies and regulations	3.60	1.195
Information about municipal organizations	3.60	1.195
Searchable databases	3.55	1.178
Mobile application for accessing the municipal website	3.48	1.155
Index for decisions made by municipal committees	3.42	1.135
Information about fuel prices	3.42	1.135
Information about the weather (weather predictions)	3.34	1.109
Information about elections	3.31	1.099
Registration to RSS feed, newsletter, newsgroups	3.26	1.082
Online radio	3.12	1.036
Web TV	3.00	0.996
Total		29.729

B. Information Regarding the Tourism Factor

Similarly, Table II shows the mean scores and the importance weights for the items that comprise the information for tourists' factor. Respondents indicate that it is important a municipal website to include instructions on how to reach various places (i.e., museums and attractions) and the possible public transportation options available to tourists. Moreover, they find vital for a municipal website to be translated in

different languages and to have an embed Google map with the major locations of the city. It should be noted, that respondents rated all the items of the information for the tourists' factor as important features of a website.

Table II. Mean Scores and Importance Weights of Information for Tourists Items

Information for Tourists		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>
Instructions on how to reach various places (i.e., museums, attractions)	4.11	1.364
Public transportation options and schedules (i.e., bus routes)	4.10	1.361
Versions of the site in other languages	4.06	1.348
Google maps with major locations (i.e., pharmacies, banks, doctors)	4.05	1.344
Operating hours of museums, attractions, etc	3.98	1.321
Information, photos, videos about attractions, museums, local events, and activities	3.77	1.251
Information, photos, videos from accommodations, restaurants, entertainment venues.	3.70	1.228
Total		9.218

C. Information Regarding the Mayor and Council Members Factor

The next Table III shows the mean and the importance weights of the items that comprise the information about mayor and council members' factor. Moderate levels of perceived importance were found in all the items of this factor. Respondents believe that it is moderately important for municipal websites to include information about council members, the current activities as well as the internal regulations of the city council.

Table III. Mean Scores and Importance Weights of Information about Mayor and Council Members Items

Information About Mayor and Council Members		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>
Information for council members (i.e., list of members, duties of members, CV's)	3.69	1.225
Current activities of the council	3.68	1.222
Information about internal regulations of the council	3.68	1.222
Contact information of council members (i.e., telephone numbers, office hours)	3.37	1.119

Information About Mayor and Council Members		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>
Information about the mayor (i.e., CV, studies, political career, professional career, personal information, marital status, biography)	3.27	1.085
Information about mayor's accomplishments to date	3.25	1.079
Mayor's financial statements	2.99	0.993
Contact information of mayor (telephone numbers, office hours)	2.98	0.989
Total		8.933

D. Information Regarding the Municipal Projects Factor

Table IV shows the mean and the importance weights of the items that comprise information about municipal projects factor. Based on the findings participants perceive as moderately important for a municipal portal to disclose information about the state of current projects, the projects to follow as well as the completed projects.

Table IV. Mean Scores and Importance Weights of Information about Municipal Projects Items

Information About Municipal Projects		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>
Current state of projects	3.70	1.228
Description of next/new projects (budget, designs, cost estimates)	3.68	1.222
Description of completed projects (technical - financial details of projects)	3.66	1.215
Description of projects proposed (promised) prior to elections	3.58	1.188
Call citizens for participation in projects	3.53	1.172
Total		6.025

E. Information Regarding the Council Meetings and Decisions Factor

Table V shows respondents' mean scores and the importance weights regarding the items that comprise the information about council meetings/decisions factor. Findings indicate that citizens believe it is important for a municipal website to present the decisions made by mayors or committees as well as the decisions following deliberations regarding municipal issues. However, again moderate levels of importance were found for the items that are related to council meetings and decisions.

Table V. Mean Scores and the Importance Weights of Information about Council Meetings/Decisions Items

Information About Council Meetings/Decisions		
<i>Items</i>	<i>Mean</i>	<i>Weight</i>

Information About Council Meetings/Decisions		
Items	Mean	Weight
Publication of mayors/committees decisions	3.84	1.275
Publication of decisions of deliberations conducted about municipal issues	3.54	1.175
Publication of the proceedings of council meetings	3.45	1.145
Live broadcasting of council meetings/committees	3.28	1.089
Online announcement of the agenda for the upcoming council meetings	3.14	1.042
Videos of council meetings/committees	3.12	1.036
Online invitation of citizens for participation in upcoming council meetings	3.08	1.022
Audio recordings of council meetings/committees	2.96	0.983
Total		8.767

F. Transactions for Citizens Factor

Regarding the online services offered by municipal websites, results show that respondents believe that it is important for municipal sites to offer various transactions such as online application for licenses, permits, etc.; online issuance of certifications; online registration for a job; and online tracking system of the state of applications (Table VI).

Table VI. Mean Scores and Importance Weights of Transactions for Citizens Items

Transactions for Citizens		
Items	Mean	Weight
Online application for licences, permits, certifications, etc	4.24	1.407
Online issuing of certifications	4.21	1.398
Online registration for a job	4.15	1.378
Online tracking system of applications	4.09	1.358
Online request of information about online services	3.92	1.301
Online payments of taxes, fines, etc	3.91	1.298
Total		8.139

G. Transactions for Businesses Factor

Table VII shows the mean scores and the importance weights of the items that comprise the transactions for businesses factor. Results indicate that all of the items were rated by respondents as important features of a municipal website. For example, they believe that it is quite important a municipal portal to offer online services to businesses such as online applications for issue clearance certificate, and issuance

of permits. Moreover, they value as important online applications such as e-procurement and online debt payments.

Table VII. Mean Scores and Importance Weights of Transactions for Businesses Items

Transactions for Businesses		
Items	Mean	Weight
Online application for municipal issue clearance certificate (i.e., issue clearance of proven debt)	3.98	1.321
Online application for issuance of permits (i.e., public spaces)	3.93	1.305
Online submission of proposals to municipal tenders (e-procurement system)	3.91	1.298
Online debt payments of businesses	3.89	1.291
Total		5.215

H. E-Consultation Factor

Moving to citizens' evaluation of the interaction-participation stage, Table VIII shows the mean scores and the importance weights of items that evaluate e-consultation factor. Respondents indicate that it is important for a municipal website to offer online ways for interaction between citizens and local governments. Specifically, participants want to be able to submit online their complaints as well as their requests. Moreover, they prefer to contact local governments via contact/email forms or suggestion/comments boxes. However, they rate as moderately important the existence of social media and online forms where they could submit comments to the city council regarding agenda items to be discussed for an upcoming city council.

Table VIII. Mean Scores and Importance Weights of E-Consultation Items

E-Consultation		
Items	Mean	Weights
Online submission of complaints	3.99	1.324
Submission of online requests	3.93	1.305
Embed "contact" form	3.79	1.258
Suggestions or comments boxes	3.76	1.248
Embed "send an email" form	3.75	1.245
Contact email of mayor	3.55	1.178
Contact emails of municipal employees, agencies	3.53	1.172
Submission of questions/comments before council meetings	3.49	1.159
Contact emails of council members	3.40	1.129
Links to social media	3.32	1.102
Agenda comments form where citizens can submit comments to the city council regarding	3.08	1.022

E-Consultation		
Items	Mean	Weights
agenda items to be discussed for an upcoming city council		
Total		13.142

I. E-Deliberation Factor

Regarding the deliberative features of a municipal website Table IX shows the mean scores and the importance weights for the three items that comprise e-deliberation factor. Based on results, it can be argued that citizens do not attribute great importance to online applications that encourage deliberation around municipal issues such as discussion fora, scheduled e-meetings and video-conferences. In fact, these features were characterized as moderately important for respondents.

Table IX. Mean Scores and Importance Weights of E-Deliberation Items

E-Deliberation		
Items	Mean	Weight
Discussion fora where citizens can deliberate/debate on issues and proposed policies regarding the municipality	3.25	1.079
Scheduled e-meetings for discussion	3.09	1.026
Videoconferencing with municipal agencies/council members	3.07	1.019
Total		3.124

J. E-Discourse, E-Petitions, E-Voting, and E-Polling Factors

Table X presents the mean scores and the importance weights for the rest of the interaction-participation factors. Results suggest that respondents place a moderate importance on online features that encourage their participation with local government. Specifically, online polling, voting and online petitions were rated as moderately important features of a municipal website.

Table X. Mean Scores and Importance Weights of E-Discourse, E-Petitions, E-Voting, and E-Polling Factors

Factor	E-Discourse, E-Petitions, E-Voting, and E-Polling		
	Items	Mean	Weight
E-Discourse	Chat capabilities where citizens can discuss with others municipal issues	3.05	1.012
E-Petitions	E-petitions	3.25	1.079
E-Voting	E-voting	3.36	1.115
E-Polling	E-polling	3.46	1.149

K. Integration Factor

Regarding the integration stage, Table XI shows the results for the three items that comprise the integration factor. Findings indicate that respondents again attribute moderate levels of importance to online features that allow customization and personalization of a municipal webpage such as user registration, personalization of content, and customization of the home page.

Table XI. Mean Scores and Importance Weights of Integration Items

Integration		
Items	Mean	Weight
User registration to the municipal website	3.57	1.185
Allow users to personalize the content of site	3.55	1.178
Allow users to customize the city homepage	2.98	0.989
Total		3.353

L. Rating the Model

The above described model can be applied for the evaluation of local government websites. Regarding the rating of the websites, researchers can rate each of the criteria by giving the value of 0 if the criterion does not exist in the website and the value of the importance weight of the specific criterion if the website incorporates the specific feature. For example, if a local government website publishes information about new jobs then researchers will assign the value of 1.514 on that attribute of the model.

Then the factor scores will be calculated by adding the values of the criteria that include each factor. This score indicates how well the website performs on that factor. The total score for each factor of the model can be compared to its maximum value. These comparisons can help evaluate the level of the website sophistication on each factor. The maximum values that each website could receive for each of the factors are as follows: information for citizens (29.73), information for tourists (9.22), information for mayor and council members (8.93), information about municipal projects (6.02), information for council meetings/decisions (8.77), transaction for citizens (8.14), transaction for businesses (5.22), e-consultation (13.14), e-deliberation (3.12), e-discourse (1.01), e-petitions (1.08), e-voting (1.12), e-polling (1.15), and e-integration (3.35).

Next, for each website the scores of the factors that comprise each of the four main categories of the e-government model can be summed up to create four category scores. Specifically, the maximum scores that a website can receive across the four categories are the following: (a) information 62.67, (b) transactions 13.36, (c) interaction/participation 20.62, and (d) integration 3.35.

Then all the category scores are summed to create a total e-government score for the website. Moreover, the overall score of the website can be calculated and compared with the maximum value of 100. This way the level of comprehensiveness of each local government website can be assessed.

V. APPLYING THE MODEL

As a first attempt to apply and validate the proposed model we chose to evaluate how well local government websites are performing on e-democracy and specifically on the interaction-participation category. Towards this end a quantitative website analysis was conducted. The sample for this study consists of the 325 Greek municipalities. Thus, our analysis was based on the total population of the Greek municipalities. Data collection took place in June 2015. During the data collection period, researchers first examined whether each municipality had a website. Inactive websites or websites under construction were excluded from the analysis. Then, each website was checked for the presence of the 18 evaluation criteria that comprise the interaction/participation category. Of the 325 municipalities 313 (96.3%) had an active website, while the remaining 12 did not have a portal or had a website that was under construction.

A. E-Consultation Factor

To evaluate the performance of Greek local government websites on the interaction-participation category, we first checked the extent to which websites incorporate the 11 features of e-consultation factor. Fig. 1 shows the percentage of Greek municipalities that include in their website applications which support e-consultation.

On the first two features that were evaluated by citizens as highly important on the e-consultation factor, Greek local government websites performed moderately well since half of them enable via their portals the submission of online complaints (45.5%) and requests (50.8). A high percentage of municipalities publish the contact email of mayor (77.6%) of employees or agencies (61.3%) while they have an embed contact form in their websites (70.6%), thus support mainly passive forms of e-consultation. On the contrary, only a small number of municipalities offer tools for more active forms of e-consultation such as submission of questions, comments before council meetings (20.8%), and agenda comments forms where citizens can propose their issues to be discussed for upcoming councils (18.8%). Number citations consecutively

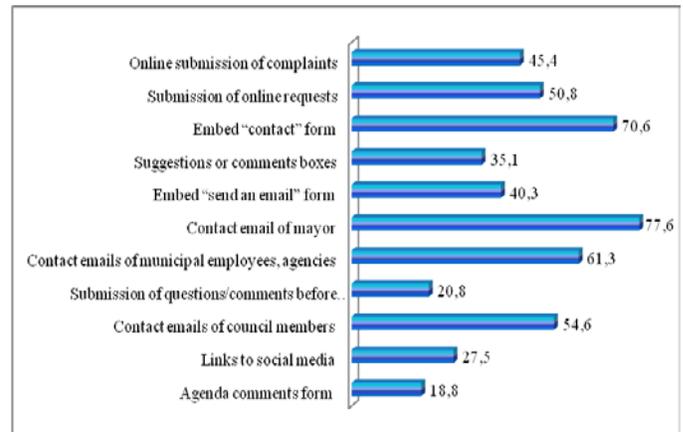


Fig. 1 Percentage of Greek Local Government Websites that Support E-Consultation Criteria

The mean value for the 313 municipalities on the e-consultation factor was 6.07 (maximum: 13.14) which indicates that the Greek local governments' portal performed moderately well on that factor. Moreover, only 23 out of the 313 websites (7.3%) received the maximum score on the e-consultation factor.

B. E-Deliberation Factor

Next, we evaluated the performance of websites on the e-deliberation factor. Fig. 2 shows the percentage of Greek municipalities with a website that support the three deliberative features. Based on results, it can be argued that only a small percentage of the Greek municipal websites incorporate a discussion forum where citizens can deliberate on critical local issues (21.7%), offer scheduled e-meetings for discussion (15.3%), and hold videoconferences with municipal agencies or council members (7.7%).

On average, Greek local governments performed poorly on the e-deliberation factor (mean value: 0.469, maximum value: 3.12). Moreover, only 22 websites out of the 313 municipalities (7%) were found to incorporate all the three examined deliberative features.

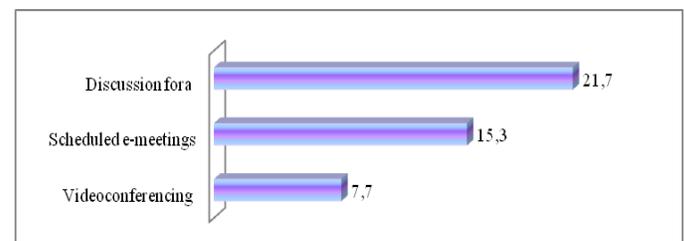


Fig. 2 Percentage of Greek Local Government Websites that Support E-Deliberation Criteria

C. E-Discourse, E-Petitions, E-Voting, and E-Polling Factors

Fig. 3 presents the percentage of Greek local governments that support applications for e-discourse, e-petitions, e-voting, and e-polling. Results indicate that Greek municipalities do not adopt tools for active forms of citizens' participation since

only a small percentage of them offer tools for citizens to use such as chat-rooms (18.8%), e-petitioning (10.9%), e-voting (32.9%) and e-polling (28.8%).

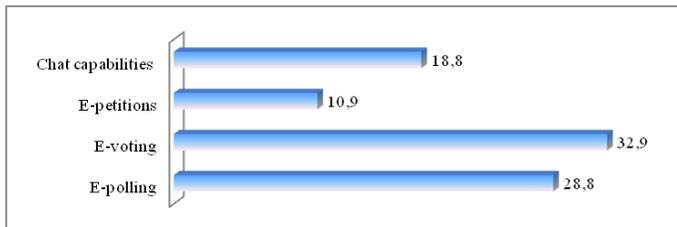


Fig. 3 Percentage of Greek Local Government Websites that Support E-Discourse, E-Petitions, E-Voting, and E-Polling Criteria

D. Evaluation of Greek Municipalities in the Interaction/Participation Category

Next we evaluated the performance of Greek municipalities on the interaction-participation category. Looking at the mean category score of the 313 municipalities it can be argued that Greek local government websites performed quite low on the interaction-participation category (mean: 7.55, maximum: 20.62).

18 out of 313 (5.7%) municipal websites received the maximum score on the interaction/participation category. These municipal governments can be regarded as pioneers in the adoption of interactive features because they enhance citizens' participation and incorporate e-democracy features in the e-government operational model. The top municipal governments in the interaction/participation category are the municipalities of Pineiou, Prosotsanis, Pylaias-Chortiat, Rafinas-Pikermiou, Rethymno, Serifos, Sifnos, Soufli, Spartis, Tanagras, Tripolis, Troizinias, Farsala, Philadelpheia, Chaidari, Chalkidona, Chios, and Psara.

A closer look at the characteristics of the top municipalities indicates that most of them are small and medium sized municipalities, numbering less than 100,000 inhabitants (mean number of inhabitants: 27,477, minimum: 478, maximum: 70,110). One possible reason accounting for the fact that small and medium-sized municipalities are more inclined to adopt e-democracy features (interactive and participatory applications) could be that the process of monitoring and managing these applications is easier for municipalities with a small number of inhabitants. Large municipalities, on the other hand, might require large amount of financial and personnel resources in order to be able to interact with their citizenry.

In addition, these e-democracy municipalities are characterized by a high level of voters' turnout. The average voter turnout of the 18 municipalities is 63%. This suggests that local governments that exhibit high levels of citizen political involvement are more prone to incorporate in their websites interactive and participatory applications.

VI. CONCLUSIONS

The aim of the present paper was to propose an evaluative framework for e-government/e-democracy initiatives at the municipal level and offer an application of the proposed model

by evaluating the e-democracy performance of Greek municipal governments.

The main contribution of the proposed model is that it incorporates not only e-government features (i.e., information dissemination, online services provision) but also e-democracy aspects which enhance e-participation of citizens, while it treats e-participation as a multi-dimensional construct that moves from simple forms such as online consultation to more active forms of engagement like e-voting. It should be noted that the model presented here builds upon previously published models on e-government which have incorporated e-democracy features and enriches them. Therefore, it is herein suggested that future studies on e-government evaluation should incorporate e-democracy aspects and avoid treating e-democracy as a separate construct from e-government. Another contribution of this model is that it adopts a citizen-centric approach since the evaluation of the metrics of the model is based on citizens' perceived importance of the metrics. Thus, it reduces subjectivity of evaluators in rating the metrics.

The proposed model was developed and validated through a citizens' survey and a quantitative website analysis. Greek citizens are interested in websites that enable them to complete a range of online transactions. Moreover, they value websites rich in informational content that give them the opportunity to interact with local governments in a simple way (i.e., through contact or email forms and suggestion boxes). Up until the present time, citizens do not regard as important more active and participatory forms of interaction with their municipalities such as e-polling, e-voting, discussion forums etc. Part of this lack of interest could be explained from the limited knowledge that Greek citizens possess about e-democracy applications. The evaluation of Greek e-government initiatives at the local level revealed that municipalities in Greece are not in the business of encouraging citizen participation through their websites. As Greek local governments continue to be laggards on e-democracy initiatives citizens will not fully appreciate the benefits of participatory online applications simply because they do not have the opportunity to use them and get involved with local government.

Greek municipal websites have still a long way to go in regards to provision of opportunities for citizens to actively participate in the issues that affect their municipalities. As our analysis indicates thus far, local governments in Greece have failed to advance their e-government technology by incorporating more e-democracy features such as discussion fora, scheduled e-meetings, videoconferences, chat-rooms, e-surveys, e-petitions, and e-voting. As a first attempt to apply and validate the proposed model we chose to evaluate how well local government.

VII. PRACTICAL IMPLICATIONS

The poor advancement in Greek local e-government is not surprising if one accounts the inefficiencies as well as the lack of resources and personnel caused by the Greek financial crisis.

Local e-government in Greece should start incorporating e-democracy features. However, implementation of e-democracy

initiatives by local municipal governments requires major transformations from the traditional bureaucratic models into more participatory, deliberative and citizen-centric models where citizens are treated more like informed and active online participants. Paying attention to and replicating best practices of e-government implementation can help municipalities advance their e-government technology.

The present study offers e-government managers an instrument for the evaluation of local government websites. Managers wishing to be pioneers on e-government/e-democracy should begin with evaluating their existing e-government system based on the proposed instrument and according to the evaluation results add or eliminate certain applications. Consequently, citizen-friendly e-government/e-democracy initiatives can be designed.

In addition, municipalities in Greece should also find ways to increase citizens' knowledge and trust about their e-democracy initiatives. Local government agencies in Greece could implement a national campaign that informs citizens about the new interactive options they offer as well as the relative benefits and advantages associated with e-democracy. Moreover, it is imperative that local governments start building citizens' trust towards their e-government and e-democracy efforts. This can be done by designing high quality websites that deliver efficiently e-government services and help citizens interact with local government officials as well as get involved in local government. Only if citizens believe that local governments can deliver on their promises will they take advantage of e-government/e-democracy initiatives [26] and even demand more participatory and deliberative features.

VIII. LIMITATIONS AND FUTURE RESEARCH SUGGESTIONS

The present study proposed an e-government/e-democracy model and evaluated Greek local governments' websites based only on the interaction-participation category of the model. The authors intend to apply the full model in the Greek municipal sector examining the level of e-government/e-democracy comprehensiveness.

A main limitation of the present study stems from the context specific nature of the data. Both the citizens' survey and the website quantitative analysis focused on Greece, surveying Greek citizens and analyzing Greek municipal websites respectively. Future research could replicate the study and evaluate municipal websites from other countries. Fruitful insights could be yielded by investigating the factors that might affect (a) citizens' perceived importance of e-government/e-democracy features of municipal websites (i.e., age, gender, internet usage, trust in local government), and (b) adoption of e-government/e-democracy applications by local government agencies (i.e., size of municipality, percentage of citizens with broadband connection, voter turnout, percentage of citizens' with higher education, etc). The poor advancement in Greek local e-government is not surprising if one

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