

## EVOLUTIONARY PATTERNS AND DEVELOPMENT PROSPECTS FOR E-GOVERNMENT: A DELPHI-BASED APPROACH TO PERCEPTIONS OF THE ADMINISTRATIVE AGENT

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**Abstract.** Information technology is an open door for governments to service citizens in a more timely, cost-efficient and effective manner. Even considering citizen resistance, cultural adversity or changes in the economic agents' relationship, few would contest that concern over the state of electronic government (e-government) has increased over the years. This concern has been responsible for the emergence of a wide range of new initiatives devoted to development of the information and knowledge society, which occupies a central place in government policies and planning strategies worldwide. In this paper, we aim to analyze the evolutionary patterns of e-government in Portugal and, based on an application of the Delphi technique, provide development prospects considering the perceptions of a panel of administrative agents. Despite the low use of e-government services, our study demonstrates that the administrative agent expresses overall satisfaction with its use. Additionally, the high level of modernization allows us to forecast the increased use of information and communication technologies in terms of e-government services.

**Keywords:** Delphi, e-government, evolutionary patterns, prospects, strategic planning, technology management.

**JEL Classification:** M20, O32, O33, O38.

## **Introduction**

As regulatory agents, governments play an important role in the modernization of any society. In this sense, the emergence of governmental initiatives devoted to development of the *information and knowledge society* has occupied a central place in governmental planning strategies worldwide. As defended by Lee (2010: 229), “*governments around the world are implementing innovative e-government systems and services. They are using information and communication technologies [...] to enhance their internal and external operations*”. Castells and Cardoso (2005) strengthened this idea, arguing that a network society has been built through the adoption of technological strategies and government policies that are being spread worldwide. Starting from this premise, and considering that the literature contains several examples of e-government initiatives, key factors of success, advantages and challenges to their implementation (e.g. Gouveia 2004a; Mórán 2007; Phippen 2007; Čiegis, Gineitienė 2008; Nour *et al.* 2008; Lee 2010; Rorissa *et al.* 2011; Wangwe *et al.* 2012) (further developments are presented in the next section), it should be highlighted that “*the increase in technology and communication has changed some of [...] attitudes on the part of governments*” (Evans, Yen 2006: 208). In particular, this change of attitude had (and still has) a direct impact on the way that administrative agents perform their daily activities, which in turn has a significant impact on the ability of governments to function well and provide citizens with better services. Therefore, one may assume that the perception of the administrative agent is of great importance in the analysis of e-government evolutionary patterns and, naturally, to provide development prospects.

Based on this initial background, the present paper aims to: (i) understand the current state of maturity of e-government in Portugal (*i.e.* its evolutionary patterns); (ii) identify the major factors that influence the use of information and communication technologies (ICTs) in terms of administrative activities; and (iii) provide development prospects based on the perceptions of a panel of administrative agents. It should be pointed out, however, that any other discussion (e.g. e-government-related concepts, developmental stages, regional asymmetries, retrospective overviews) falls outside the scope of this paper and will not be taken up here (details on these topics can be found in Evans, Yen 2006; Lee 2010).

Methodologically, considering that the Delphi technique has proven over the years to be effective in forecasting technological trends (*cf.* Ferreira 2003; Ferreira, Monteiro Barata 2011), there is considerable scope to explore its applicability in the particular context of this study. For that purpose, our experiment involves a panel of several administrative agents from the most representative city and parish councils in Portugal. We know of no prior work using the Delphi technique to analyze the evolutionary patterns and provide development prospects for e-government in this particular context. In this sense, the study contributes to current research by offering empirical results related to the application of the Delphi technique and forecasting e-government evolutionary trends.

The remainder of the paper is structured as follows: Section 1 presents the literature review highlighting the most recent trends in e-government; Section 2 presents a brief methodological background of the Delphi approach and justifies its application in the context of the present study; Section 3 presents the results; and the last section concludes the paper.

## 1. Literature review and recent trends in e-government

Gouveia (2004b: 12) described the information society (IS) as “*a society that uses predominantly information and communication technology for the exchange of information in digital format and that supports the interaction among individuals, using methods and practices in permanent construction*”. In this regard, one may assume that e-government is one of the most important components of IS, which should act on three major areas of intervention: (i) *e-administration*, which involves public administration and political processes; (ii) *e-citizens & e-services*, which is based on relationships among citizens and organizations; and (iii) *e-society*, which is a broader area related to public participation and citizenship (Cook et al. 2002; Gouveia 2007; Kažemikaitienė, Bilevičienė 2008; Ferreira 2010). It should be pointed out, however, that these three areas of intervention require available infrastructures and imply that people should be able to access them. If that is the case, “*e-government represents the free flow of information that improves knowledge, opportunity, relationships, time effectiveness, and even encourages the standardization of products and ideas because citizens view a common set of information*” (Evans, Yen 2006: 231). Nevertheless, one should bear in mind that because technology changes e-government practices should change accordingly. This leads governments to new challenges and requires permanent improvements and updates.

According to Amaral (2007), ICTs have been challenging the traditional channels of creating businesses and guiding government structures into e-government logic. This means that the development of the Internet operates as an integrating component of the new economy (Kažemikaitienė, Bilevičienė 2008; Ferreira 2010; Wangwe et al. 2012), leading to “*mass use of PCs [personal computers], exponential growth in broadband Internet use, widespread use of mobile telecommunications, convergence between media, and content development*” (Amaral 2007: 89). Following these technological trends, e-government allows what is called “*e-participation*”. In accordance with Gouveia (2004b, 2007), Nour et al. (2008), Lee (2010) and Rorissa et al. (2011), *e-participation* implies increased information availability, improved ability to query and access that information, ease of interaction in Government-to-Consumer (G2C) and Consumer-to-Government (C2G) relationships, and, consequently, public involvement through the use of ICTs. From this premise, and with the scope of promoting participation, usage, sharing and citizenship, the challenges of e-government involve its ability to electronically mediate, aiming to bring together the administrative, social and economic dimensions of society. In this regard, and according to Serrano (2007: 32), the role of ICTs becomes imperative for the “*possibility of contact, in real time, economic agents, as well as for the search for strategic partners at different territorial levels*”. Figueiredo

(2007: 136) seemed to support this idea and argued that the creation of inside-oriented infrastructures is a critical strategic mistake, which should be replaced by an orientation of “*electronic delivery of services to citizens and businesses*”. In addition, the importance of certain concepts, such as *network* and *interoperability*, should be pointed out (Gouveia 2004b; Posch 2007; Ferreira 2010). In practical terms, such concepts are expected to overcome power conflicts, include a common language, and be able to promote protocols and facilitate information exchange. Therefore, and from a structural perspective, it is important that e-government understands and promotes interaction among the dimensions of people, processes, information and technologies (POSI 2003).

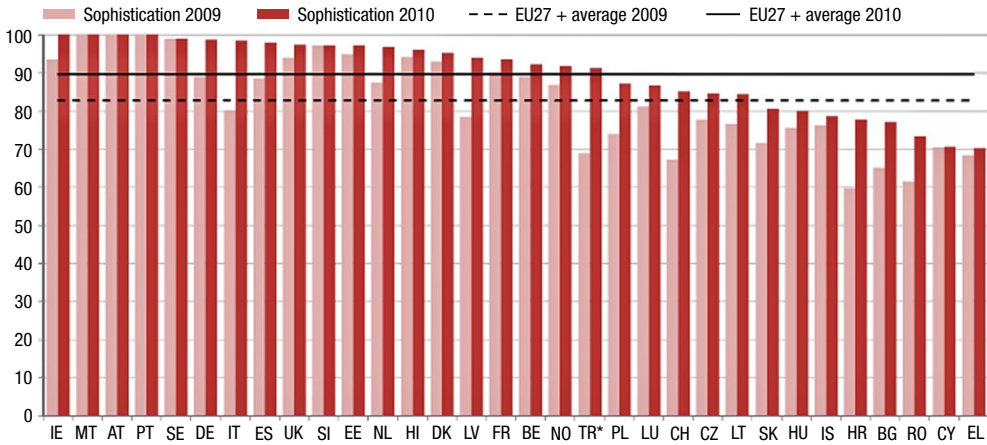
Abdulmohsen and Mayhew (2007) argued that the e-government concept includes the daily supply of services available to citizens through electronic means, such as the Internet or telephone. Currently, the Internet has become the most accessible and effective means for the provision of governmental information and services. As such, the presence of public administration (PA) on the Internet offers significant benefits and reveals increased transparency, economic development and increased public awareness, which supports the concept of “*e-democracy*” (for further details, see also Nour *et al.* 2008). Nevertheless, Molnár (2008) and Gouveia (2009) argued that the citizen-based approach of e-government (*i.e.* G2C) implies a review and permanent simplification of all public processes and services offered, namely in terms of regulation. Therefore, database standardization and interoperability should be seen as priorities. One should bear in mind, however, that this concept of interoperability can only be achieved with a horizontal business model for all levels of the PA, accompanied by the necessary conditions for effective cooperation among the administrative systems (Móran 2007). In this context of citizen-based approach, it is possible to present features that should be inherent to any e-government model or system: (i) it must be targeted to the life of the citizen; (ii) it should be available 24 hours per day; (iii) it must be totally available through multiple channels (*e.g.* Internet, telephone); and (iv) it should be made available in a “user-friendly” logic (for further developments, see Chiolas 2008; Ferreira 2010).

According to Capgemini Ernst & Young (*in* Molnár 2008), there are five levels of online service sophistication (also known in the literature as “*maturity levels*”): (i) *information*, which is related to the reception of general information about processes and/or documents required; (ii) *one-way interaction*, which concerns downloading and filing of electronic documents; (iii) *two-way interaction*, in which information can be inserted without paper support (this excludes, however, the delivery of public administrative documents (*e.g.* certificates and receipts)); (iv) *transaction*, which ensures complete online transactions; and (v) *personalization*, which is based on a proactive citizen-based approach where there is no longer a need to submit personal information each time a citizen accesses online services (for further details, see Mulgan 2006; Wauters *et al.* 2007; Molnár 2008; Ferreira 2010; Lee 2010).

Following Nour *et al.* (2008: 448), “*there has been a proliferation of e-government initiatives worldwide undertaken under different forms of government, socioeconomic settings, and technological conditions*”. In this sense, European countries have been revealing remarkable growth in terms of e-government initiatives and sophistication,

which in turn has allowed them to improve significantly in terms of efficiency (for further details, see Wauters *et al.* 2007; OECD 2008; Capgemini *et al.* 2010). Figure 1 illustrates the level of sophistication of the European countries.

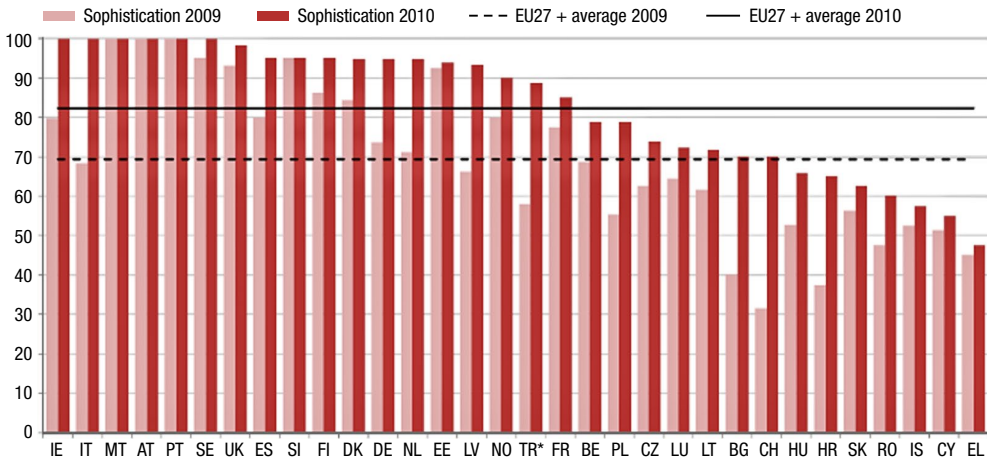
Figure 1 shows Austria, Ireland, Malta and Portugal as top performers (100%) in terms of online sophistication. These countries are followed by Germany, Italy and Sweden (with 99%). Finally, we can see Cyprus and Greece (with 70%). As far as availability of public services is concerned, the countries' average is 82%. Once again, Austria, Ireland, Malta and Portugal lead this field along with Sweden (100%) (Fig.2).



**Fig. 1.** Ranking of European countries by online sophistication (in %)

**Notes:** \* Survey not implemented in 2009. The score of 2007 is used in the graph.

*Source:* Capgemini *et al.* (2010: 7).



**Fig. 2.** Ranking of European countries by online public services (in %)

**Notes:** \* Survey not implemented in 2009. The score of 2007 is used in the graph.

*Source:* Capgemini *et al.* (2010: 8).

One of the major concerns of e-government is to achieve an efficient, inclusive and transparent PA. Graafland (2003), Aykut (2007), Molnár (2008), Ferreira (2010) and Lee (2010) supported this idea and suggested that the changes that have been ongoing, in terms of how PA communicates with citizens, stem from increased citizen support of technologies that create new ways of operating online. From this premise, the transformation of PA services to electronic services, fully available anytime and anywhere, should be based on the logic of cooperation, which should not discriminate and, hence, involve all private and public entities. Additionally, “*e-government is expected to play a critical role for public administration and governance in the future; [...] providing more participative opportunities for citizens*” (Lee 2010: 220).

The next section presents background of the Delphi technique, which is important in understanding how the application of this technique can assist in the analysis of the evolutionary patterns, and furthermore provides development prospects for e-government in Portugal.

## **2. Methodological framework**

### **2.1. Basics of the Delphi technique**

In broad terms, the Delphi approach begins with the development of a survey, which should be completed individually by experts on the target topic. Specifically, as noted by Ferreira and Monteiro Barata (2011: 246), the method is based on “*a well-established sequence of successive individual questions supplemented with information and advice, which permits correcting the first stages of the process. [...] it is a tool, which, under certain parameters, enables consensus. [...] and is based on the rational principle that ‘n’ human minds are better than one when confronting the lack of precise knowledge about a certain subject*”.

While the method should allow for consensus, it is important to emphasize, however, that the final results should closely resemble reality. In this sense, the basic principles of a Delphi-based approach are: *anonymity*, *controlled feedback* and *statistical treatment of responses*. The Delphi’s operational structure is shown in Figure 3 (further details can be found in Dalkey, Helmer 1963; Dalkey 1969; Hsu, Sandford 2007; Niehaves, Ortbach 2010; Ferreira, Monteiro Barata 2011; Ferreira *et al.* 2012).

As outlined, the results of applying the Delphi technique have a statistical basis. According to Ferreira (2003) and Ferreira *et al.* (2013), Delphi results are obtained through a function  $G = G_j(I, E, R)$ , which projects the response of a given group of experts  $G_j$  to an event  $E$ , where  $I$  is the number of experts,  $E$  is the event space (which can be continuous or discrete), and  $R$  is the domain of answers, which allows for an estimation for each event and expert of the group. The results may, however, be presented based on different statistical measures (*e.g.* central tendency – mean, median, mode or quartiles – or dispersion – standard deviation, variance or semi-interquartile amplitude).

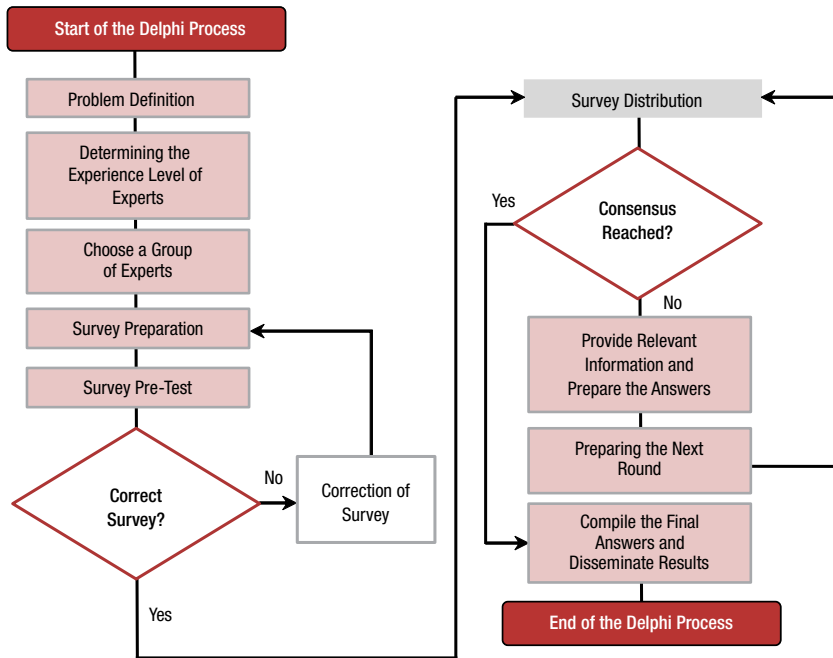


Fig. 3. Operational structure of the Delphi technique  
 Source: Zapata in Ferreira (2003, adap.).

## 2.2. Pros and cons of the Delphi technique

It is widely acknowledged that every methodology has strengths and weaknesses. The Delphi technique is no exception, and different considerations of its pros and cons can be found in the literature (e.g. Dalkey, Helmer 1963; Dalkey 1969; Hsu, Sandford 2007; Ferreira, Monteiro Barata 2011; Ferreira *et al.* 2013). Figure 4 identifies some of the most discussed advantages and limitations of the Delphi technique.

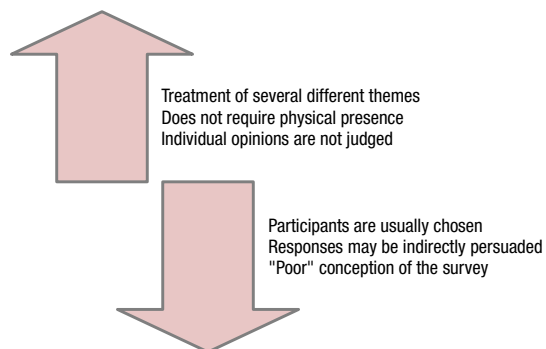


Fig. 4. Pros and cons of the Delphi technique  
 Source: Ferreira *et al.* (2013, adap.).

As Ferreira and Monteiro Barata (2011) pointed out, Delphi applications have been employed over the years in a wide range of disciplines, including economics, politics, public finance, operations management and technological innovation. The method allows for the treatment of different topics and promotes reflection on early judgments as well as possible correction of previous responses. Because the survey is individual and confidential, participants are expected to express their opinions and convictions without the influence of the organization hierarchy. In addition, it should be mentioned that the Delphi method may be applied in isolation or integrated with other approaches, allowing individuals and organizations to identify problems and search for compromise solutions based on the knowledge gleaned from the respondents' feedback. Finally, as stated by Ferreira *et al.* (2012), the method does not require historical data, which seems to be extremely positive when dealing with under-researched areas.

As for the cons, experts may not be readily available in many cases, limiting the scope of Delphi applications. Considering that the methodology does not require the physical presence of the participants involved, it should be noted, in terms of survey application, that respondents may misunderstand some questions, which may ultimately jeopardize the results. Also, due to the possibility of a participant feeling forced to answer according to the answers of the group, the statistical treatment of the responses provided after each round may become an influencing factor. In addition, conservative tendencies are of considerable significance here (Dalkey 1969; Ferreira *et al.* 2013). Finally, due to the possibility of multiple rounds, where the survey is always the same and the process becomes monotonous and/or time-consuming, respondents may no longer wish to participate and, consequently, drop out of the process. Nevertheless, considering that the Delphi technique has proven over the years to be effective in forecasting technological trends, there is considerable scope to explore its applicability in the particular context of this study. The next section presents and discusses the results achieved with an application of the Delphi technique in terms of evolutionary patterns and development prospects for e-government.

### **3. Results analysis**

Taking into account the research objectives outlined for this study, the initial Delphi panel was composed of 30 administrative agents from different city and parish councils of the Portuguese territory. After the first round, the number of panel members was reduced to 15 and, after the second round, only 13 members responded to the survey. It should be noted, however, that there is no ideal number of panel members for application of the Delphi technique (*cf.* Ferreira, Monteiro Barata 2011; Ferreira *et al.* 2013). Therefore, the responses from the 13 members in the final round provide the basis of our analysis.

#### **3.1. Panel characterization**

The reduction in the number of participants from round to round is anticipated in the literature (*cf.* Ferreira 2003; Ferreira, Monteiro Barata 2011). Several factors can justify this reduction (*cf.* subsection 2.2). In our case, the reduction in the number of partici-



pants was mainly justified by the length of the questionnaire (*i.e.* 10 pages of multiple-answer questions). Table 1 presents a summary of data regarding the respondents in the 2<sup>nd</sup> round.

As shown in Table 1, most respondents are *male* (92.31%), mostly in the age group of 32–41 years (69.23%). As far as qualification is concerned, most of the panel members hold a *higher academic degree* (76.92%). Also, the predominant areas of qualification are *engineering* and *other* (38.46% for both). The data obtained according to the structure of the questionnaire are presented in the next subsection.

**Table 1.** Characterization of the respondents (second round)

		Delphi Panel	
		N	%
Gender	Female	1	7.69
	Male	12	92.31
	Total	13	100.00
Year of birth	1960–1965	1	7.69
	1966–1970	2	15.39
	1971–1980	9	69.23
	1981–1985	1	7.69
	1986–1990	0	0.00
	1991–1995	0	0.00
	Total	13	100.0
Qualifications	Secondary Education	0	0.00
	Bachelor	1	7.69
	“Licenciatura”	10	76.92
	MSc, MBA, or Similar	0	00.0
	DBA or PhD	0	00.0
	Other	2	15.39
	Total	13	100.0
Area	Business & Economics	3	23.08
	Engineering	5	38.46
	Other	5	38.46
	Total	13	100.0

### 3.2. Characterization of the current situation

The objective of this section is to determine the *level of implementation* and *availability of information technology*, *availability of informatics*, *Internet access*, and *other technological tools* supplied in the municipal services. Based on data collected from the panel

of experts (see Table 2), one can see that information technology is *fully implemented* in several municipal services (62%), while informatics tools are only *partially available* (85%).

For the next question, we tried to understand the participants’ opinions about what technological tools were more important in providing high-quality services. Based on a Likert scale from 1 to 5 (1 = *not important*, 3 = *moderately important*, 5 = *decisively important*), the respondents elected *infrastructure*, *intra-service platforms*, *programs of document management* and *programs of economic and financial management* as the most important technological tools (Table 3).

Table 4 presents the results based on the *availability of the Internet to municipal workers*, *Internet use* for the development of their work activities, and *adequacy of data communication speed through the Internet*. In the first section of the table, most of the respondents affirm that the Internet is *available to all workers* (54%), followed by a considerable number who say that the Internet is *available only for some workers* (46%). In the next section, the answers indicate that the Internet is *imperative* (62%) for the development of respondents’ work activities, while 38% say that it is *very important*. In the third section, 61% of the respondents say that the speed of data communication through the Internet is *appropriate*. However, 23% say that the speed is *unsuitable* and, paradoxically, some argue that is *very appropriate* or *not at all suitable* (8%, respectively).

The second part of the survey analyzed the main results obtained with the use of ICT in the daily functions of municipal workers.

**Table 2.** Level of implementation of information technology and availability of informatics

Level of implementation of information technology in municipal services (%)		Level of availability of informatics tools (%)	
Fully implemented	In most of the services	Provided completely	Provided in part
62	38	15	85
Total		100	

**Notes:** Coefficients of semantic confidence [mean; n = 13]:  $\alpha = 91.15\%$  and  $89.08\%$  [respectively].

**Table 3.** Technological tools to provide high-quality service

Tools	Median	Mean	Standard deviation	Coefficient of variation
Infrastructure	5	2.923	2.465	0.843
Internet	4	3.462	1.713	0.495
Intra-service platforms	5	4.077	1.656	0.406
Operating system ( <i>Word, Excel</i> , etc.)	3	3.000	1.528	0.509
Programs of document management	5	4.538	1.391	0.307
Programs of economic and financial management	5	3.846	1.908	0.496

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 87.69\%$ .

**Table 4.** Availability, importance and adequacy of Internet in municipal services

	Respondents' opinion	%
Availability of Internet to municipal workers	Yes, to all	54
	Yes, to some	46
	Total	100
Importance of Internet use for the development of their work activities	Imperative	62
	Very important	38
	Total	100
Adequacy of speed of data communication through the Internet	Very appropriate	8
	Appropriate	61
	Unsuitable	23
	Not at all suitable	8
	Total	100

**Notes:** Coefficients of semantic confidence [mean; n = 13]:  $\alpha = 90.77\%$ ;  $90.77\%$  and  $90.00\%$  [respectively].

### 3.3. Technology and procedures related to the use of ICT

The analysis of responses to the first question of this group was based on the following variables: *better information for citizens*, *increased productivity*, *operative ease*, *reduced bureaucracy* and *reduced costs for the municipality*. Based on data presented in Table 5, we can estimate the importance of these variables. It is important to clarify that, in this question, respondents had to choose the three most important variables and rank them in terms of importance (1 = *first most important*, 3 = *third most important*).

According to the respondents, *better information for citizens* and *increased productivity* (18 points in the ranking for both) are the most important variables resulting from the use of ICT in their daily work. It should be also noted that the third most important variable is *operative ease* (15 points) and, for fourth and fifth, we have a tie between *reduced bureaucracy* and *reduced costs for the municipality* (12 points for both).

**Table 5.** Main results obtained with the use of ICT in work

Variables	Punctuation
Better information for citizens	18
Increased productivity	18
Operative ease	15
Reduced bureaucracy	12
Reduced costs for the municipality	12
Total	75

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 85.77\%$ .

Using a Likert scale from 1 to 5 (1 = *minimal relevance*, 5 = *highest relevance*), Table 6 shows the main impacts of ICTs in the competitive advantage of the municipality.

Based on Table 6, and according to the respondents, new technologies have a considerable impact on *procedural quickness* and in the *quality of service* of municipal services, with median scores of 5 (critical importance) and 4 (very important), respectively. The remaining items assumed moderate importance (*i.e. motivation of employees, operating capacity, possibility of more transparency and prestige/image*).

Using a Likert scale ranging from 1 to 5 (1 = *minimal relevance*, 5 = *highest relevance*), Table 7 shows what factors participants considered most important for the promotion of technological change.

Accordingly, the results show that *debureaucratization* and *proximity to citizens* are the most relevant factors. However, one cannot say that there are no important factors, since the remaining items have very high scores: *cost-cutting, image of municipality, response to officials* and *training of skilled human resources*.

**Table 6.** Main impacts of new technologies in the competitive advantage of the municipality

Impacts	Median	Mean	Standard deviation	Coefficient of variation
Motivation of employees	3	2.308	1.437	0.623
Operating capacity	3	2.769	2.127	0.768
Possibility of more transparency	3	2.846	2.035	0.715
Prestige/image	3	2.462	2.145	0.871
Procedural quickness	5	3.308	2.323	0.702
Quality of service	4	3.538	1.941	0.549

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 77.46\%$ .

**Table 7.** Important factors for the promotion of technological change

Factors	Median	Mean	Standard deviation	Coefficient of variation
Cost cutting	4	3.615	1.805	0.499
Debureaucratization	5	3.846	1.819	0.473
Image of municipality	4	3.077	2.100	0.682
Proximity to citizens	5	4.077	1.553	0.381
Response to officials	4	2.846	1.908	0.670
Training of skilled human resources	4	3.769	1.423	0.378

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 85.38\%$ .

### 3.4. E-government in the municipality

The third part of the survey provided a deeper analysis particularly oriented toward the impacts of e-government in the municipality. Table 8 allows us to understand in what main areas e-government activity has been implemented. This question was based on multiple choice answers.

According to Table 8, with 11 responses, *urbanism* is clearly the area of e-government activity that stands out from the others. Second, we have *fees and licenses* and *other* with 6 responses each (which are often associated with geo-referencing tools, geographic information system (GIS) and the like). Next, we have *environment* and *education* (with 3 responses each), *social action* (2 responses) and *human resources* and *treasury* (1 response each). It should be noted that *accounting* and *sports* are not presented as areas of e-government activity, so there is clearly much work that is still to be developed.

Respondents were next asked to indicate the three main advantages of using e-government and rank them based on a Likert scale ranging from 1 to 3 (1 = *first most important*, 3 = *third most important*) (Table 9).

The results presented in Table 9 indicate that the benefit ranked in first place is *debureaucratization* (23 points), followed by *accessibility* (18 points) and *quickness* (15 points). On the other hand, advantages receiving the fewest votes were *simplification* (7 points) and *cost-cutting* (4 points).

### 3.5. Overall evaluation

The fourth part of the survey analyzed the overall assessment in terms of *ICT availability*, *availability of technological resources*, *training in these areas* and *use of e-government*. Table 10 presents the results regarding the overall evaluation of ICT availability.

**Table 8.** Areas of e-government activity in the municipality

Area	Votes
Accounting	0
Education	3
Environment	3
Fees and licenses	6
Human resources	1
Social action	2
Sports	0
Treasury	1
Urbanism	11
Other	6
Total	33

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 70.77\%$ .

**Table 9.** Main advantages of using e-government by the municipality

Advantages	Punctuation
Accessibility	18
Cost cutting	4
Debureaucratization	23
Quickness	15
Simplification	7
Total	67

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 89.23\%$ .

**Table 10.** Evaluation of ICT availability in the municipality

Evaluation	Votes
Very good	3
Good	8
Sufficient	2
Negative	0
Total	13

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 90.77\%$ .

**Table 11.** Evaluation of available technological resources and ICT training

Evaluation	Votes
Very good	1
Good	9
Sufficient	3
Negative	0
Total	13

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 82.31\%$ .

**Table 12.** Evaluation of the use of e-government in the municipality

Evaluation	Votes
Fully used	0
Widely used	2
Used	11
Underused	0
Nothing used	0
Total	13

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 85.38\%$ .

**Table 13.** Initiatives that potentiate an inclusive information society

Initiatives	Votes
Functional alteration of the contents for workers	1
Increasing training	7
Internet availability	5
More support for online services	10
Strengthening the State incentives	4
Total	27

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 87.69\%$ .

Following the data presented in Table 10, we can easily see that the respondents consider the degree of ICT availability in the municipalities to be *good* (8 votes). However, some panelists considered it to be *very good* (3 votes). Although some panelists classified ICT as *sufficient* (2 votes), there were no negative evaluations.

Regarding *technological resources* and *ICT training* (see Table 11), most of the participants stated that the municipality has technological and training resources. Nine considered it *good*, and none assessed it negatively.

As shown in Table 12, even though e-government is not *fully used* in the country, nor is it *underused* or *nothing used*, the participants believe that it is *widely used* (2 votes) or *simply used* (11 votes).

The next subsection presents and discusses the results achieved in terms of development prospects for e-government.

### 3.6. Evolutionary perspectives

The fifth and final part of the survey sought to analyze the future perspectives of municipal workers regarding the implementation of e-government. The necessary initiatives for wider use of e-government in the future are presented in Table 13.

According to Table 13, the initiatives considered most enhancing of an inclusive IS are *more support for online services* (10 votes), followed by *increasing training* (7 votes), *Internet availability* (5 votes), *strengthening the State incentives* (4 votes) and *functional alteration of the contents for workers* (1 vote).

The next question asked the participants to rank, by order of importance (1 = *first most important*, 3 = *third most important*) the three factors that they considered most important to strengthen the country's position in the European ranking of e-government development. According to Table 14, the majority of responses focused on *easy access to contents* (30 points), followed by *objectives of the organization* (20 points) and, ranked in third place, *motivation of employees* (10 points).

Respondents were next asked to rank the four areas that they considered most important to invest in e-government (1 = *most important*, 4 = *least important*). The final ranking was the following: first, *availability of online services* (with 44 points); second, *computer platforms* (29 points); third, *relationship between municipal services* (24 points); and, fourth, *relationship with public entities* (21 points) (Table 15).

Based on the results achieved with this final part of the survey, our study demonstrates that the existing high level of modernization allows us to forecast the increased use of ICTs in terms of e-government services.

### Discussion and final remarks

Information technology is an open door for governments to service citizens in a more timely, cost-efficient and effective manner. In the European context, Austria, Ireland, Malta and Portugal are top performers in terms of online sophistication, followed by Germany, Italy and Sweden (*cf.* Caggemini *et al.* 2010). In this regard, the desire for public administration that is citizen-based seems to be at the basis of the government policies and planning strategies of different countries, leading to the emergence of governmental initiatives devoted to development of the *information and knowledge society*. Starting from this premise, and considering that the literature contains several examples of e-government initiatives, key factors of success, challenges and advantages, this paper has highlighted that “*the increase in technology and communication has changed some of [...] attitudes on the part of governments*” (Evans, Yen 2006: 208). In particular,

**Table 14.** Most important elements for Portugal's position in the European rankings

Elements	Punctuation
Easy access to contents	30
Legal diploma/obligations	9
Motivation of employees	10
Objectives of the organization	20
Total	69

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 84.62\%$ .

**Table 15.** Areas in which the municipality must commit (e-government)

Areas	Punctuation
Availability of online services	44
Computer platforms	29
Relationship with public entities	21
Relationship between municipal services	24
Total	118

**Notes:** Coefficient of semantic confidence [mean; n = 13]:  $\alpha = 86.54\%$ .

as pointed out earlier, this change of attitude had (and still has) a direct impact on the way that administrative agents perform their daily activities, which in turn has a significant impact on the ability of these governments to function well and provide citizens with better service. Thus, we assumed that the perception of the administrative agent is of great importance in the analysis of e-government evolutionary patterns and, naturally, in providing development prospects. Following this, our essay aimed to: (i) understand the current state of maturity of e-government in Portugal (*i.e.* its evolutionary patterns); (ii) identify the major factors that influence the use of ICTs in terms of administrative activities; and (iii) provide development prospects based on the perceptions of a panel of administrative agents. Considering these main objectives, and that the Delphi technique has proven over the years to be effective in forecasting technological trends, we explored its applicability in the particular context of our study. For that purpose, the experiment carried out involved a panel of several administrative agents from the most representative city and parish councils in Portugal. As previously stated, we know of no prior work using the Delphi technique to analyze the evolutionary patterns and provide development prospects for e-government in the particular context of this study. Thus, the study contributes to current research by offering empirical results related to the application of the Delphi technique and forecasting e-government evolutionary trends.

Based on the analysis of the empirical results, the panel's overall assessment in terms of ICT availability is considered good. Additionally, most of the participants stated that their municipality has good technological and training resources and, even though e-government is not fully used in the country, it is widely used. On the other hand, the initiatives considered most enhancing of an inclusive IS are more support for online services, followed by increasing training, Internet availability, strengthening the State incentives and functional alteration of the contents for workers.

In looking ahead to future research, and considering that e-government initiatives require "*continuous attention in terms of resources*" (Lee 2010: 230), it would be important to conduct periodic studies devoted to gauging the opinions of a broader panel of administrative agents and, it is hoped, replicate the experiment and compare the results obtained in different countries. Additionally, exploratory case analyses and phenomenological studies would be interesting in supporting the theoretical frame. Empirical investigations into the distinctiveness of the components of the frame would also be needed to further the theoretical development, at both the macro and micro levels. As Evans and Yen (2006: 231) suggested, "*e-government will continue to be an important topic to monitor, as it will dramatically affect the life of the individual citizen and their governments on a global scale*".

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