

**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*. 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 essay 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, technology.

Jel classification: M20, O32, O33, O38.

1. Introduction

As regulatory agents, governments play an important role in the modernization of any society. In this sense, the emergence of governmental initiatives particularly devoted to development of the *information and knowledge society* has occupied a central place in governmental planning strategies worldwide. As defended by Lee (2010), “*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*”.

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 technology* (ICT) 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 and 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 and Monteiro Barata 2011), we believe that 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.

This paper is structured as follows: Section 2 presents the literature review highlighting the most recent trends in e-Government; Section 3 presents a brief methodological background of the Delphi approach and justifies its application in the context of the present study; Section 4 presents the results of our experiment; and Section 5 concludes the paper.

2. Literature review and recent trends in e-Government

Gouveia (2004) assumes that e-Government is one of the most important components of the Information Society (IS), which should act on three major areas of intervention: (i) *e-Administration*, which involves public administration and political processes; (ii) *e-Citizens and 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 (Gouveia 2007; Ferreira 2010). 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 (Ferreira, 2010), leading to “*mass use of PCs [personal computers], exponential growth of 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 (2004, 2007), Nour *et al.* (2008) and Lee (2010), among many others, e-participation implies an increase in the information available, which improves the ability to query and access it, the ease of interaction in *government-to-consumer* (G2C) and *consumer-to-government* (C2G) relationships and, consequently, public involvement through the use of ICTs.

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 discussion, see also Nour *et al.*, 2008). Therefore, database standardization and interoperability should be seen as priorities. 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 available in a “*user-friendly*” logic (for further developments, see Ferreira, 2010). Following *CapGemini Ernst & Young* (in Molnár, 2008), there are five levels of online service sophistication (Fi. 1).

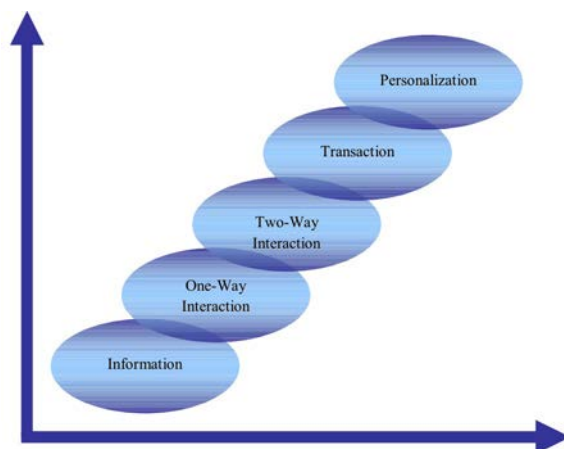
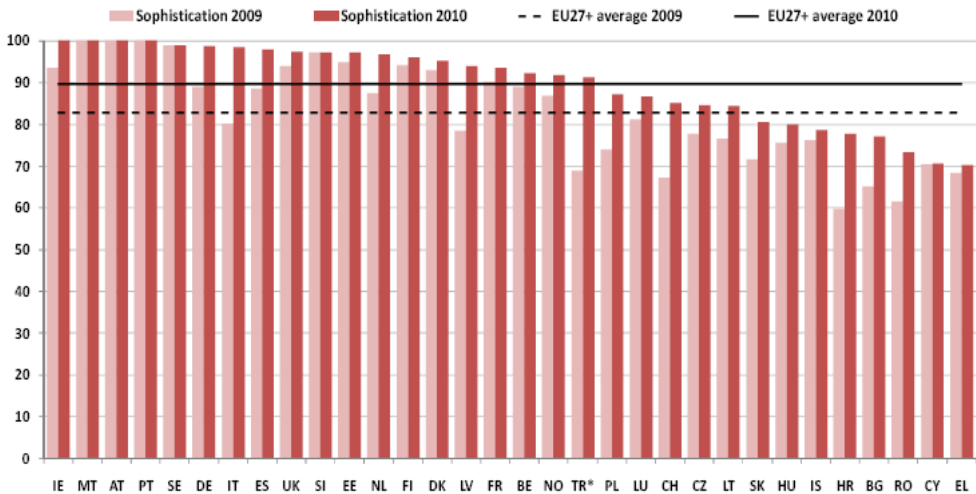


Fig. 1. Levels of online service sophistication (Source: Mulgan 2006, adap.)

As shown in Figure 1, 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 the information can be inserted without paper support (this excludes, however, the delivery of public administrative documents (e.g. certificates, 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 (Mulgan 2006; Molnár 2008; Ferreira 2010; Lee 2010). Figure 2 illustrates the level of sophistication of the European countries.



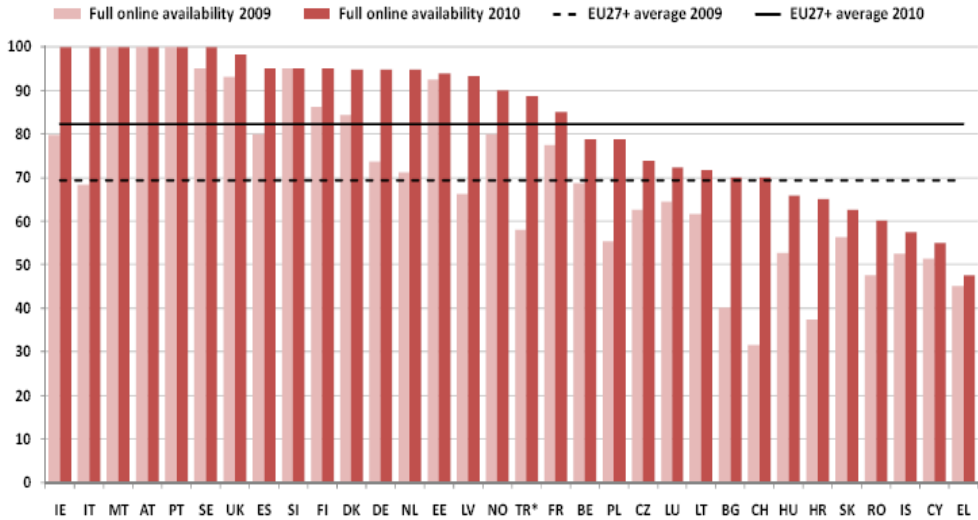
* Survey not implemented in 2009. The score of 2007 is used in the graph.

Fig. 2. Ranking of European countries by online sophistication (in %) (Source: Capgemini *et al.*, 2010: 7)

Figure 2 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 public services’ availability is concerned, the countries’ average rate is 82%. Once again, Austria, Ireland, Malta and Portugal lead this field along with Sweden (100%) (Fig. 3).

As discussed previously, one of the major concerns of e-Government is to achieve an efficient, inclusive and transparent PA. Gouveia (2004), Mulgan (2006), Molnár (2008), Ferreira (2010) and Lee (2010), among others, support this idea and suggest that the changes that have been ongoing, in terms of how PA com-

municates with citizens, stem from increased citizen support of technologies that create new ways of operating online.



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

Fig. 3. Ranking of European countries by online public services (in %) (Source: Capgemini *et al.* 2010)

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

3. Methodological framework: basics of the Delphi technique

Aiming to resolve problems for the US Air Force, the Delphi technique was developed during the 1950s by Norman Dalkey, Olaf Helmer and respective collaborators at the *RAND Corporation* (Dalkey and Helmer 1963; Hsu and Sandford 2007). In broad terms, the Delphi approach begins with the development of a survey, which should be completed individually by experts on the target topic.

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 4 (further details can be found in Dalkey and Helmer 1963; Ferreira 2003; Šečkute, Pabedinskaite 2003; Hsu and Sandford 2007; Ferreira and Monteiro Barata 2011).

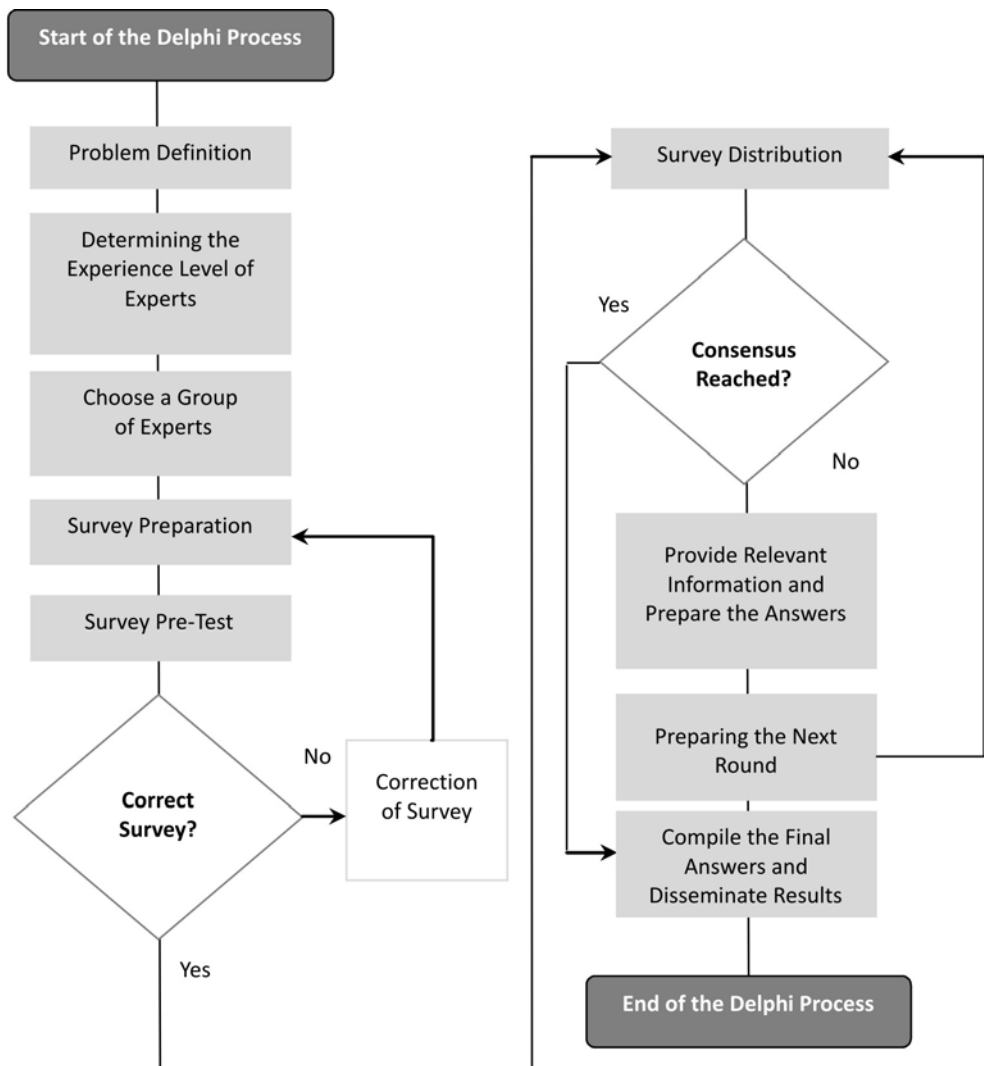


Fig. 4. Operational structure of the Delphi technique
(Source: Zapata *in* Ferreira 2003, adap.)

4. Results analysis

Considering 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 (Šečkute and Pabedinskaite 2003; Ferreira

and Monteiro Barata 2011). Therefore, responses from the 13 members in the final round provide the basis of our analysis.

4.1. Sample characterization

The reduction in the number of panelists from round to round is anticipated in the literature (*cf.* Ferreira, 2003; Ferreira and Monteiro Barata, 2011). Several factors can justify this reduction. In our case, the reduction in the number of panelists was mainly justified by the length of the questionnaire. As for the sample characterization, 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 subsections.

4.2. Characterization of the current situation

The objective of this section is to determine the level of implementation and availability of information technology, informatics' availability, Internet access, and other technological tools supplied in the municipal services. Based on data collected from the panel of experts (Table 1), one can see that information technology is fully implemented in several municipal services (62%), while informatics' tools are only partially available (85%).

Table 1. Level of implementation of information technology and availability of informatics [N=13]

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

For the next question, we tried to understand the opinions of panelists about what technological tools were more important in providing high-quality services. On a Likert scale from 1 to 5 (*1 = not important, 3 = moderately important, 5 = decisively important*), the respondents elected *intra-service platforms, programs of document management, programs of economic and financial management and infrastructure* as the most important technological tools (Table 2).

Table 2. Technological tools to provide high-quality service [N=13]

Tools	Median	Average	Stand. Deviation
Internet	4	3.462	1.713
Intra-service platforms	5	4.077	1.656
Programs of document management	5	4.538	1.391
Programs of econ. and financial management	5	3.846	1.908
Operating system (<i>Word, Excel, etc.</i>)	3	3.000	1.528
Infrastructure	5	2.923	2.465

Table 3 presents the results based on the *availability of the Internet to municipal workers, Internet use for the development of their work activities* and the *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 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).

Table 3. Availability, importance and adequacy of Internet in municipal services [N=13]

	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

4.3. Evolutionary perspectives

This 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 4.

Table 4. Initiatives that potentiate an inclusive information society [N=13]

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

According to Table 4, 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 incentives of the state* (4 votes) and a *functional alteration of the contents for workers* (1 vote).

The next question asked the panelists 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 5, 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).

Table 5. Most important elements for Portugal's position in the European rankings [N=13]

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

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 6).

Table 6. Areas in which the municipality must commit (e-Government) [N=13]

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

5. 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 this sense, 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. Based on an analysis of the empirical results of our essay, the panel's overall assessment in terms of ICT availability is considered good. Additionally, most of the panelists 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 incentives of the state 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), it would be important to conduct periodic studies devoted to gauging the opinions of a broader panel of administrative agents, and replicate the experiment and compare the results obtained in different countries. "*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*" (Evans, Yen 2006).

References

- Amaral, L. 2007. A sociedade da informação [The information society], in *Sociedade da Informação: O Percurso Português – Dez Anos de Sociedade de Informação: Análise e Perspectivas* [Information Society: The Portuguese Route – Ten Years of Information Society: Analysis and Perspectives]. Lisbon: Edições Sílabo, 85–108.
- Capgemini; IDC; Rand Europe; Sogeti; DTi 2010. Digitizing public services in Europe: Putting ambition into action, *9th Benchmark Measurement*, European Commission

- [online], [accessed 10 September 2011]. Available from Internet: <http://www.google.pt/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCEQFjAA&url=http%3A%2F%2Fec.europa.eu%2Finformation_society%2Fnewsroom%2Fcf%2Fdocument.cfm%3Faction%3Ddisplay%26doc_id%3D747&ei=vaxpUNXVG4izhAejj4CYDA&usq=AFQjCNGa3dQiKzHXeswmYIE0ZXMxTpAQ>.
- Dalkey, N.; Helmer, O. 1963. An experimental application of the Delphi method to the use of experts, *Management Science* 9(3): 458–467. <http://dx.doi.org/10.1287/mnsc.9.3.458>
- Evans, D.; Yen, D. 2006. E-Government: Evolving relationship of citizens and government, domestic, and international development, *Government Information Quarterly* 23(2): 207–235. <http://dx.doi.org/10.1016/j.giq.2005.11.004>
- Ferreira, F. 2003. *Inovação Tecnológica no Sistema Financeiro Português: Evolução e Perspectivas*. Coimbra: Pé de Página Editores.
- Ferreira, F.; Monteiro Barata, J. 2011. A snapshot of the Portuguese e-banking activity: Insights and a conceptual framework to allocate strategic hindrances, *International Journal of Electronic Business* 9(3): 238–254. <http://dx.doi.org/10.1504/IJEB.2011.042544>
- Ferreira, N. 2010. *Desafios na Implementação de Iniciativas de e-Government Local: O Caso do Projecto ALO Digital*. MSc Dissertation, Portugal: University Institute of Lisbon.
- Gouveia, L. 2004. O local e-Government: A governação digital na autarquia [The local e-Government: The digital governance in local municipality], Livro V – *Colecção Inovação e Governância nas Autarquias* [Book V – *Innovation and Governance in municipalities Collection*], SPI – Principia.
- Gouveia, L. 2007. Uma perspectiva orientada ao território para o local e-government [An oriented perspective to the territory to the local e-government], Paineis das autarquias na era da informação: O governo electrónico local [Panel local authorities in the information age: The electronic local government], 12º CLAD, Dominican Republic.
- Hsu, C.; Sandford, B. 2007. The Delphi technique: Making sense of consensus, *Practical Assessment, Research and Evaluation*, Vol. 12(10) [online], [accessed 12 June 2012]. Available from Internet: <<http://pareonline.net/pdf/v12n10.pdf>>.
- Lee, J. 2010. 10 year retrospect on stage models of e-Government: A qualitative meta-synthesis, *Government Information Quarterly* 27(3): 220–230. <http://dx.doi.org/10.1016/j.giq.2009.12.009>
- Molnár, S. 2008. e-Government in the European union, information society: From theory to political practice, in Pintér, R. (Ed.), *Coursebook*, 146–170.
- Mulgan, G. 2006. Moldar de novo o estado e a sua relação com os cidadãos: O potencial das tecnologias de comunicação e informação no curto, médio e longo prazo [Shaping the new state and its relationship with citizens: The potential of information and communication technologies in the short, medium and long term], in Conferência promovida pelo Presidente da República [Conference sponsored by the President of the Republic], 205–214.
- Nour, M.; AbdelRahman, A.; Fadlalla, A. 2008. A context-based integrative framework for e-government initiatives, *Government Information Quarterly* 25(3): 448–461. <http://dx.doi.org/10.1016/j.giq.2007.02.004>
- Šečkute, L.; Pabedinskaite, A. 2003. Application of forecasting methods in business, *Journal of Business Economics and Management* 4(2): 144–157.

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