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Completed Research

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Abstract

Despite a huge repository of work on enterprise systems (ES) that are widely used across different industries in the private sector, there is a scarcity of publications on this topic in the context of the public sector. Moreover, an assessment about the current research landscape on ES in the context of the public sector is virtually nonexistent. In this study, we address this gap by reviewing 31 academic papers on ES in the public sector. In our analysis, we examine the research focus, research approach and theoretical foundation. Then, by synthesizing the recommendations for the prospective projects, we propose several promising avenues for the future research. Overall, our literature review confirms that this research stream is still in its early stage and much more research efforts need to be dedicated.

Keywords

Enterprise Systems, ES, Enterprise Resources Planning, ERP, public administration, public sector.

Introduction

Enterprise Systems (ES) are powerful information systems for handling various organizational functions (Chou and Chang 2008). At the executive level, ES provides decision makers with access to organizational data, such as accounting and financial records, human resource data, information about operations and customers (Roztocki et al. 2020). At the managerial level, ES provides middle managers with organizational data needed for their planning, directing and controlling responsibilities. At the operational level, ES adoption forces organizations to handle their business activities in a more efficient way by tracking industry practices and applying a Business Process Management (BPM) approach (Gabryelczyk and Roztocki 2018).

A vast majority of authors conducting research on ES focus their attention on the private sector and for-profit organizations, but there are also several papers on ES in the public sector. Surprisingly, in many of these papers, authors do not explicitly define the public sector. In the 1980s and 1990s, Rose (1981) and Lane (1993) emphasized the need to establish a clear definition of the public sector and its demarcation in relation to the private sector. At this time, the need for a definition was conditioned, in particular, serious public concerns about the so-called "big government," and the government growing larger and expanding in many economic areas. In this context, in order to evaluate the government and its actions, it was necessary to clearly define what constitutes government organizations or the public and private sector entities, in general (Rose 1981).

In his work, Lane (1993) presents four approaches to define the public sector. He emphasizes the importance of public administration and public authority as decision makers on behalf of the society, which provides response to the needs coming from the general public. Lane (1993) stresses the macroeconomic aspect of public sector operation. Based on these considerations, he draws attention to governmental operations in terms of consumption, investment, transfers and production. For the purpose of our paper and building on Lane's (1993) considerations, we propose the following operational definition of the public sector. The public sector is defined as a collection of strictly (legal) regulated

government activities, especially in the area of consumption, investment, transfer and production, which brings outcomes (or consequences) for the society.

There have been several attempts to review the current status of ES research in the public sector. Kelemen (2014) reviewed 31 papers on the topic published from January 2008 until March 2013. He found that at the time of his research, ES was implemented in various organizations from the public sector, such as education, defence, and public health care. However, to our best knowledge, there is no comprehensive review that systematically assesses the current research landscape in the field of ES in the public sector. Thus, our objective in this paper is to close this gap and explore the following research questions:

1. What are the topics investigated in the literature?

2. What are the identified gaps and resulting research avenues proposed?

The remainder of the paper is structured as follows. After discussing the background of our research, we describe our research methodology. After presenting the results, we discuss our findings. We conclude our paper with pointing out our contributions and showing promising research avenues.

Background

A methodological review of existing literature is vital for every research project. Consequently, literature review papers are valuable resources for researchers conducting studies in a given field (Webster and Watson 2002). In this section of the paper, we build a case for our literature review by showing the urgent need for a methodical assessment of existing publications in the emerging field of ES in the public sector. First, we review several literature review papers on ES by synthesizing their most important conclusions. Then, we introduce three existing literature review papers specifically on ES in the public sector and show their contribution to the existing body of knowledge while pointing to their limitations.

There are several published literature review papers that focus on ES. Esteves and Pastor (2001) reviewed 189 journal and conference papers that were published between 1997 and 2000. In a different literature review, Shehab et al. (2004) reviewed 76 journal papers, conference proceedings and books on ES that were published between 1990 and 2003. In 2007, Esteves and Bohorquez updated earlier work and expanded the paper sample to 640 papers that were published in journals and conference proceedings. In summary, all these literature reviews focus on ES in general but did not specifically address the topic of ES in the public sector.

The literature review papers specifically on ES in the public sector emerged much later. In 2006, Raymond et al. published a study which analyzed 46 'success stories' from 15 countries published on the websites by the largest Enterprise Resources Paneling (ERP) vendors. Authors of this paper characterize and categorize four types of motivations that lead to the adoption of ES systems in e-government: technical, operational, strategic, and performance. They conclude that the main driving force for the public sector organizations is to implement ES to integrate their existing information technology, while seeking to improve existing business processes (Raymond et al. 2006). Overall, Raymond et al. (2006) work is rather an ERP industry analysis than a methodological review of previously published academic papers.

The oldest systematic literature review paper specifically on ES in public sector that we were able to identify was published in 2014 which shows a 13 year delay. In this literature review paper, Kelemen (2014) reviews 31 papers and categorizes them according to the country and the area of the public sector where the ES was implemented. However, Kelemen (2014) omits classifying the papers in his sample in terms of research stream category. The majority of papers in the Kelemen's (2014) sample report on the ES implementations in the USA focuses on public education. In a more recent study, Lugonja (2018) reviews a relatively small sample of 10 papers about ES in the public sector. Based on the synthesis of these papers, Lugonja (2018) concludes that interoperability, defined as the ability to work with other computer systems while providing a straightforward user interface, is one of the most influential factors regarding ES implementations in the public sector.

Overall, we were able to identify only two methodological reviews conducted by Kelemen (2014) and Lugonja (2018) who examined an emerging field of ES in the public sector. As compared to ES in the private sectors, this presents a substantial gap and motivates our work.

Methodology

To assemble a sample of papers needed for our analysis, in October 2019, we searched published studies by using databases such as Scopus, Science Direct, Web of Science, Taylor and Francis, Springer, Elsevier, Ebsco, and Google Scholar. In order to be included in our sample, the paper needs to satisfy the following criteria. First, the work must be a full paper written in English and published in an academic journal or in a conference proceeding of an international academic conference. Second, the one of the following phrases: "Government", "Public administration", "Public institution", "Public organization", "Public sector", or "Public service" must appear in the title, in the abstract, or in the keywords. Third, one of the following phrases: "Enterprise system", "Enterprise resource planning", "ES", "ERP", or a specific ES (e.g. SAP), must appear in the title, in the abstract, or in the keywords. In addition, books, book chapters, studies published in non-peer-reviewed journals, short and extended abstracts, dissertations, theses, and working papers were not considered in our study. In essence, we were using more strict criteria than Kelemen (2014), who included in his sample books and dissertations in Croatian. Our search ended up with a sample of 31 papers spanning the years 2000 through 2019 as depicted in Table 1.

Year	Count	Year	Count	Year	Count	Year	Count	Year	Count
2000	1	2004	0	2008	2	2012	1	2016	2
2001	1	2005	2	2009	2	2013	4	2017	4
2002	3	2006	1	2010	1	2014	1	2018	0
2003	3	2007	0	2011	1	2015	1	2019	1

Table 1. Papers by Year

As can be seen from Table 1, the earliest publication we were able to identify is from 2000. This represents a time gap as the mainstream research on ES in general, going back as far as 1996 (Roztocki et al. 2020). Concerning publication volume, there are about two papers on the topic published each year.

In analyzing papers in our sample, we followed the methodology for literature review proposed by Roztocki and Weistroffer (2015). Our analytical research framework is depicted in Figure 1.
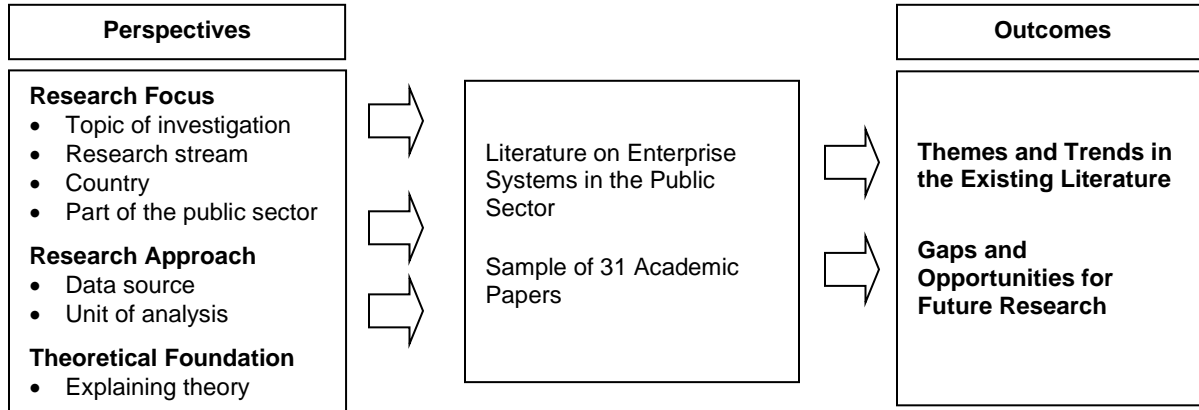

Figure 1. Analytical Framework – Perspectives and Outcomes (adapted from Roztocki and Weistroffer (2015))

Using the analytical research framework by Roztocki and Weistroffer (2015), we grouped the papers in our sample by research focus, research approach, and theoretical foundation. Research focus contains the topic of the paper, the research stream category, the country in which the data was collected, and the part of the public sector. Similar to a literature review conducted by Kelemen (2014), we categorized papers by the particular part of the public sector: education, public administration, healthcare and defense/police forces. We also conducted the research stream categorization. For the purpose of this categorization, both authors independently coded and assigned the papers in the sample to a mainstream category based on the content. Possible differences were discussed to reach an agreement. Regarding the research approach, we considered the data source and unit of analysis. For theoretical foundation, we examined the paper for explaining theory, model, and framework.

Results

Using the analytical research framework developed by Roztocki and Weistroffer (2015) and taking into account the content and topic of investigation of the papers in our sample we identified six categories of the research stream as presented in Table 2. This table lists all 31 papers in our sample with topic of investigation, research stream category, country of data collection, the part of the public sector and level of investigation which we classify as country, organization, department or individual level.

Paper	Topic of Investigation	Research Stream Category	Country/ Territory	Part of the public sector	Level of Investigation
Al-Harthi and Saudagar (2019)	Success drivers for ERP implementation	Success factors of ES implementation	Saudi Arabia	Public administration	Organization
Alsharari (2017)	ERP implementations from institutional logic perspective	Implementation of ES	United Arab Emirates	Public administration	Organization
Althonayan and Althonayan (2017)	The impact of ERP implementation on users' performance	Impact of ES implementation	Saudi Arabia	Education	Individual
Alves and Matos (2013)	Comparisons between ERP implementations in the public and the private sector	Implementation of ES	Portugal	Multiple	Organization
Blick et al. (2000)	Examine the role of business process modeling for ERP implementations	Implementation of ES	USA	Defense	Organization
Bukamal and Abu Wadi (2016)	Success factors for ERP implementation	Success factors of ES implementation	Bahrain	Multiple	Organization
Campos Fernandes Leandro et al. (2017)	Success factors for ERP implementation	Success factors of ES implementation	Brazil	Education	Organization
Chang and Gable (2002)	ERP life cycle from the perspective of involved individuals	ES life cycle implementation	Australia	Public administration	Individual
Coelho et al. (2016)	Examine the client-consultant relationship during the ERP implementation	Implementation of ES	Brazil	Public administration	Organization
Crisostomo (2008a)	Success factors for ERP implementation	Success factors of ES implementation	Guam	Public administration	Organization
Crisostomo (2008b)	Success factors for ERP implementation	Success factors of ES implementation	Guam	Public administration	Organization
de Castro Silva and de Oliveira (2015)	Examine the challenges during the ERP planning and selection process	Impact of ES implementation	Brazil	Education	Organization
Equey Balzli and Morard (2012)	Impact of ES on required skills of employees	Impact of ES implementation	Switzerland	Public administration	Individual
Fernandez et al. (2017)	Examine the impact of ERP implementation	Impact of ES implementation	Malaysia	Public administration	Organization
Gulledge and Simon (2005)	Describe the evolution of ERP implementations	Implementation of ES	USA	Defense	Organization
Gulledge and Sommer (2002)	Alignment between ES and Business Process Management (BPM)	ES and organizational change	USA	Defense	Organization
Gulledge and Sommer (2003)	The interaction between BPM and ES	ES and organizational change	USA	Defense	Department
Kumar et al. (2002)	ERP implementations and best practices from organizational perspective	Success factors of ES implementation	Canada	Public administration	Organization
Rautiainen and Scapens (2013)	ERP adoption and organizational change in the context of actor network theory and new institutional sociology	ES and organizational change	Finland	Public administration	Organization
Robey et al. (2006)	Identification of different contract vehicles and how they map to ERP implementation methodologies	ES life cycle implementation	USA	Public administration	Organization
Rosacker and Rosacker (2010)	Information technology project management	Impact of ES implementation	USA	Public administration	Organization
Sedera et al. (2003)	Examine the ERP systems success	Impact of ES implementation	Australia	Public administration	Organization

Paper	Topic of Investigation	Research Stream Category	Country/ Territory	Part of the public sector	Level of Investigation
Siau and Messersmith (2003)	ERP implementations from organizational perspective	Implementation of ES	USA	Education	Organization
Sommer (2011)	Examine the role of middle management in the successful ERP implementation	Success factors of ES implementation	USA	Defense	Organization
Spano et al. (2009)	Examine the impact of implementing ERP system on organizational processes and individuals	Impact of ES implementation	Italy	Public administration	Organization
Spathis and Ananiadis (2005)	Examine the impact of decisions stemming from the ERP system on the accounting information and management process	Impact of ES implementation	Greece	Education	Organization
Stewart and Rosemann (2001)	Design of ERP related curriculum	Teaching ES	Australia	Education	Organization
Wagner and Antonucci (2009)	Describe the first large-scale, public-sector ERP implementation	Implementation of ES	USA	Public administration	Organization
Williams et al. (2013)	Describe the usefulness of the teleological process theory in managing ERP implementation	ES and organizational change	UK	Public administration	Organization
Ziemba and Oblak (2013)	Critical success factors for ERP implementation in public sector	Success factors of ES implementation	Poland	Public administration	Organization
Ziemba and Oblak (2014)	Types of information systems implemented in public administration	Implementation of ES	Poland	Public administration	Organization

Table 2. Papers with Topics of Investigation, Countries of Data Collection, and Part of the Public Sector

As can be seen in Table 2, the reviewed papers are strongly concentrated with identification of success factors of ES implementation, a description of the process of particular ES implementation and examination of the impact of ES implementation on both organization and individuals.

With reference to our methodology and Kelemen's (2014) papers on the categorization of the public sector, we noticed that a large portion of the research (eighteen) were conducted in different public administration institution both on country and local authority level. We also identified six studies conducted in educational and five in the defense entities. There were also two articles describing ES implementation issues in various public organizations.

Despite healthcare represents a substantial portion of the public sector (Kelemen 2014) and are provided mostly by public-owned healthcare institutions according to many countries' regulation, using established criteria of the papers selection we did not find any articles about ES in the healthcare sector. However, some previous research in the healthcare field of ES implementation were conducted, but the authors fail to provide a clear statement about the public sector status (e.g. Boonstra and Govers 2009; Garg and Agarwal 2014; Poba-Nzaou et al. 2014). Overall, our analysis of the papers ended with identification of six research streams that were covered in our sample.

Although the papers in our sample focus on 16 countries, it appears that the research is dominated by cases conducted in the USA. Also, in response to the relatively high popularity of ES in Europe, research in eight papers were disseminated, however there were no studies from France and Germany. It seems that scholars from these countries focused on private sector ES implementation issues rather than public sector (Azan and Bollecker 2011; Heinzelmann 2017; Leyh 2012). Only three papers report research conducted in Australia and Brazil. Some researches refer to success factors of ES implementation, describing the process of implementing ES system and the impact of ES implementation on the public sector organization were undertaken in Middle East countries. With the exception of Poland, in our search, we were not able to find papers about research conducted in public organizations in transition economies (e.g. Russia, Romania and Belarus). In addition, no African countries are present in our sample.

As depicted in Table 2, most of the studies in our sample investigate ES on the organizational level. Only three papers in our sample investigate the individual and only one on departmental level. Studies that investigate ES in the public sector on the country level are not present. Moreover, referring to adopted

research framework developed by Roztocki and Weistroffer (2015) and examining the selected papers for the source of the data, we noticed that many authors used mix of data sources. The most common source of data are surveys (14 papers) and interviews (13 papers), while some authors report on their observations and experiences.

In the next step of our analysis, we searched the papers in our sample for explaining theories as depicted in Table 3.

Paper	Theory	Application of Theory
Alsharari (2017)	Institutional logics	Use to understand and manage ES
Coelho et al. (2016)	The theoretical framework proposed by Pozzebon and Pinsonneault (2012)	Explain and understand how knowledge and power are shared and negotiated during ES implementation
Kumar et al. (2002)	The innovation process theory framework and the Markus and Tanis (2000) model	Used as a basis to delineate the ERP adoption process
Rautiainen and Scapens (2013)	Actor network theory (ANT)/ New institutional sociology (NIS)	Used to understand accounting changes in the organization
Sedera et al. (2003)	The DeLone and McLean (1992) IS success model	Provide the basis for construct identification in ES success implementation
Siau and Messersmith (2003)	Interactionist model of organizational creativity and Innovation Strategy Model	Verify applicability of Innovation Strategy Model in public sector organizations
Spathis and Ananiadis (2005)	Disconfirmation theory	Explain users' satisfaction
Wagner and Antonucci (2009)	Process theory	Explain success factors in ES implementation
Williams et al. (2013)	Teleological process theory	Understand organizational change

Table 3. Theories Used

As it could be seen from Table 3, we found out that only nine out of 31 papers contain theoretical background that are used to explain and justify the achieved results. In addition, a mix of various theories was used and no dominant theory appeared.

Finally, in the last step of our analysis, we searched the papers in our sample for recommendations regarding future research. The results are depicted in Table 4.

Paper	Future Research	Quotations form Source Articles
Al-Harthi and Saudagar (2019)	Examine the identified success drivers in private sector and testing the interrelationship between them in public sector	"The findings of this research could be used in future researches in order to examine them in other industry such as private sector. (…) Second thing that may inspires future researches is testing the interrelationships between the success drivers presented in this research."
Althonayan and Althonayan (2017)	Examine stakeholder's perspective during maturity phase of ES implementation in universities and impact of ES on stakeholders	"Future research would be useful during the maturity phase to include all stakeholders in several Saudi universities. (…) more research can be beneficial to test the applicability of the impact of the ERP system on stakeholders' performance in (…) [public and private organization]"
Alves and Matos (2013)	Expanded geographic scope	"… there is an opportunity for replicating this study across different countries."
Campos Fernandes Leandro et al. (2017)	Monitoring and verification of usefulness of proposed CSF categorization	"… it is suggested the observation and monitoring of critical success factors in loco, demonstrating the need for adjustments to the initial proposal of CSF presented in this work, in ERP systems implementations …"
Chang and Gable (2002)	Benefits of ES implementation in public sector	"… numerous of studies of IS issues have been conducted of public sector but there has been little study of public sector organization."
Coelho et al. (2016)	Examine the impact of political changes on ES implementation. Explain the difference between public and private sectors ES implementation	"Further research could be undertaken in this area. One suggestion to this end may be to continue monitoring this ERP implementation project until it is launched (…) change in political power may also provide an interesting opportunity for studying the project. (…) investigation of the difference between implementing ERP in the private and public sectors."
Crisostomo (2008a)	Develop comparative studies in the scope of uses of different ES, defining the successful ES implementations	"Conduct a study that compares ERP systems that uses the same basis of accounting method (…) in the public sector. Conduct a study that compares different ERP system used within the same industry (…) to determine the successes of implementing an ERP system."
Crisostomo (2008b)	Identify the risk factors and barriers of ES implementation in public sector	"Conduct a study that identifies the risk factors in implementing an ERP system in the public sector. Conduct a study that identifies the barriers of successful implementation in the public sector."
de Castro Silva and de Oliveira (2015)	Develop tools that facilitate the process of adjustment of projects scope to implement ES	"The study continues in order to elaborate tools that facilitate the process of adjustment of scope of projects to implement ERP."

Paper	Future Research	Quotations form Source Articles
Equey Balzli and Morard (2012)	Expand the research on national and departmental level and expand sample group. Continue the research in the scope of changes in a professional groups	"… future research should consider this sample's stratification, and ensure that questionnaires are sent to the most diverse group of employees possible." "… testing the level of accountants' educational backgrounds, and the ideal skill sets necessary to work effectively with the new accounting tools."
Fernandez et al. (2017)	Expand the scope of respondents and apply other qualitative methods. Expand the research in other types of organizations	"… the respondents of this study are dominated by accountants. (…) future research might want to look on other personnel in public sector. (…) Future studies can be conducted on other department of public sector or other types of organizations …"
Gulledge and Simon (2005)	Continuation SAP implementation methodology development	"…it is our hope that the focus on these issues will elevate interest in pursuing some of the unanswered questions as we continue to pursue the unfinished research agenda described in Al-Mashari (2003)."
Kumar et al. (2002)	More research focused on the implementation process and solving the problems that arise	"… research can be recognized that are based on organizational concerns found in this study. (…) Another natural extension of this study could be to explore organizations which have stabilized their ERP systems and have moved to the Onwards and Upwards stage …"
Rautiainen and Scapens (2013)	Expand the research in other types of organizations. Explore the use of multiple theories in accounting research	"Concepts from both ANT and NIS may be useful for researchers studying how changes take place in different parts of an organization. (…) However, further studies are needed to explore the use of multiple theories in accounting research."
Rosacker and Rosacker (2010)	Identify best practices for ES identification	"Future empirical studies surrounding "best business practices" with respect to information technology project management would be valuable …"
Siau and Messersmith (2003)	Effects of ES on innovation	"…further research needs to be conducted on the factors that have proven to predict innovative effectiveness, to determine which factors are ultimately most important in deciding an organization's potential for innovation."
Sommer (2011)	Expand the sample	"Future efforts will endeavor to expand the sample size …"
Spano et al. (2009)	Investigate differences in evaluation of a system between users and non-users	"… we found differences between users and non-users. (…) This is certainly an issue for further investigation to understand which system elements individuals' perceptions are based on."
Spathis and Ananiadis (2005)	Examine the effects of ES implementation on improvements of financial performance (e.g. financial ratios)	"Future research could focus on other dimensions of ERP system benefits (…) Future research may further examine expected as opposed to actual benefits derived from ERP applications (…), as well as the impact of technical, organizational and financial problems …"
Wagner and Antonucci (2009)	Investigate the difference between implementation of ES in the public vs. private sector	"This suggests that there is a further need for additional analysis and study of possible differences between public and private-sector ERP implementations …"
Williams et al. (2013)	Examine the role of various stakeholders	"Future research may extend to a narrative analysis of the designer's interaction with stakeholders to achieve a consensus …"
Ziemba and Obląk (2013)	Identify CSFs	"There is a need to conduct more in-depth research into (…) CSFs for successful BPM and GRP implementation in public administration …"
Ziemba and Obląk (2014)	Examine the possible effects of ES implementation on the public sector organizations	"… (1) improvement of government processes by using government process management and ERP systems, (2) improvement of government management by using BI systems, (3) exploration of "best practices" …"

Table 4. Future Research

As depicted in Table 4, in 23 papers some opportunities for further research were proposed. Many authors of these papers call for future research on critical success factors of ES implementation and developing a catalog of good practices in implementing ES, role of stakeholders and the impact of ES implementation on individuals and comparing the practices of ES implementation in private and public sectors. Moreover, Al-Harthi and Saudagar (2019) point out that it is not enough to conduct research focused only on identification of critical factors of ES implementation. Future research should especially concentrate on identification of the relationships between these factors.

Some researchers propose quite obvious opportunities for future research to expand the geographical scope, examine more organizations or expand sample of currently published studies. Few proposals for future research seem very interesting to investigate as for e.g. Coelho et al. (2016) who suggest that further research can be pushed to study the impact of political changes on ES implementation. In turn, Siau and Messersmith (2003) recommend focusing research on identifying the ES implementation factors that are significant in deciding an organization's potential for innovation. We also observed possibilities to develop research in the scope of ES implementation and post implementation impact on individuals and their perspective of opportunities for knowledge and competence improvement for potential benefits in an

organization. For example, competence improvement is reported to have a positive effect on job satisfaction (Kowal and Roztocki 2015) but this topic has not been investigated in the context of ES and employees in the public sector.

Contribution, Limitation and Conclusion

A methodological review of existing literature is vital to the progress in a particular field to stimulate academic discussion and inspires other scholars in their own research activities (Webster and Watson 2002). Other researchers could build on the ideas and recommendations provided in the review paper and by saving time, they pursue a more focused and aggressive research agenda. Thus, a methodological literature review presented in this paper, doubtfully constitutes a substantial contribution to the field of ES in the public sector.

Concerning our first research question, the most common topics in the literature on ES in the public sector is the identification of success factors related to system implementation and assessing the impact of ES on organizations that implemented it. Concerning our second research question, besides rather trivial recommendations such as expanding the scope of investigation to other organizations or increase the sample size, many authors believe that future research should look for additional critical success factors related to ES implementation in the public sector. In addition, many authors call for future research that should investigate the role of various stakeholders and to compare ES adoption in the public versus the private sector.

Of course, our work is subject to limitations. A major limitation of our research is the relatively small sample of papers. As compared to Esteves and Bohorquez (2007), who reviewed 640 papers on ES, we were able to identify only 31 papers that specifically focus on ES in the public sector. Therefore, some of our conclusions may be incomplete and perhaps biased. However, this limitation in the same way presents an evident research opportunity for the future, as other authors may conduct a more complete investigation as many more papers in this field will be published.

To conclude, we are very positive that results presented in this work will support and motivate other researchers to advance the promising field of ES in the public sector.

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