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Understanding e-government research: A perspective from the information and library science field of knowledge

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A perspective from the information and library science field of knowledge

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Abstract

Purpose – The purpose of this paper is to consolidate existing knowledge and provide a deeper understanding of e-government research for assisting researchers in the development of their future analyses, identifying trends of research and the methodology used.

Design/methodology/approach – A bibliometric approach has been used to examine e-government research in periodical publications listed in ISI in the field of information science and library science during the period 2000-2014.

Findings – The authors found that although e-participation research has increased in the last years, future research should focus on accessibility policies, and on the motives, capabilities and perceptions of disabled and older people to take advantage of e-government initiatives to be involved in the social affairs.

Practical implications – The study has shown the need to carry out further research into e-participation in order to understand the true dimension of social networks and their involvement in e-democracy. Also, it is highlighted the need for the design and evaluation of tools for automation of the services and to enable citizens to vote in local initiatives.

Originality/value – This historical assessment allows identification of significant insights and trends related to e-government, and patterns in the published articles and develops a cohesive and comprehensive research agenda to guide researchers worldwide in their quest for a better understanding of e-government.

Keywords Research themes, e-government, Methodologies, Bibliometric study, Information science and library science

Paper type Literature review

1. Introduction

The emergence of information and communication technology (ICT) in the field of public administration has aroused widespread interest in the search for mechanisms enabling the public administration to make a more positive impact on daily life. This trend is understood to be one form of expression of the information society as well as a central part of the process of modernizing the public administration (Park and Joo, 2010), promoting the strategic, intensive use of ICT (Dunleavy *et al.*, 2006), both in the

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internal relations of public administrations (Edelenbos and Klijn, 2007) and in terms of the relationship of these organizations with citizens (Kim *et al.*, 2011) and with companies in the private sector (Callanan, 2005).

However, the introduction of technological advances has not only revolutionized the area of government, but has penetrated the entire public sector. In the public health service, we find the development of electronic storage methods, provoking a change from manuscript documents to electronic records, thus favouring the dissemination of information, making it more readily available to a wide range of users, including patients (Reti *et al.*, 2009). Allowing access to a plurality of stakeholders requires the effective use of electronic health records, which is essential for meaningful advance in health care quality and patient safety (Walker *et al.*, 2008), as well as making clinical data available for multiple purposes in addition to clinical care (Sequist *et al.*, 2007). Similarly, the supply of health care services has been greatly enhanced with the introduction of telemedicine, which has the potential to reduce health care costs while increasing the access, capacity and quality of health care, thus improving the quality of life of patients (Van den Brink *et al.*, 2007).

In sum, up to now, the field of e-government is generating an increasing volume of research literature (Bélanger and Carter, 2012). However, the research field of e-government is a broad one, and researchers are currently involved in a range of different research projects within this field. Given the great heterogeneity in the literature devoted to e-government and the absence of a broad bibliographical overview of this question in the interdisciplinary field of information science and library science, we believe it is necessary to analyze the main contributions made in order to lay a solid foundation for future research in the field of e-government.

Therefore, to fill this gap, the objective of this paper is to assist researchers in the development and direction of future analysis, by identifying trends in research topics and the methodology applied. In addition, this study will identify research gaps and possibilities for improvement in e-government research context. To this end, the present paper adapts several bibliometric approaches to analyze papers published at the leading international journals listed in the SSCI index in the fields of information science and library science for the year 2014.

The rest of this paper is organized as follows. Section 2 presents research questions and objective. Section 3 reviews the main bibliometric analyses conducted in the field of e-government. Section 4 introduces the present study in this respect, first describing the sample selection process and analytical methodology used and then the results obtained from this approach. Finally, the main conclusions of this study are summarized and some questions on future trends in this area are highlighted for discussion.

2. Research questions and objective

Since the introduction of new technologies in public administrations, there has been a wide variety of research on this subject (Yildiz, 2007; Heeks and Bailur, 2007; Bélanger and Carter, 2012), mainly based on experiences of this introduction in the government context. The outlet for this research has been mainly international journals or international conferences and it has helped academics, practitioners, policy-makers and all stakeholders on e-government topics in order to know how to translate the findings of this research into their work. The bibliometric studies have tried to help in organizing the information available and to trace a trend for future research. Nonetheless, whereas most bibliometric projects show limited view (Yildiz, 2007;

Bélanger and Carter, 2012; Snead and Wright, 2014), entire publication records on high-quality journals in main fields of knowledge are rarely studied. This lack of bibliometric studies could make to lost interesting lens of e-government research taking into account that e-government, in terms of information technology use, has been studied from several approaches. Therefore, it would be interesting to analyze the research published in the main fields of knowledge in order to have different perspectives of the e-government research, and know the main journals that are particularly interested in publishing such studies as well as whether these journals are leaders in setting trends in research topics. Taking into account the field of information science and library science as those with a higher volume of e-government research published, the first research question is derived:

RQ1. How many research articles have been published in information science and library science ISI journals during the period 2000-2014? What are the main journals that publish the most e-government articles?

The bibliometric projects have tried to identify a discipline and have helped in structuring the information available and in tracing a trend for future research. In this sense, Tsay (2013) and Zhao (2010) show the evolution of interdisciplinary fields, highlighting the journals taken as essential reference for researchers, research gaps, trends and opportunities for future research. Similarly, Lecy *et al.* (2014) have started the discussion of research in the field of public administration with the network literature using compact citations networks to identify promising future research topics. In this regard, the analysis of the most published topics in e-government and specially those published in the highest quality journals could help researchers to know the state of the art, to show the interest of the highest quality journals for the publication of some topics and, based on previous comments, to lead them to focus on research gaps. That is, this analysis could be interesting for guiding e-government research. Therefore, the following research question is derived:

RQ2. What are the main research topics that are of interest to information science and library science ISI journals? Is there any discernible tendency related to the quartile in which the journal is included?

On the other hand, a researcher could be interested in knowing whether the aim of the research could determine the methodology used to analyze the subject. If this analysis is made, researchers could have a guide to know the methodology to be used in their research. So, their research papers could avoid methodological mistakes as prior research indicates (Lan and Anders, 2000; Plümber and Radaelli, 2004). In this regard, it could be interesting to analyze whether the use of the methodology of the research and data collection method are influenced by the subject of the research. Also, it would be interesting to know if the journals are particularly interested in publishing papers that use a specific methodology. This information could be of interest for researchers to be able to send your articles to the most appropriate journals, which could ensure a certain degree of success in the publication possibility. The following research question is therefore derived:

RQ3. What methodologies are used to analyze the phenomenon of e-government? Do journals show any preference for articles that use a particular methodology? And, in the analysis of different e-government phenomena, is there any preference for the use of specific methodologies?

In light of the numerous advancements in e-government across the globe, this paper provides an extensive historical assessment of the development of electronic government research. Indeed, there is a need to synthesize and organize extant literature to identify patterns in the published articles and develop a cohesive and comprehensive research agenda to guide researchers worldwide in their quest for a better understanding of e-government.

Therefore, the purpose of this paper is to consolidate existing knowledge and provide a deeper understanding of e-government research for assisting researchers in the development and direction of their future analyses, identifying trends in terms of research and the methodology used. To achieve this aim, we examine the subject of e-government research and the methodologies used in the e-government articles in the main journals included on the ISI index, highlighting potential opportunities for research in the field, in the belief that analyzing the past will allow us to prepare for the future. Such insights and trends can be helpful in shaping future academic pursuits.

3. Literature review

Bibliometric studies allow members of the academic community to identify the historical roots of a determined field of study (Sidorova *et al.*, 2008), to identify prospects for future research and to decide the right direction in which to focus subsequent research. An historical assessment can help expand existing knowledge by investigating change and continuity over time (Cocosila *et al.*, 2011). Therefore, this paper not only serves as a synopsis of existing research, but also as an identifier of emerging trends, gaps and areas for future study.

This tool has been widely used in research field such as library information science (Tseng and Tsay, 2013; Tsay, 2013; Zhao, 2010), allowing the knowledge of the evolution of this interdisciplinary field, journals taken as a reference by researchers, the input knowledge, research gaps, trends and future opportunities. Similarly, in the field of public administration, there has been a great deal of research, leading to lively debate and discussion network-focused research in the public administration (Lecy *et al.*, 2014; Raadschelders and Lee, 2011; Vogel, 2014).

In the context of e-government, there are few bibliometric studies to be found in the literature. Yildiz (2007) discussed the limitations of previous research in this field such as the vagueness of the definition of e-government and pointed to the need for empirical studies that could provide theoretical arguments as well as new concepts and categories. This paper made a critical evaluation of previous studies of e-government and considered future lines of research. However, it reviewed only articles focusing on the implementation of ICTs in public administrations and on models of implementation of e-government, without taking into account other facets of the latter. However, this paper did not consider the whole range of studies that existed at the time of writing and, therefore, its conclusions could be biased.

Heeks and Bailur (2007), on the other hand, focused on the outlook for e-government, the philosophy of research and the use of theory, but analyzed only the communications presented and the participation at scientific meetings in Europe, plus the scientific contributions published in two journals in the field of information science. However, this paper did not consider the whole range of studies that existed at the prestigious journals and, therefore, its conclusions could be biased.

Similarly, Rodríguez Bolívar *et al.* (2010) provided an overview of previous research into e-government, making a detailed analysis of the contributions published in public administration and information science journals from 2000 to 2009. These authors

concluded that quantitative research methodologies should be applied so that theoretical frameworks may be established (Bailey, 1992; Lan and Anders, 2000), because if a field of study is to reach maturity, more sophisticated and objective quantitative methodologies must be used. Only thus can theoretical approaches be tested, validated and definitively accepted.

Recently, Bélanger and Carter (2012) examined the most highly cited e-government articles according to the ISI Citation Index, and e-government research published in the Association for Information Systems Senior Scholars' basket of journals. In this study they identified publication outlets, theoretical foundations, methodological approaches, sampling and topic areas for e-government research. Research gaps, trends and opportunities recognized in this study should be considered with caution because the analysis focused on a limited number of journals with editorial policies and specific profiles, leaving out prestigious journals, showing an overview of the state of e-government extensible to a wider range of researchers.

Similarly, Snead and Wright (2014) perform a review of academic journals with the intention of evaluating research efforts in e-government in USA. In this research gaps were identified in the efforts at different levels of research production, showing opportunities for future areas of research, but without considering the studies undertaken by European and Asian universities. Therefore, the conclusions and practical implications highlighted in this study can only be taken into consideration by researchers and scholars from universities and research centers in USA, because differences in the treated subjects exist and interest are not shared by other non-American research centers, as manifested Rodríguez Bolívar *et al.* (2010).

With the previous research, Akkaya *et al.* (2010) were interested in conceptual and empirical studies analyzing the role of trust influencing the acceptance of e-government services, and implemented on all electronic accessible sources, and revealed a total of 24 documents about trust in e-government adoption. In addition, Hofmann *et al.* (2012) conducted literature review identifying the factor that influence the acceptance of e-government services by different stakeholders, which searched for articles in 20 top ranked IS and e-government journals. In this sense, we think that these studies show a very small sample of items, and provide the reader a reduced view of the previous literature.

On the other hand, Nusir and Bell (2013) used a systematic review of e-government services characteristics, and Hu *et al.* (2013) proposed an e-government service capability measurement model. The former one proposed a taxonomy which will aid decision makers and practitioner in developing e-government systems to facilitate communicating between supplier side and demand side (Nusir and Bell, 2013), whereas the second one proposed a metric system that allows e-government leaders, CIOs and managers to assess their sector's capability (Hu *et al.*, 2013). In any case, both of them described some limitations in their respective studies that must be corrected in future research.

Finally, Joseph (2013) presents a theoretical model for the analysis of e-government studies and further uses a bibliometric analysis to examine constructs such as theoretical perspective, methods and units of analyses, but this study uses a single data source (*Government Information Quarterly*) for the analysis of research methods in the area of e-government during the period 2005-2010. Although this journal is a leading journal and a reference point for researchers in e-government, the consideration of a single information resource severely limits the unreached theories and practical implications.

Therefore, much remains to be done in this area of bibliometric research. On the one hand, because the analysis conducted in some cases is very partial and limited (Snead and Wright, 2014; Akkaya *et al.*, 2010), and the results presented, thus, are unreliable, as the studies in question failed to examine all the major journals most likely to compile and publish research into e-government (Heeks and Bailur, 2007; Bélanger and Carter, 2012; Joseph, 2013). In other cases, bibliographic reviews have focused only on aspects of ICT implementation in public administrations and on those of e-government implementation, without taking into account other aspects of e-government or analyzing the methodological robustness of prior studies (Yildiz, 2007). Finally, some studies have taken a generic approach to the current state of e-government but have not focused on the main lines of research addressed to date. Although they provide an interesting general overview of the question of e-government, their results could be subject to bias if the research items examined in the field of e-government influenced the methodologies used (Rodríguez Bolívar *et al.*, 2010).

This paper go even further and carry out a complete and detailed review which will cover all aspects of e-government, focusing on governmental organizations, libraries, public hospitals and educational institutions, examining the research on e-government published in the main indexed journals in the SSCI/JCR, listed in the fields of library science and information science, thus demonstrating the potential for future research.

4. Research methodology

4.1 Sample selection

This study is focused on analyzing publications in JCR listed journals in the field of information and library sciences, in the view that they constitute a resource that is often used by academics as a source of new knowledge and as a medium for its disclosure (Nord and Nord, 1995), and at the same time, as an indicator of scientific productivity (Legge and Devore, 1987). Symposia, summaries of communications, letters to the editor, articles of a professional nature and book reviews were excluded from this analysis because, in our opinion, they offer a limited view of the subject. However, we did take into account articles included in special issues of journals, considering that these reflect a greater interest in the study of a particular issue and in the need to examine it further (Rodríguez Bolívar *et al.*, 2010).

We have used objective criteria (Gordon, 1982) as references to select the journals with which to carry out our analysis. The reason for this choice is to avoid the bias found when subjective criteria are used (Vocino and Elliott, 1982), although it is true that objective indicators, too, are not without their critics (Cameron, 2005). In this sense, we have excluded journals with only marginal importance, i.e. those with an impact factor lower than 0.25 or fewer than 50 total citations (Plümber and Radaelli, 2004). In addition, as the paper analyses a period of 15 years, the journals selected should be listed in the ISI index almost all the years during the analyzed period of this paper.

Regarding the selection of articles, and unlike Wright *et al.* (2004), we have reviewed all the articles in each of the journals that meet the conditions described above. To do this, the title and the abstract (Lan and Anders, 2000; Plümber and Radaelli, 2004), the keywords (Hartley and Kostoff, 2003) and the introduction of the articles to analyze the objective were relevant factors in this process. In the few cases in which the application of these discrimination criteria was not enough, we have read the entire article. This exhaustive selection procedure was conducted separately by the three authors, to

ensure the greatest objectivity. After selecting all articles, each author did his own cataloguing separately; the authors then met on several occasions to discuss the results, and to reach an agreement where discrepancies arose.

As a consequence of this somewhat laborious process, from a database initially composed of 33,546 articles published in 73 periodical publications listed in ISI in the field of information science and library science, during the period 2000-2014 (for this last year we examined only articles published until September 2014), 1,110 met the selection criteria established and focused on e-government – see Table I. The journals have grouped together depending on the quartile to which they belong according to their impact factor and for this purpose we have used all of the selected journals included in information science and divided by four, thus obtaining the number of journals that will make up each quartile.

4.2 Content analysis

With the express aim of meeting the goals established for this paper, each of the articles included in our database was classified, using MS Excel software, by the year of publication, the journal title, the main subject dealt with and the principal methodology used. Therefore, when the articles examined multiple research topics and/or used multiple methods, double counting was avoided by focusing only on the main research item and methodology used. To ensure this approach, it was essential to identify the main objective of the paper.

Furthermore, in order to determine the subjects and methodologies, the authors conducted a content analysis of each article separately (Krippendorff, 1980). The following process was followed to determine the main categories: first, categories were selected and adapted from those previously used in public administration research by Bingham and Bowen (1994) and Lan and Anders (2000). This initial list was then expanded, because it did not consider categories such as electronic or digital-divide participation or resistance barriers to e-government, among others. In the second phase, content analysis was applied to determine new categories from those proposed in public administration research. To achieve this aim, an exploratory qualitative analysis was performed, which allowed us to test the data for the first time. During this phase, QSR NVivo 8 software was used to automate item coding, software was used to automate item coding (Frasser, 2000). This codification was made using the option of constructing random labels, thus achieving a hierarchical conceptual structure which is gradually improved, extended and changed, taking as a starting point the academic literature on e-government.

In this codification phase, we held several meetings in order to achieve some consensus in the determination of the labels – see the list below – and then proceeded to separately codify each one of the articles that make up the sample (Lan and Anders, 2000). As with the determination of the subject matter, several meetings were subsequently held in order to discuss the controversies that arose until a consensus was reached in the cataloguing of all of the articles that make up the sample – e-Government Research Themes (source: the authors):

- Change organizational behavior: these articles are focused on the different forms of behaviour and changes in public administrations that allow greater transparency in the activities of government and public services (Kawalek and Wastall, 2005); as well as attitudes of staff towards the internet (Spacey *et al.*, 2004) and the development of the services of telemedicine (Chau and Hu, 2002).

Table I.
Articles of e-government found in each ISI journal (2000-2014)

	Journal title	Abbreviation title	Impact factor 2013	Total articles	e-government articles
First quartile	*MIS Quarterly*	*MISQ*	5.405	532	6
	Journal of the American Medical Informatics Association	*JAMIA*	3.932	1,072	34
	Journal of Information Technology	*JIT*	3.789	257	2
	Journal of Informetrics	*JI*	3.580	1,118	0
	Journal of Strategic Information Systems	*JSIS*	2.571	238	8
	Information and Organization	*I&O*	2.538	169	4
	Information System Research	*ISR*	2.322	471	1
	Scientometrics	*SCIEN*	2.274	1,872	4
	Journal of the American Society for Information Science and Technology	*JASIST*	2.230	2,408	16
	International of Journal Information Management	*IJIM*	2.042	606	33
	Government Information Quarterly	*GIQ*	2.033	382	321
	Journal of Computer-Mediated Communication	*JCMC*	2.019	707	20
	Journal of Management Information Systems	*JMIS*	1.925	483	6
	Journal of Health Communication	*JHC*	1.869d	735	15
	International Journal of Computer-Supported Collaborative Learning	*IJCSCL*	1.830	153	0
	Information and Management	*I&M*	1.788	722	20
	Annual Review of Information Science and Technology	*ARIST*	1.727	84	4
	European Journal of Information Systems	*EJIS*	1.654	665	17
	Social Science Computer Review	*SSCORE*	1.542	458	59
	International Journal of Geographic Information Science	*IJGIS*	1.479	685	4
Second quartile	*Online Information Review*	*OIR*	1.443	229	27
	Library and Information Science Research	*LISR*	1.384	317	15
	Research Evaluation	*REVA*	1.338	218	0
	College and Research Libraries	*CRL*	1.333	436	7

(*continued*)

Table I.

	Journal title	Abbreviation title	Impact factor 2013	Total articles	e-government articles
	Information Systems Journal	*ISJ*	1.333	242	10
	Journal of Knowledge Management	*JKM*	1.257	813	0
	Journal of the Association for Information Systems	*JAIS*	1.250	354	4
	Telecommunication Policy	*TP*	1.128	489	18
	Journal of Information Science	*JIS*	1.087	605	13
	Information Processing and Management	*IP&M*	1.069	843	9
	Learned Publishing	*LEARN*	1.037	429	2
	Journal of Documentation	*JD*	1.035	515	13
	MIS Quarterly Executive	*MISQE*	1.031	136	1
	Journal of the Medical Library Association	*JMLA*	0.079	375	15
	Information Society	*IS*	0.972	318	29
	Information Technology and People	*IT&P*	0.938	243	15
	Health Information Library Journal	*HILJ*	0.932	322	13
	Information Technology and Management	*IT&M*	0.897	872	3
	Library Quarterly	*LIBRQ*	0.861	238	9
	Revista Española de Documentación Científica	*REDC*	0.717	458	4
	Telematics and Informatics	*T&I*	0.705	189	9
Third quartile	*Knowledge Management Research & Practice*	*KMR&P*	0.683	352	4
	Information Research	*IR*	0.660	337	10
	Portal: Libraries and Academic	*PORTAL*	0.651	345	15
	Library Resources and Technical Services	*LR&TS*	0.636	211	10
	Social Science Information	*SSI*	0.594	413	0
	Aslib Proceedigns	*ASLIB*	0.575	515	39
	Journal of Academic Librarianship	*JAL*	0.574	546	16

(*continued*)

Table I.

	Journal title	Abbreviation title	Impact factor 2013	Total articles	e-government articles
	Serials Review	*SEREW*	0.531	307	14
	Australian Academic & Research Libraries	*AA&RL*	0.526	232	1
	Ethics and Information Technology	*E&IT*	0.520	284	3
	Journal of Global Information Technology Management	*JGITM*	0.500	232	8
	Program-Electronic Library and Information Systems	*PROG*	0.500	246	27
	Restaurator	*RESTA*	0.484	221	0
	Journal of Global Information Management	*JGIM*	0.472	225	13
	Knowledge Organization	*KNOW*	0.448	139	0
	Information Development	*ID*	0.440	538	10
	Information Technology for Development	*ITD*	0.421	167	19
	Journal of Organizational and End User Computing	*JOEUC*	0.417	204	0
	Profesional de la Información	*PROF*	0.402	1,238	20
	Library Hi Tech	*LHITECH*	0.394	574	4
Fourth quartile	*Library and the Cultural Record*	*LCRE*	0.381	289	0
	Scientist	*SCIEN*	0.351	1,124	0
	Interlending and Document Supply	*IDS*	0.350	529	29
	Malaysian Journal of Library and Information Science	*MJLIS*	0.333	138	2
	Information and Culture	*I&C*	0.316	203	0
	Library Collections, Acquisitions and Technical Services	*LCA&TS*	0.276	298	12
	Journal of Librarianship Information Science	*JLIS*	0.273	260	16
	Libri	*LIBRI*	0.263	286	16
	Library Trends	*TRENDS*	0.262	249	32
	Journal of Scholarly Published	*SCHO*	0.255	216	0
	Total			33,546	1,110 (3.31%)

Source: The authors/ISI of Knowledge

- Citizens' satisfaction and perceptions: this item includes studies are referred to determine user satisfaction and their expectations about the quality of services offered by public agencies through their web sites (Callahan, 2005).
- Dissemination of information: this research theme includes articles that discussed digital consumer health information provided to patients via touch screen health kiosk (Nicholas *et al.*, 2003), public libraries' web sites (Burroughs, 2009) and governmental web sites (Caba *et al.*, 2005).
- e-participation and digital democracy: this item includes articles that illustrated studies about emergent changes in the relationship between government and the citizen as result of e-government (Taylor *et al.*, 2007).
- Implementation of e-government: this item includes articles focused on the process of governance, innovation in service delivery online, adoption and implementation e-government in public administrations (Reddick, 2009), public libraries (Chowdhury *et al.*, 2006) and public universities (Pisciotta *et al.*, 2005) and public hospitals (Hollingworth *et al.*, 2007).
- Interorganization relations: this research theme includes articles that focused on the political or institutional aspects of interagency relations between governmental units at the local, state or national level (Bingham and Bowen, 1994); interlibrary networking and collaboration on procurement of e-content between libraries (Allen *et al.*, 2003).
- Legal aspects: this research includes articles focused on administrative proceedings or any type of law that enables and encourages the adoption and implementation of e-government initiatives in public administrations (Bingham and Bowen, 1994).
- Programme evaluation and planning: this item includes articles that discussed the results of an evaluation of public programs related with initiatives of e-government and policies expansion of new information and communication technologies (Bingham and Bowen, 1994); as well as evaluating library (Shen *et al.*, 2006).
- Social behaviours and user-centred studies: this research theme includes articles that focused on trends in student use of library resources and services (Xie, 2008) as well as user-centred study of the accessibility of e-government sites (Van Dijk *et al.*, 2008).
- Trust in public organizations: it is focused on how electronic government has been proposed as a way to increase citizen trust in government, information disclosed by public organization, improve citizen evaluations of government generally (Tolbet and Mossberger, 2006).

5. Analysis of the results

RQ1. How many research articles have been published in information science and library science ISI journals during the period 2000-2014? What are the main journals publishing the most e-government articles?

Interest in the implementation of ICT in the different areas of public entities has been reflected in a gradual increase in the research carried out in the field of e-government

from 2000 (see Figure 1). Nevertheless, the presence of e-government research in the field of information science and library science is still scarce, with the articles published in this field in ISI-listed journal only making up 3.31 per cent of all published articles (1,110/33,546) – see Table I.

We can observe in Table I that there is a clear preference for one journal to publish this type of research, with more than a quarter of the articles (28.92 per cent; $n = 321$) being published in *Government Information Quarterly*; this is followed at a considerable distance by other titles such as *Social Science Computer Review – SSCORE* – (5.32 per cent), *Aslib Proceedings* (3.51 per cent), *Journal of the American Medical Informatics Association – JAMIA* – (3.06 per cent), *International Journal of Information Management* (2.97 per cent), *Library Trend*s (2.88 per cent), *Interlending and Document Supply* (2.61), *Information Society* (2.61 per cent) and *Online Information*

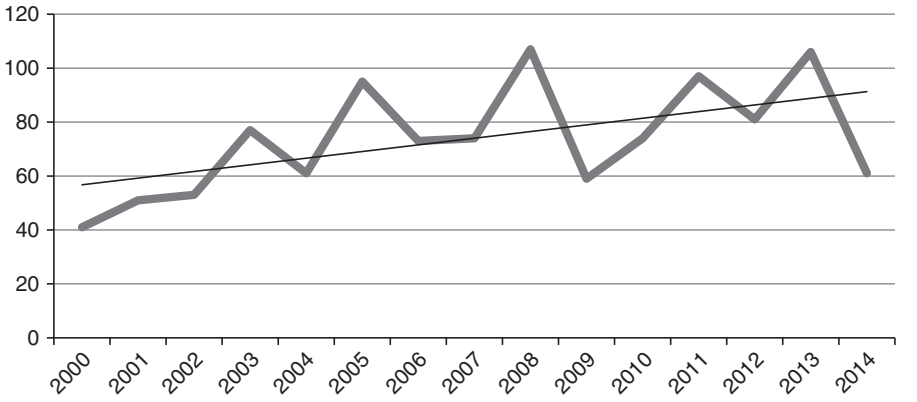

Figure 1.
Time sequence for articles on e-government (2000-2014)

Source: The authors

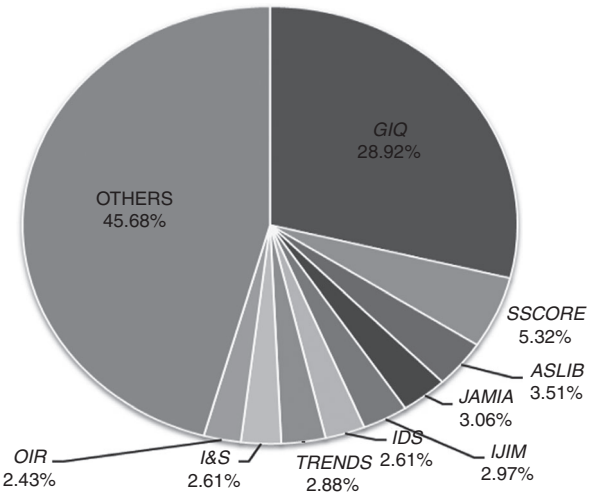

Figure 2.
Articles of e-government found in ISI journals (2000-2014)

Source: The authors

Review (2.43 per cent) – see Figure 2. We also find that journals that do not consider among the articles published research into e-government, such as *Journal of Informetrics*, *Research Evaluation*, *Knowledge Organization*, *Restaurator*, *Social Science Information*, *Information and Culture*, among others. Moreover, as we shall see in Table II, 71.17 per cent of the articles on e-government (790/1,110) are to be found in journals in the first and second quartile:

RQ2. What are the main research topics that are of interest for information science and library science ISI journals? Is there any trend depending on the quartile in which the journal is included?

In this sense, we should highlight the fact that Information Science journals are particularly interested in articles that deal with the implementation of e-government (29.10 per cent), programme evaluation and planning (13.60 per cent), e-participation and digital democracy (12.16 per cent), and social behaviour and user-centred studies (11.17 per cent) and information dissemination (10.90 per cent) (see Figure 3).

On the other hand, there are subjects which have not been thoroughly examined in information science and library science research, such as administrative proceedings or any type of law that encourages the adoption and implementation of e-government initiatives (2.07 per cent), and how e-government has been proposed as a way to increase citizens' trust in government (2.07 per cent) (see Figure 3). The reason for the apparent lack of research into these subjects, on the whole, is not their lesser importance but rather that they are often published and listed in different research fields.

If we analyze the date included in Table II, we can see that there is a certain trend in the publication of particular research topics about e-government depending on the quartile in which the journal appears. This is mainly due to the fact that there are journals with a very specific profile grouped together by quartiles. In this sense, the first-quartile journals – management and information systems – present many articles on the implementation of digital government and on the efforts made by different agencies to implement e-government (27.70 per cent; $n = 159/574$), improvement the communication with citizens and their participation in public affairs (17.25 per cent; $n = 99/574$), evaluation of different initiatives of e-government and policies to promote its implementation (10.45 per cent; 60/574) and access to a greater amount of information to enable citizens to be more informed (10.45 per cent; 60/574). These journals have a particular profile, with an interest in the latest technologies and innovations in the public entities to promote an open, transparent, and accountable government, and studies about participatory decision making and civic engagement and the role of information technology in promoting and/or limiting civil discourse, participation, and practice, as well as the development, implementation, and use of information systems and emerging technologies as platforms and delivery tools for government resources.

The second-quartile journals are more varied, although citizens' satisfaction and perceptions, trust in public organizations are relatively neglected subjects and legal aspects (3.24 per cent $n = 7/216$; 2.78 per cent; $n = 6/216$; 2.78 per cent; $n = 6/216$, respectively). These journals tend to be more multidisciplinary and with diverse profiles. Although the definitions of their aims and scope are wide ranging, these journals show a certain tendency towards particular topics, e.g. *Library and Information Science Research* and *College and Research Libraries* prefer programme evaluation and planning studies, and social behaviour and user-centred articles, *Health Information Library Journal* is interesting in studies about health information needs and use, information technology and its applications in health care settings, and managing health information

Table II.
Main subject published in each of the journal analyzed

Subjects/journals	First quartile		Total	Second quartile		Total	Third quartile		Total	Fourth quartile		Total
Change organization behaviour 95 articles (8.56%)	*MISQ* (3) *JAMIA* (4) *JSIS* (3) *I&O* (1) *IJIM* (4)	*GIQ* (32) *JMIS* (1) *I&M* (1) *EJIS*(3) *SSCR* (4)	56 (58.95%)	*LISR* (1) *ISJ* (3) *JIS* (1) *LEARN* (1) *JD* (2) *IS* (3)	*ITD* (3) *HILJ* (1) *ITM* (1) *LIBRQ* (1) *T&I* (2)	19 (20.00%)	*KMR&P* (2) *SEREW* (4) *E&IT* (1) *JGIM* (4)	*ID* (3) *ITD* (1) *PROF* (2)	17 (17.88%)	*IDS* (1) *TRENDS* (1) *LCA&TS* (1)		3 (3.17%)
Citizens' satisfaction and perceptions 53 articles (4.77%)	*MISQ* (1) *JSIS* (1) *JASIST* (1) *IJIM* (2) *GIQ* (17)	*JCMC* (2) *I&M* (2) *EJIS* (1) *SSCR* (1)	27 (50.94%)	*OIR* (2) *CRL* (1) *JAIS* (1)	*JD* (1) *HILJ* (1)	7 (13.21%)	*IR* (1) *PORTAL* (1) *LR&TS* (1) *JAL* (2) *AA&RL* (1)	*JGITM* (1) *PROG*(2) *ID* (1) *ITD* (2) *PROF* (1)	13 (24.53%)	*IDS* (2) *JLIS* (1) *TRENDS* (3)		6 (11.32%)
Dissemination of information 121 articles (10.90%)	*JAMIA* (6) *IJIM* (3) *GIQ* (45) *JCMC* (1)	*JHC* (3) *SSCR* (1) *IJGIS* (1)	60 (49.59%)	*OIR* (5) *LISR* (3) *JIS* (2) *IP&M* (1) *JD* (2) *JMLA* (4)	*IS* (1) *ITP* (1) *HILJ* (1) *LIBRQ* (1) *REDC* (2)	23 (19.00%)	*IR* (2) *PORTAL* (3) *LR&TS* (1) *ASLIB* (9)	*JAL* (2) *PROG* (3) *ITD* (3) *PROF* (3)	26 (21.49%)	*IDS* (4) *MJLIS* (1) *TRENDS* (5) *LIBRI* (2)		12 (9.92%)
e-participation and digital democracy 135 articles (12.16%)	*JAMIA* (1) *JSIS* (1) *SCIEN* (2) *JASIST* (2) *IJIM* (2)	*GIQ* (45) *JCMC* (12) *I&M* (3) *EJIS* (1) *SSCR* (30)	99 (73.33%)	*OIR* (6) *ISJ* (2) *JAIS* (2) *TP* (1) *JIS* (1)	*IP&M* (1) *JD* (1) *IS* (8) *LIBRQ* (1) *T&I* (2)	25 (18.52%)	*IR* (1)	*ASLIB* (7)	8 (5.93%)	*TRENDS* (1) *LIBRI* (2)		3 (2.22%)
Implementation of e-government 323 articles (29.10%)	*MISQ* (1) *JAMIA* (18) *JIT* (1) *JSIS* (2) *I&O* (2) *SCIEN* (2) *JASIST* (4) *IJIM* (8)	*GIQ* (87) *JCMC* (2) *JMIS* (2) *JHC* (1) *I&M* (8) *ARIST* (4) *EJIS* (7)	149 (46.13%)	*OIR* (5) *LISR* (3) *TP* (6) *JIS* (3) *IP&M* (3) *LEARN* (1) *JD* (1) *MISQE* (1)	*JMLA* (4) *IS* (5) *IT&P* (8) *HILJ* (5) *LIBRQ* (3) *REDC* (2) *T&I* (3)	53 (16.41%)	*KMR&P* (2) *IR* (4) *PORTAL* (5) *LR&TS* (5) *ASLIB* (6) *JAL* (4) *SEREW* (6)	*JGITM* (6) *PROG* (10) *JGIM* (7) *ID* (4) *ITD* (7) *PROF* (9) *LHITECH* (3)	78 (24.15%)	*IDS* (9) *MJLIS* (1) *LCA&TS* (9) *JLIS* (7) *LIBRI* (4) *TRENDS* (13)		43 (13.31%)

(*continued*)

Subjects/journals	First quartile		Total	Second quartile		Total	Third quartile		Total	Fourth quartile		Total
Inter-organizational relations 62 articles (5.59%)	*JAMIA* (1) *I&O* (1) *JASIST* (2) *IJIM* (5) *GIQ* (13)	*JMIS* (1) *EJIS* (3) *SSCR* (6) *IJGIS* (3)	34 (55.74%)	*OIR* (1) *TP* (1) *JIS* (2)	*IT&P* (1) *HILJ* (1) *IT&M* (1)	7 (11.48%)	*ASLIB* (1) *JAL* (1) *SEREW* (2) *PROG* (2)	*ID* (1) *ITD* (2) *PROF* (2)	11 (18.03%)	*IDS* (6) *TRENDS* (2) *LCA&TS* (1)		9 (14.75%)
Legal aspects 23 articles (2.07%)	*IJIM* (1) *GIQ* (14)	*SSCR* (1)	16 (69.576%)	*TP* (3)	*IS* (3)	6 (26.08%)				*SSCORE* (1)		1 (4.35%)
Program evaluation and planning 151 articles (13.60%)	*MISQ* (1) *JAMIA* (2) *JASIST* (4) *IJIM* (3)	*GIQ* (40) *JHC* (3) *I&M* (2) *SSCR* (5)	60 (9.24%)	*OIR* (5) *LISR* (4) *CRL* (3) *ISJ* (2) *TP* (6) *JIS* (3) *IP&M* (2) *JD* (4)	*JMLA* (5) *IS* (8) *ITP* (1) *HILJ* (1) *IT&M* (1) *LIBRQ* (2) *T&I* (1)	48 (47.06%)	*PORTAL* (2) *LR&TS* (2) *ASLIB* (6) *JAL* (2) *E&IT* (2) *JGITM* (1)	*PROG* (9) *JGIM* (1) *ID* (1) *ITD* (3) *PROF* (2) *LHITECH* (1)	32 (31.93%)	*IDS* (4) *LCA&TS* (1) *JLIS* (2) *TRENDS* (3) *LIBRI* (1)		11 (11.76%)
Social behaviours and user-centred studies 124 articles (11.17%)	*JAMIA* (2) *JASIST* (3) *IJIM* (5) *GIQ* (31) *JCMC* (2)	*JHC* (7) *I&M* (2) *EJIS* (2) *SSCR* (9)	54 (43.90%)	*OIR* (1) *LISR* (4) *CRL* (3) *ISJ* (2) *TP* (1) *JIS* (1) *IP&M* (2)	*JD* (2) *JMLA* (2) *IS* (1) *HILJ* (2) *LIBRQ* (1) *T&I* (1)	23 (18.70%)	*IR* (2) *PORTAL* (4) *LR & TS* (1) *ASLIB* (10) *JAL* (5)	*SEREW* (2) *PROG* (1) *JGIM* (1) *PROF* (1)	27 (21.05%)	*IDS* (3) *JLIS* (6) *LIBRI* (7) *TRENDS* (3)		19 (15.45%)
Trust in public organizations 23 articles (2.07%)	*JIT* (1) *JSIS* (1) *ISR* (1) *GIQ* (5) *JCMC* (1)	*JMIS* (2) *JHM* (1) *I&M* (2) *SSCR* (2)	16 (69.57%)	*OIR* (2) *ISJ* (1) *JAIS* (1)	*IS&P* (1) *HILJ* (1)	6 (26.09%)	*ITD* (1)		1 (4.34%)			
Total	574 articles (51.71%)			216 articles (19.46%)			213 articles (19.19%)			107 articles (9.64%)		

Table II.

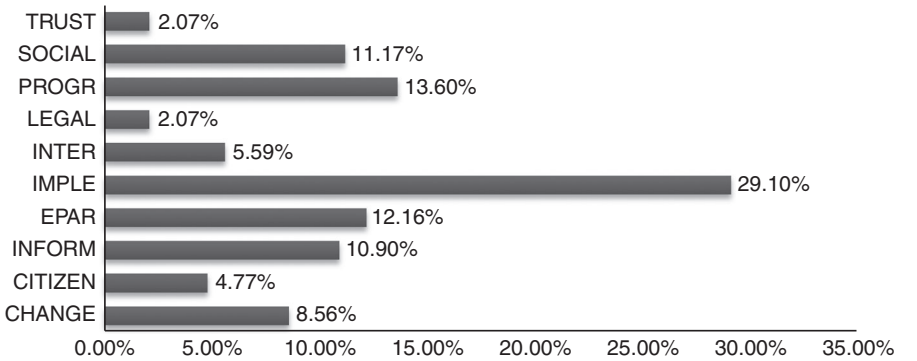

Figure 3.
Main subject published in the information science and library science journals

Source: The authors

programmes and services, and *Information Society* or *Information Technology and Management* tends to focus the impacts, policies, systems concepts, and methodologies related to information technologies and changes in society and culture.

The third and fourth-quartile journals (Table II) pay an interest in articles on the implementation of e-government, and also studies analyzing user behaviour of public services and evaluating e-government programmes. These journals have a particular area of interest, library and information science, and their articles deal with how managers, patients and the public in general can make use of web technology, and with the social, economic and regulatory factors involved in developing policies for the internet, improving services and conducting transactions.

These quartiles also contain journals which give a higher priority to certain topics, thus *Aslib Proceedings*, along with articles on e-participation and digital democracy, includes articles about the dissemination of information research and social behaviour and user-centred studies, and *Library Trends* on implementation of e-government and dissemination of information:

RQ3. What are the methodologies used to analyze the phenomenon of e-government? Do the journals show any preference for the publication of articles that use specific methodologies? And, in the analysis of the different phenomena related to e-government, is there any preference of the use of particular methodologies?

From the type of research reported in the articles published on e-government, we observe a preference for the use of empirical research methods (90.27 per cent) over non-empirical methods (9.73 per cent) (Table III). Although various methodological tools are used in e-government analysis in information science and library science journals, those containing most articles on e-government show a particular preference for the use of qualitative methodologies (61.98 per cent) rather than quantitative ones (28.29 per cent). This tendency towards qualitative methods is more evident in the second-quartile journals than in the first-quartile journals, and this trend is maintained and becomes more evident as we go down in the quartile (Table IV).

Among the qualitative tools, those most frequently used are case studies (41.71 per cent), followed at a great distance by other qualitative methods, such us the evaluation research (7.54 per cent), content analysis (6.28 per cent) and heuristic approach (3.77 per cent) (Table V); thus, there is no clear preference for any alternative

Years	Non-empirical	Qualitative studies	Quantitative studies	Total studies	% non-empirical	% qualitative studies	% quantitative studies
2000	6	29	6	41	14.63	70.73	14.63
2001	3	41	7	51	5.88	80.39	13.73
2002	12	36	5	53	22.64	67.92	9.43
2003	13	48	16	77	16.88	62.34	20.78
2004	9	36	16	61	14.75	59.02	26.23
2005	11	60	24	95	11.58	63.16	25.26
2006	7	44	22	73	9.59	60.27	30.14
2007	9	46	19	74	12.16	62.16	25.68
2008	9	55	43	107	8.42	51.40	40.19
2009	3	41	15	59	5.08	69.49	25.42
2010	8	53	13	74	10.81	71.62	17.57
2011	7	66	24	97	7.22	68.04	24.74
2012	4	44	33	81	4.94	54.32	40.74
2013	1	61	44	106	0.94	57.55	41.51
2014	6	28	27	61	9.84	45.90	44.26
Total	108	688	314	1,110	9.73	61.98	28.29

Source: The authors

Table III. Temporal trends in the use of methodologies

Quartiles	Non-empirical	Qualitative articles	Quantitative articles	% non-empirical	% qualitative articles	% quantitative articles
First	62	323	189	10.80	56.27	32.93
Second	22	131	63	10.18	60.65	20.17
Third	11	153	49	5.16	71.83	23.01
Fourth	13	81	13	12.15	75.70	12.15

Source: The authors

Table IV. Use of methodologies according to the quartile journal

qualitative methodology. In this sense, we observe an interesting tendency to use only qualitative methodology in the articles published in *International Journal of Geographic Information Science*, *Information and Organization*, *Journal of the Association for Information Systems*, *Telecommunication Policy*, *Program: Electronic Library and Information System*, *Serials Review*, *Library Trends*, among others.

The most widely used quantitative methodologies are regression analysis (26.43 per cent), followed by structural equation model (18.47 per cent) and evaluation research (12.42 per cent). Although the use of qualitative methodologies is generalized, some journals do prefer quantitative methodologies; thus, 70 per cent of the articles in *Information and Management* use quantitative methodologies, notable among which is the Structural Equations Model (57.14 per cent). A similar case is found for the *Journal of Computer-Mediated Communication*, which accounts for 60 per cent of the articles that use quantitative tools, among which the dominant tool is regression analysis (50 per cent) – Table VI.

Therefore, there is a clear preference for the use of qualitative methodologies and, throughout the horizon analyzed, there is a decreasing trend. Indeed, its use has gradually become weaker over time, although in 2010 there was an increase which became a decrease again in 2011 (Table III). This decreasing trend is the opposite of the trend shown by the quantitative methodologies which show an increasing trend throughout the nine years period and continued to rise in 2011 (Table III).

Table V.
Methodology used in each of the journals analyzed in the e-government phenomenon (qualitative studies)

Methodologies/ journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Non-empirical	*JAMIA* (5)	14.71	57.41	*OIR* (3)	11.11	20.37	*IR* (1)	10.00	10.18	*IDS* (8)	27.59	12.04
108 articles	*JASIST* (2)	12.50		*LISR* (1)	6.67		*ASLIB* (3)	7.69		*JLIS* (2)	12.50	
(3.57%)	*IJIM* (3)	9.09		*TP* (2)	11.11		*AA&RL* (1)	100		*LIBRI* (1)	6.25	
	GIQ (43)	13.40		*JIS* (3)	23.08		*E&IT* (1)	33.33		*TRENDS* (2)	6.25	
	JCMC (1)	5.00		*JD* (1)	7.69		*ID* (2)	20.00				
	ARIST (2)	50.00		*IS* (8)	27.59		*PROF* (3)	15.00				
	SSCR (6)	10.17		*IT&P* (1)	6.67							
				HILJ (1)	7.69							
				LIBRQ (1)	11.11							
				T&I (1)	11.11							
Action research	*MISQ* (2)	33.33	75.00	*TP* (1)	5.56	16.67	*ASLIB* (1)	2.56	8.33			
12 articles	*JAMIA* (1)	2.94		*IS* (1)	3.45							
(1.51%)	*IJIM* (1)	3.03										
	GIQ (4)	1.25										
	I&M (1)	5.00										
Case studies	*MISQ* (2)	33.33	43.37	*OIR* (4)	14.81	17.71	*KMR&P* (2)	50.00	25.60	*IDS* (14)	48.28	13.25
332 articles	*JAMIA* (10)	29.41		*LISR* (2)	13.33		*IR* (3)	30.0020.00		*MJLIS* (1)	50.00	
(41.71%)	*JSIS* (4)	50.00		*ISJ* (4)	40.00		*PORT* (3)	20.00		*LCA&TS* (7)	58.30	
	I&O (4)	100		*JAIS* (2)	50.00		*LR&TS* (2)	25.64		*JLIS* (4)	25.00	
	ISR (1)	100		*TP* (5)	27.78		*ASLIB* (10)	25.00		*LIBRI* (3)	18.785	
	JASIST (1)	6.25		*JIS* (2)	15.38		*JAL* (4)	17.14		*TRENDS* (15)	46.87	
	IJIM (14)	42.42		*IP&M* (4)	44.44		*SEREW* (8)	50.00				
	GIQ (82)	25.54		*LEARN* (2)	100		*JGITM* (4)	70.37				
	JCMC (2)	10.00		*JD* (3)	23.08		*PROG* (19)	30.77				
	JMIS (2)	33.33		*MISQE* (1)	1000		*JGIM* (4)	50.00				
	I&M (4)	20.00		*JMLA* (4)	26.67		*ID* (5)	36.84				
	EJIS (8)	47.06		*IS* (8)	27.59		*ITD* (7)	55.00				
	SSCR (8)	13.56		*IT&M* (10)	66.67		*PROF* (11)	75.00				
	IJGIS (2)	50.00		*HILJ* (3)	23.08		*LHITECH* (3)					

(*continued*)

Methodologies/ journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
				ITP (1)	33.33							
				LIBRQ (2)	22.22							
				T&I (2)	22.22							
Comparative analysis 38 articles (4.77%)	*JAMIA* (2)	5.88	52.63	*CRL* (1)	14.29	15.77	*ASLIB* (2)	5.13	18.42	*LCA&TS* (1)	8.33	15.77
	JIT (1)	50.00		*TP* (1)	5.56		*PROG* (3)	11.11		*LIBRI* (1)	6.25	
	GIQ (16)	4.98		*JIS* (1)	7.69		*ITD* (1)	5.26		*TRENDS* (4)	12.50	
	SSCR (1)	1.69		*JD* (1)	7.69		*PROF* (1)	5.00				
				HILJ (1)	7.69							
				LIBRQ (1)	11.11							
Content analysis 50 articles (6.28%)	*JAMIA* (2)	5.88	42.32	*OIR* (2)	7.14	26.92	*ASLIB* (1)	2.56	15.38	*IDS* (1)	3.45	15.38
	JASIST (1)	6.25		*TP* (1)	5.56		*PROG* (1)	3.70		*JLIS* (1)	6.25	
	IJIM (2)	6.06		*JD* (1)	7.69					*LIBRI* (2)	12.50	
	GIQ (21)	6.54		*IS* (3)	10.34					*TRENDS* (1)	3.13	
	JCMC (2)	10.00		*HILJ* (1)	7.69							
	SSCR (4)	6.78		*REDC* (3)	75.00							
Critical incident technique 26 articles (3.27%)	*JAMIA* (1)	2.94	15.38	*OIR* (1)	3.70	38.46	*IR* (1)	10.00	26.92	*JLIS* (1)	6.25	19.23
	IJIM (2)	6.06		*CRL* (1)	14.29		*PORT* (1)	6.67		*LIBRI* (1)	6.25	
	GIQ (5)	1.56		*ISJ* (1)	10.00		*JAL* (2)	12.50		*TRENDS* (2)	6.25	
	JHC (1)	6.67		*TP* (1)	5.56							
	SSCR (1)	1.69		*JIS* (1)	7.69							
	IJGIS (1)	25.00		*JMLA* (1)	6.67							
				LIBRQ (1)	11.11							
Discourse analysis 2 articles (0.25%)				*JD* (1)	7.69	100						
				IS (1)	3.45							
Epidemiological studies 2 articles (0.25%)	*JAMIA* (2)	5.88	100									

(*continued*)

Table V.

Table V.

Methodologies/ journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Ethnographic studies 7 articles (0.88%)	*MISQ* (1)	16.67	85.71	*JIS* (1)	7.69	14.29						
	JAMIA (1)	2.94										
	JIT (1)	50.00										
	IJIM (1)	3.03										
	GIQ (1)	0.31										
	JCMC (1)	5.00										
	IJGIS (1)	25.00										
Evaluation research 60 articles (7.54%)	*JAMIA* (1)	2.94	30.00	*OIR* (3)	11.11	23.33	*IR* (1)	10.00	45.00	*IDS* (1)	3.45	18.33
	JASIST (1)	6.25		*LISR* 84)	26.67		*PORT* (1)	6.67		*MJLIS* (1)	50.00	
	IJIM (1)	3.03		*TP* (1)	5.56		*LR&TS* (2)	20.00		*LCA&TS* (2)	16.67	
	GIQ (9)	2.80		*IP&M* (1)	11.11		*ASLIB* (7)	17.95		*JLIS* (4)	25.00	
	JCMC (1)	5.00		*JD* (1)	7.69		*JAL* (4)	25.00		*LIBRI* (1)	6.25	
	JMIS (1)	16.67		*JMLA* (2)	13.33		*E&IT* (2)	66.67		*TRENDS* (2)	6.25	
	JHC (1)	6.67		*HILJ* (1)	7.69		*JGITM* (1)	12.50				
	SSCR (3)	5.08		*T&I* (1)	11.11		*PROG* (1)	3.70				
							ITD (3)	15.79				
							PROF (4)	20.00				
							LHITECH (1)	25.00				
Exploratory study 3 articles (0.38%)	*JASIST* (1)	6.25	100									
	IJIM (1)	3.03										
	GIQ (1)	0.31										
Feasibility studies 23 articles (2.89%)	*JAMIA* (1)	2.94	34.78	*OIR* (8)	3.70	17.40	*PORT* (4)	26.67	30.43	*IDS* (1)	3.45	17.40
	JASISTS (1)	6.25		*JIS* (1)	7.69		*LR&TS* (1)	10.00		*LCA&TS* (2)	16.67	
	GIQ (4)	1.25		*JMLA* (2)	13.33		*JAL* (1)	6.25		*TRENDS* (1)	3.13	
	JHC (2)	13.33					*SEREW* (1)	7.14				

(*continued*)

Methodologies/ journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Hermeneutic exploration 7 articles (0.88%)	*GIQ* (4)	1.25	57.14	*ISJ* (1)	10.00	14.29	*IR* (1) *JGIM* (1)	10.00 7.69	28.57			
Heuristic approach 30 articles (3.77%)	*JAMIA* (2) *JASIST* (1) *GIQ* (6) *JCMC* (1) *SSCR* (1)	5.88 6.25 1.87 5.00 1.69	36.67	*OIR* (1) *LISR* (1) *CRL* (2) *JIS* (1) *JMLA* (1) *HILJ* (1) *REDC* (1)	3.70 6.67 14.29 7.69 6.67 7.69 25.00	26.67	*PORTAL* (1) *LR&TS* (1) *ASLIB* (4) *PROG* (2)	6.67 10.00 10.25 7.41	26.67	*LIBRI* (3)	18.75	10.00
Informetric study 29 articles (3.64%)	*SCIEN* (2) *JASIST* (1) *IJIM* (1) *GIQ* (19)	50.00 6.25 3.03 5.92	79.31	*JAIS* (1) *T&I* (1)	25.00 11.11	6.90	*PORTAL* (2) *ASLIB* (1)	13.33 2.56	10.34	*TRENDS* (1)	3.12	3.45
Life history method 15 articles (1.88%)	*GIQ* (8) *ARIST* (1)	2.49 25.00	60.00	*JIS* (1) *IS* (1)	25.00 3.45	13.33	*SEREW* (1)	7.14	6.67	*TRENDS* (3)	9.38	20.00
Longitudinal design 6 articles (0.75%)	*GIQ* (2) *JMIS* (1)	0.62 16.67	50.00	*IS* (1) *IT&M* (1)	3.45 33.33	33.33	*ITD* (1)	7.14	16.67			
Meta analysis 5 articles (0.63%)	*GIQ* (2) *SSCR* (1)	0.62 1.69	60.00	*TP* (1)	5.56	20.00	*PROG* (1)	3.70	20.00			
Normative approach 5 articles (0.63%)	*GIQ* (2) *ARIST* (1) *SSCR* (1)	0.62 25.00 1.69	80.00				*PROF* (1)	5.00	20.00			

(*continued*)

Table V.

Table V.

Methodologies/ journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Social network analysis 3 articles (0.38%)	*SCIENT* (1)	25.00	33.33	*TP* (1) *T&I* (1)	5.56 11.11	66.67						
Usability study 2 articles (0.25%)	*GIQ* (1)	0.31	50.00				*JAL* (1)	6.25	50.00			
Workflow analysis 2 articles (0.25%)				*JMLA* (1)	6.67	50.00	*SEREW* (1)	7.14	50.00			
Webometric study 3 articles (0.38%)	*SSCR* (2)	3.39	66.67	*LIBRQ* (1)	11.11	33.33						
Others[c] 15 articles (1.88%)	*JAMIA* (2) *GIQ* (7) *I&M* (1)	2.94 2.18 5.00	66.67	*TP* (1) *JD* (1) *IT&P* (1) *HILJ* (1)	5.56 7.69 6.67 7.69	26.67	*ASLIB* (1)	2.56	6.67			

Total 796

Notes: [a]This result is the percentage of dividing the frequency of items found in each of the methodologies and total e-government articles found in each journal; [b]this result is the percentage of dividing the frequency of items found in each of the methodologies and total articles found in each methodology; [c]epidemiological study (*JAMIA*), reliability study (*I&M*), naturalistic study (*JD*), grounded theory (*ASLIB*), holistic approach (*GIQ*), marketing approach (*GIQ*), scenario evaluation (*GIQ*), legal statutory analysis (*GIQ*), triangulation (*HILJ*), delphi method (*GIQ*), inductive approach (*GIQ*), interpretive method (*TP*), capability approach (*IT&P*)

Source: The authors

Methodologies/Journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
ANOVA	*GIQ* (2)	0.62	100									
3 articles	*JHC* (1)	6.67										
(0.96%)												
Case studies	*GIQ* (1)	0.31	25.00	*JIS* (1)	7.69	16.67	*IR* (1)	20.00	33.33	*IDS* (1)	3.45	16.67
12 articles	*I&M* (2)			*JMLA* (1)	6.67		*LR&TS* (1)	10.00		*JLIS* (1)	6.25	
(3.82%)							*ASLIB* (1)	2.56				
							SEREW (1)	7.14				
Comparative analysis	*IJIM* (1)	3.03	36.84	*OIR* (1)	3.70	31.58	*PORTAL* (1)	6.67	31.58			
19 articles	*GIQ* (2)	0.62		*LISR* (1)	6.67		*LR&TS* (1)	10.00				
(6.05%)	*I&M* (1)	5.00		*JD* (1)	7.69		*ASLIB* (2)	5.13				
	SSCR (3)	5.08		*JMLA* (1)	6.67		*JAL* (1)	6.25				
				IS (1)	3.45		*JGIM* (1)	7.69				
Content analysis	*GIQ* (2)	0.62	80.00	*OIR* (1)	3.70	20.00						
10 articles	*JCMC* (2)	10.00		*LISR* (1)	6.67							
(3.18%)	*EJIS* (1)	5.88										
	SSCR (3)	5.08										
Critical incident technique	*SSCORE* (1)	1.69	33.33	*JD* (1)	7.69	66.67						
3 articles				*LIBRQ* (1)	11.11							
(0.96%)												
Data envelopment analysis	*GIQ* (1)	0.31	50.00	*TP* (1)	5.56	50.00						
2 articles												
(0.64%)												
Evaluation research	*JAMIA* (1)	2.94	17.95	*OIR* (1)	3.70	33.33	*PORTAL* (1)	6.67	28.21	*JLIS* (3)	18.75	20.51
39 articles	*IJIM* (1)	3.03		*LISR* (2)	13.33		*LR&TS* (1)	10.00		*LIBRI* (4)	25.00	
(12.42%)	*GIQ* (3)	0.93		*CRL* (2)	28.57		*ASLIB* (5)	12.82		*TRENDS* (1)	3.13	
	JCMC (1)	5.00		*JIS* (1)	7.69		*JAL* (3)	18.75				
	SSCR (81)	1.69		*IP&M* (1)	11.11		*SEREW* (1)	7.14				
				JMLA (1)	6.67							
				HILJ (3)	23.08							
				LIBRQ (2)	22.22							

(*continued*)

Table VI.
Methodology used in each of the journals analyzed in the e-government phenomenon (quantitative studies)

Table VI.

Methodologies/Journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Factorial analysis	*JASIST* (3)	7.69	64.29	*LISR* (1)	6.67	28.57	*JGIM* (1)	7.69	7.14			
14 articles	*IJIM* (1)	3.03		*IP&M* (1)	11.11							
(4.46%)	*GIQ* (2)	0.62		*JD* (1)	7.69							
	JCMC (1)	5.00		*IT&M* (1)	33.33							
	JHC (1)	6.67										
	EJIS (1)	5.88										
Feasibility studies	*GIQ* (1)	0.311	50.00	*IP&M* (1)	33.33	50.00						
2 articles (1.04%)												
Heuristic approach	*JAMIA* (1)	2.94	75.00	*CRL* (1)	14.29	25.00						
9 (2.55%)	*JASIST* (1)	6.25		*JD* (1)	7.69							
	GIQ (3)	0.95										
	I&M (1)	5.00										
Logistic regression	*GIQ* (5)	1.58	86.67	*TP* (1)	5.56	6.67	*ITD* (1)	5.26	6.67			
15 articles	*JCMC* (1)	5.00										
(4.77%)	*JHC* (2)	13.33										
	SSCR (5)	8.47										
Longitudinal design	*JAMIA* (1)	2.94	44.44	*OIR* (1)	3.70	33.33				*IDS* (2)	6.89	22.22
9 articles	*GIQ* (1)	0.31		*IP&M* (1)	11.11							
(2.87%)	*JMIS* (1)	16.67		*IS* (1)	3.45							
	JHC (1)	6.67										
Mean differences	*GIQ* (3)	0.93	100									
3 articles	*JHC* (1)	6.67										
(0.96%)												

(*continued*)

Methodologies/Journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Panel data	*GIQ* (2)	0.62	75.00				*ITD* (1)	5.26	25.00			
4 articles	*JCMC* (1)	5.00										
(1.27%)												
Regression analysis	*JAMIA* (1)	2.94	67.47	*OIR* (5)	18.52	18.07	*KMR&P* (1)	25.00	14.46			
83 articles	*JSIS* (1)	12.50		*ISJ* (2)	10.00		*PORTAL* (1)	6.67				
(26.43%)	*JASIST* (1)	6.25		*TP* (1)	5.56		*JGITM* (2)	37.50				
	IJIM (2)	33.33		*IS* (3)	10.34		*JGIM* (2)	23.08				
	GIQ (25)	7.79		*IT&P* (2)	13.33		*ITD* (4)	21.05				
	JCMC (5)	25.00		*HTLJ* (1)	7.69							
	JHC (3)	20.00		*T&I* (1)	11.11							
	I&M (2)	10.00										
	EJIS (3)	17.65										
	SSCR (12)	20.34										
Social network analysis	*GIQ* (1)	0.31	50.00	*OIR* (1)	3.70	50.00						
2 articles												
(0.63%)												
Spearman correlations	*GIQ* (1)	0.31	50.00	*LISR* (1)	6.67	50.00						
4 articles (1.27%)	*JHC* (1)	6.67		*IT&P* (1)	6.67							
Structural equations model	*MISQ* (1)	16.67	75.86	*OIR* (2)	7.41	8.62	*KMR&P* (1)	25.00	15.52			
58 articles	*JSIS* (3)	37.50		*ISJ* (1)	10.00		*IR* (1)	10.00				
(18.47%)	*JASIST* (1)	6.25		*IS* (1)	3.45		*JGIM* (3)	37.50				
	IJIM (1)	3.03		*T&I* (1)	11.11		*ID* (3)	30.00				
	GIQ (22)	6.85					*ITD* (1)	5.26				
	JMIS (1)	16.67										
	JHC (1)	6.67										
	I&M (8)	40.00										
	EJIS (2)	11.76										
	SSCR (4)	6.78										

(*continued*)

Table VI.

Table VI.

Methodologies/Journals	First quartile Journals	%[a]	%[b]	Second quartile Journals	%[a]	%[b]	Third quartile Journals	%[a]	%[b]	Fourth quartile Journals	%[a]	%[b]
Time motion studies 2 articles (0.63%)	*JAMIA* (2)	5.88	100									
Others[c] 13 articles (4.14%)	*SCIEN* (1) *JASIST* (1) *GIQ* (2) *JCMC* (1) *SSCR* (1)	25.00 6.25 0.61 5.00 0.17	46.15	*LISR* (1) *ISJ* (1) *JMLA* (1)	6.67 10.00 6.67	23.08	*LR&TS* (1) *SEREW* (1) *ASLIB* (1)	10.00 7.14 2.56	23.08	*IDS* (1)	3.45	7.69

Total 314

Notes: [a]This result is the percentage of dividing the frequency of items found in each of the methodologies and total e-government articles found in each journal; [b]this result is the percentage of dividing the frequency of items found in each of the methodologies and total articles found in each methodology; [c]work flow analysis (*SEREW*), inferential study (*SSCR*), experimental study (*JASIST*), formative study (*JMLA*), mathematical approach (*GIQ*), cluster analysis (*JCMC*), reliability study (*ISJ*), contingent evaluation (*LR&TS*), cross study (*SSCR*), life history method (*IDS*), normative approach (*GIQ*), psephology study (*ASLIB*), webometric study (*SCI*)

Source: The authors

In this sense, researchers are more inclined to use quantitative methodologies to analyze questions related to e-administration, to the detriment of qualitative methodologies and non-empirical studies. Furthermore, over the last few years more sophisticated and systematic methodologies have been used to summarize research results such as bibliometric studies and scientometrics approach. These tools allow us to update information and reach clearer conclusions, thus clarifying any conceptual and theoretical weaknesses present in previous studies which may affect conclusions. This allows us to assess the real progress of research into a particular subject. In the same way, methodological tools are used such as meta synthesis and meta analysis, with the aim of integrating studies with common objectives, making it possible to reach conclusions and provide evidence in a more objective way, which will also be of assistance to researchers and their future research projects.

Table VII shows that there are specific trends in terms of the use of certain methodologies to analyze the main research topics. In the case of research into the implementation of e-government we can see that 79.57 per cent of the tools used are qualitative, and among them we can highlight the use of case studies and non-empirical studies. Regarding the use of quantitative methodologies, the outstanding techniques ware regression analysis and structural equations models.

Regarding research into programme evaluation and planning, we can see that there is a trend towards the use of qualitative methodologies (78.81 per cent), particularly case studies, whilst in among the quantitative methodologies used we can observe some diversity as we find regressions analysis, comparative analysis, heuristics and evaluation research. In the case of studies into social behaviours and user-centred studies, we can observe the opposite trend to those observed in the previous topics. In this sense, quantitative methodologies are predominant (61.29 per cent) and among these we can highlight the use of evaluation research.

In terms of articles on the dissemination of information, we can see that researchers mainly used qualitative methodologies (80.17 per cent), particularly case studies and non-empirical articles. Finally, when academics studied the phenomenon of e-participation they mainly used (62.96 per cent), specifically case studies showing the experiences of particular public administrations.

In short, e-government research has increased over the time period and the main topics analyzed by researchers have been the implementation of e-government, programme evaluation and planning, social behaviours and user-centred studies, dissemination of information and e-participation and digital democracy. This research has mainly been published in six core journals, *Government Information Quarterly*, *Social Science Computer Review*, *Journal of the American Medical Informatics Association*, *Interlending and Document Supply*, *Library Trends* and *Information and Society*. In a similar way, there has been a clear preference for qualitative methodologies rather than quantitative ones, although over time there has been a decrease in the former in favour of the latter. Moreover, we have also observed the use of more sophisticated methodologies such as Informetric Studies, Meta-Analysis Studies, Webometric Studies or Social Analysis Network.

6. Discussion and implications

The evidence found in this research shows that the efforts made by public administrations to involve citizens in public affairs is one of the main topics (Miranda *et al.*, 2009) which has aroused the interest of researchers over this time period. e-participation has become the main issue addressed by some journals

Table VII.
Methodologies used to analyze each of the phenomena related to e-government

Research topics	Qualitative methodologies			Quantitative methodologies		
Change organization behaviour 95 articles (8.56%)	Action-research study (2) Case studies (45) Comparative analysis (4) Content analysis (3) Critical incident technique (1) Evaluation research (3) Hermeneutic exploration (1) Informetric study (1)	Life history method (1) Marketing research (1) Non-empirical (15) Workflow analysis (1)	78 (82.11%)	Critical incident technique (1) Evaluation research (1) Factorial analysis (2) Regression analysis (4)	Structural equations model (7) Time motion study (1) Workflow analysis (1)	17 (17.89%)
Citizens' satisfaction 53 articles (4.77%)	Case studies (12) Evaluation research (8) Feasibility analysis (1) Hermeneutic study (1) Non-empirical (3)		25 (47.17%)	ANOVA (1) Case study (1) Comparative analysis (4) Data envelopment analysis (1) Evaluation research (2) Factorial analysis (1)	Logistic regression (2) Regression analysis (6) Pearson correlations (1) Structural equations model (9)	28 (52.83%)
Dissemination of information 121 articles (10.90%)	Action-research study (2) Case studies (36) Comparative analysis (6) Content analysis (11) Critical incident technique (3) Epidemiological study (1) Evaluation research (7) Exploratory study (1) Feasibility study (7) Hermeneutic exploration (1)	Heuristic approach (2) Informetric analysis (1) Life history method (2) Meta analysis (1) Non-empirical (12) Normative approach (3) Triangulation (1)	97 (80.17%)	Case study (1) Comparative analysis (3) Content analysis (1) Evaluation research (1) Feasibility study (1) Formative study (1) Logistic regression (1) Longitudinal study (1)	Regression analysis (9) Spearman correlations (2) Panel data (1) Structural equation model (2)	24 (19.83%)

(*continued*)

Research topics	Qualitative methodologies			Quantitative methodologies		
e-participation and digital democracy 135 articles (12.16%)	Action-research study (2) Case studies (32) Comparative analysis (1) Content analysis (9) Critical incident technique (4) Ethnographic studies (1) Evaluation research (4) Exploratory analysis (1) Delphi method (1) Heuristic approach (2) Inductive study (1)	Informetric analysis (8) Longitudinal design (1) Meta-analysis study (1) Non-empirical (11) Webometric analysis (2) Social network analysis (2)	85 (62.96%)	Case study (1) Cluster analysis (1) Comparative analysis (2) Content analysis (5) Critical incident technique (1) Cross-analysis (1) Evaluation research (1) Factorial analysis (2) Heuristic approach (1) Logistic regression (3)	Mean differences (1) Panel data (1) Regression analysis (19) Social network analysis (2) Spearman correlations (1) Structural equations models (7)	50 (37.04%)
Implementation of e-government 323 articles (29.10%)	Action-research study (2) Capability approach (1) Case studies (114) Comparative analysis (11) Content analysis (9) Critical incident technique (7) Epidemiological (1) Ethnographic study (4) Informetric analysis (13) Evaluation research (22) Feasibility studies (11) Formative study (1) Grounded theory (1) Hermeneutic exploration (2) Heuristic approach (11)	Holistic approach (1) Life history method (6) Longitudinal design (2) Meta analysis (2) Non-empirical (31) Normative approach (1) Reliability study (1) Usability study (1) Webmetric study (1) Workflow analysis (1)	257 (79.57%)	Case studies (3) Comparative analysis (1) Content analysis (2) Contingent evaluation (1) Data envelopment analysis (1) Evaluation research (6) Feasibility study (1) Life history method (1) Logistic regression (3) Longitudinal design (3) Normative approach (1)	Regression analysis (22) Psephology study (1) Reliability study (1) Spearman correlations (1) Structural equations models (15) Time motion study (1) SWOT analysis (1) Webometric analysis (1)	66 (20.43%)

(*continued*)

Table VII.

Table VII.

Research topics	Qualitative methodologies			Quantitative methodologies		
Inter-organizational relations 62 articles (5.56%)	Action-research study (1) Case studies (29) Comparative analysis (1) Content analysis (3) Critical incident technique (1) Ethnographic study (2) Informetric analysis (1)	Evaluation research (1) Feasibility studies (2) Longitudinal design (1) Non-empirical (10)	53 (85.48%)	ANOVA (1) Factorial analysis (1) Evaluation research (2) Heuristic approach (1) Logistic regression (1) Regression analysis (2) Structural equations models (1)	9 (14.52%)	
Legal aspects 23 articles (2.07%)	Case studies (6) Comparative analysis (1) Content analysis (2) Evaluation research (1) Hermeneutic exploration (1) Interpretative study (1) Life history method (3)	Non-empirical (6) Normative approach (1) Social network analysis (1)	23 (100%)			
Program evaluation and planning 151 articles (13.60%)	Action-research studies (3) Case studies (42) Comparative analysis (9) Content analysis (11) Critical incident technique (2) Discourse analysis (2) Evaluation research (14) Feasibility studies (2) Longitudinal design(1) Hermeneutic exploration (1) Heuristic approach (9)	Informetric study (2) Legal statutory analysis (2) Life history method (3) Longitudinal analysis (1) Non-empirical (14) Scenario evaluation (1) Usability study (1)	119 (78.81%)	Case studies (3) Comparative analysis (4) Content analysis (1) Correspondence study (1) Evaluation research (4) Factorial analysis (3) Heuristic approach (4) Longitudinal design (2)	Mathematic approach (1) Mean differences (1) Panel data (1) Regression analysis (7)	32 (21.19%)

(*continued*)

Research topics	Qualitative methodologies			Quantitative methodologies		
Social behaviours and user-centred studies 124 articles (11.17%)	Case studies (11) Comparative analysis (5) Content analysis (2) Critical incident technique (8) Ethnographic study (1) Heuristic approach (6) Evaluation research (8)	Exploratory study (1) Naturalistic study (1) Non-empirical (4)	48 (38.71%)	ANOVA (1) Case studies (3) Comparative approach (4) Content analysis (1) Critical incident technique (1) Factorial analysis (5) Evaluation research (21) Experimental study (1) Heuristic approach (2) Inferential analysis (1)	Longitudinal design (2) Logistic regression (6) Mean differences (2) Regression analysis (13) Structural equations models (13)	76 (61.29%)
Trust in public organizations 23 articles (2.07%)	Case study (5) Comparative analysis (1) Evaluation research (2) Informetric analysis (1) Non-empirical (2)		11 (46.67%)	Evaluation research (1) Longitudinal design (1) Panel data (1) Regression analysis (3)	Reliability study (1) Structural equations models (5)	12 (53.33%)

Source: The authors

Table VII.

(Raadschelders and Lee, 2010), and constitutes an important area of research within the field of e-government, as shown in the previous academic studies (Rodríguez Bolívar *et al.*, 2012).

Furthermore, e-participation and deliberative democracy have been among the main topics studied. However, our results indicate that there are aspects of this research topic that have not been widely covered by researchers such as the different barriers and restrictions faced by citizens when accessing new interactive tools which means that participation is not complete, and also how different governmental strategies could encourage this participation (Julnes and Johnson, 2011). This problem is of particular significance to the elderly and to people with disabilities, and constitutes a research question of great interest, calling for extensive academic analysis. Nor has there been any analysis of e-participation and its behaviour within the context of an economic-financial crisis such as the one we are currently experiencing. In fact, up to now, prior research has only been focused on the advantages of e-government for participation processes but our results go beyond identifying problems caused by e-government implementation and, especially, by e-participation processes.

Due to the empirical and sociological nature of the field of public administration studies (Ragab, 2005), the main methodology used in research into e-government is empirical, with an emphasis on a qualitative approach. However, our results show that in recent years this pattern is changing, and that quantitative methods are increasingly favoured by researchers. It is necessary for providing e-government field of knowledge with greater methodological support. Indeed, there is a growing necessity to offer conceptual frameworks and a theoretical foundation that will provide a basis for the efficient implementation of e-government, as part of the process of modernization of public administrations.

Furthermore, in a similar line to that of Heeks and Bailur (2007) and Yildiz (2007), we can state that research tends to focus on studies that observe and assess the results of initiatives in the field of technological innovation, placing particular emphasis on the models of e-government implemented, showing the findings of feasibility analysis, the contents and the heuristics of government web sites, and in some cases presenting advice on good practices to follow, but without testing previous theories nor producing new theories or perfecting the ones that already exist. Nevertheless, in terms of the discovery of factors or aspects that facilitate the introduction of ICT to assist the implementation of new administrative reforms, these may be of practical use, but given their merely descriptive nature they are not very helpful for government planners and public managers and other decision makers when they have to improve plans related to e-administration (Yildiz, 2007).

In this sense, we agree with Yildiz (2007) when he states that researchers should try to learn about e-government experiences directly from politicians, since their perceptions represent an important part of the functions and formulation of policies and this knowledge would allow us to obtain information about what is happening inside the black box of e-administration and to offer information on successful cases that could be imitated. Indeed, prior research has indicated the need of leadership to encourage the creation of team when governments seek to undertake e-government initiatives (Luna-Reyes and Gil-Garcia, 2011), because the lack of support from major public leaders may be reflected in the lack of appropriate government ICT policy formulation (Brown and Thompson, 2011).

In this regards, the perspective of politicians and public managers in terms of e-government would be crucial in order to learn about internal questions that

researchers are incapable of perceiving from the outside. This type of cooperation would offer information for public-private e-government projects, referring to the necessary principles and framework for the sharing out of responsibilities and the exchange of information among the network of organizations in such a way as to generate public value and to meet the needs of the public in terms of equity, responsibility and competence.

These deficiencies were already exposed by studies carried out by the European Commission through the Institute for Prospective Technological Studies (Frissen *et al.*, 2007) but, up to now, research has not advanced in these problems. There must be greater awareness of the value of investment in ICT, mainly in terms of frameworks, methods and metrics to properly control, assess and communicate the costs and benefits of these investments for the different parties involved. In this regard, the forthcoming title to be published by Springer could shed some light to fill this research gap (Rodríguez Bolívar, 2014).

Moreover, our research has demonstrated the lack of research into the semantic and cultural interoperability of public services, along with the determination of the critical factors that allow citizens to adopt e-government at different stages of the implantation of the service (Sang *et al.*, 2009), particularly in relation to population movements and globalization, leading increasingly multicultural populations but without taking into account the cultural and linguistic differences that impede affective communication between citizens and governments (Zhao, 2011). This kind of research shows that the economic and democratic circumstances that condition the political context exert a notable influence on the innovation process in public administrations.

Also regarding public services, this research may have been constrained, to date, and further studies are needed, into these questions and many others, such as incentives for their implementations (Hu *et al.*, 2013), whether public authorities are adopting a suitable model in this respect, the evolution of such services, the need for ongoing improvement and innovation (Osborne and Brown, 2011), whether this implementation represents a transformational change among public administrations (Weerakkody *et al.*, 2011) and the possible role of new Web 2.0 tools in improving the distribution of these services.

In addition, the no universal access to online services, especially in rural areas (Atkin *et al.*, 2008; Schuppan, 2009) and in vulnerable groups or low income groups (Lin *et al.*, 2011), along with the high level of illiteracy in the population and low penetration of PC in some countries, such as some of those named "developing countries", represent a weakness for the start of e-government (Weerakkody *et al.*, 2007). Therefore, future research should be led to these areas and to the need of analyzing efficient e-government policies to reach these people in order to reduce the digital divide drastically.

On the other hand, our findings show both theoretical and practical implications in the development of research into e-government. From a theoretical point of view, research into e-government needs a theoretical basis to model the processes of modernization in public administrations in relation to the implementation of new technologies, which is even more relevant in the current context of economic crisis for governments wherein the role of e-government could become even more relevant to mitigate the effects of this crisis.

Moreover, the great bulk of research on e-government still refers to the evolution and stages of the models and our research shows the need to construct models that allow us to measure the efficiency of e-government initiatives. Therefore, it would be

useful for the maturity of this study field to conduct longitudinal studies in which process models have developed evolution of e-government – the theory of e-government evolution – (Gil-Garcia and Martínez-Moyano, 2007). In this sense, previous research has assumed the existence of benefits derived from the implementation of new technologies, but has not explored the cost that these measures have had in public entities nor have they measured the economic and social impact of these measures.

In this regards, further efforts based on the theory for understanding e-government as a field of study are needed because current research only present the results achieved in a specific context, making it difficult to aggregate and evaluate the results of a set working for a subject area of e-government. This recommendation seeks to encourage researchers to go further in their conceptualizations in the development of models, which allow provide more solid theoretical foundations future studies. To do this, researchers must better explain theoretical contributions in the development of the proposed models.

e-government research could be considered an eclectic field, involving diverse methodologies and disciplines, each contributing specific theories and approaches but, as noted previously, to date the most commonly used methodologies have been of a qualitative nature, perhaps due to researchers' preference to undertake case studies of e-government issues, to analyze the state of the art of e-government projects, making use of surveys and interviews as the main methods of data collection.

In the last years, there has been a slight change, and quantitative research tools are now increasingly used, although there is a weak presentation of methodologies in publications, and few studies include multi-method evaluation approach for data collection (Snead and Wright, 2014). Therefore, we believe that the new generation of stronger theories requires the use of mixed methods to favour the generation of conclusions and findings more rigorous and richer in the interpretation of results (Hevner and Chatterjee, 2010). The combination of quantitative and qualitative methods in the study requires the "triangulation" of data, which leads to the expansion of the scope of the study, the emergence of new ideas, perspectives and complementary studies (Creswell, 2013).

From a practical point of view, our study has shown the need to carry out further research into e-participation in order to understand the true dimension of social networks and their involvement in e-democracy. In this sense, given the interest of professionals in the field of e-government, future research should consider more studies on the design and evaluation of a tool for citizens to vote in local initiatives, an evaluation framework for web sites of e-government, or the design and evaluation of new tools for automated e-government services.

In addition, analysis of the contextual factors affecting e-government will enhance our understanding of the underlying forces that promote e-government projects (Hofmann *et al.*, 2012). In this regard, although previous studies have examined some factors related to e-government as a tool for the dissemination of governmental information, these studies are inconsistent as regards the variables and measurement techniques used. Therefore, future research should be developed to identify statistically significant factors in this respect, to enable public managers to design better strategies for the implementation of e-government.

Furthermore our study has shown the need for a practical analysis of whether the economic-financial crisis has led to the development of new e-government models in line with the varied impact of the crisis on different economies. The differences that

might be observed here could give us some indication of the need to adapt public reforms in ICT to the environment in which they are developed and are applied.

This study examined a snapshot of articles published in the field of e-government, in journals listed in the field of information science and library science. In this sense, it may be difficult to extrapolate these findings and make general comments about the entire field of e-government research, since we have not analyzed journals listed in the fields of public administration, computer science or communication. A more comprehensive approach would include articles from a wider variety of sources such as additional journals, databases and conference proceedings.

7. Conclusions and further research

Our findings show that it is clear that administrative reforms and the tools necessary to carry them out, such as the introduction of new technologies, are an essential topic for any journal included in the sphere of information science, along with the trend for citizens to use new resources and public services provided by public administrations – hospitals, libraries, government or universities. In the same way, e-participation among citizens has aroused the interest of many members of the academic community who have analyzed the barriers and restrictions that citizens have to face. Due to the relevance of disabled people and senior citizens, this is a research topic with great potential for the future and should be explored more thoroughly by the academic community.

This research should identify whether the accessibility policies implemented by public administrations and the motives and perceptions of disabled and older people on the advantages of new technologies and if they own capacity and learning skills needed to be involved and to participate in the social affairs. Research should highlight the problems to which citizens are faced, and whether these policies actually get to meet the needs of these citizens, even to make comparisons between governments in different countries with the aim of identifying synergies on good social policies and practices necessary to reduce this digital divide.

In addition, in order to efficient involvement of citizens in public sector management, there is a need for research that includes the opinions of citizens as to whether they consider the information offered by organisms to be relevant, sufficient or comprehensible.

Moreover, the evidence from this study shows that there is a need to consolidate e-government research through the use of quantitative research methodology and we believe that this represents one of the great research opportunities for the future in terms of the implementation of new technologies in public administrations, especially if we consider their important inferential power and the fact that quantitative methods offer more precise and objective data (Bailey, 1992).

Also, there are not a great deal of studies about the implementation of e-government in poorer economies and, therefore, research should try to encourage the development of this type of public administration and, to this end, it would be necessary to know the perception and attitude of public managers regarding e-government policies (Alcaide Muñoz *et al.*, 2014), along with the processes of planning and decision making, which would allow us to better understand the complexity involved in the innovation of public administrations and the process of reforms to which they are subject (Yildiz 2007).

In this regard, analysis of the context in which e-administration is developed can help us to understand the underlying forces that are increasing e-government projects.

We believe that a promising area of study could be that of policies related to the process of adoption of e-government in a complex political environment (Kamal *et al.*, 2015). Indeed, the results of future studies could strengthen the connection between e-government and the traditional concerns of public administration.

To conclude, the review presented in this paper provides a comprehensive summary of the research into e-government within the field of information science and library science, highlighting the main research topics and methodologies used. Nonetheless, this is the main limitation of our study: the focus on one field of knowledge and not to analyze others like public administration and computer science fields of knowledge. In any case, explanations and clarifications are given whenever possible. Knowledge gaps and research opportunities are identified from these observations, which reveal changes in the research methods applied, with a greater application of quantitative methods, thus reinforcing the development of a theoretical framework so that the application of e-government may efficiently contribute to improving management in the public sector.

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Further reading

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