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Recommended Citation

Schreiber, Bettina; Eckhardt, Andreas; and Laumer, Sven, "Between Cost Efficiency and Limited Innovation – A Scientometric Study of Business Process Standardization" (2010). *AMCIS 2010 Proceedings*. 38.

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Between Cost Efficiency and Limited Innovation – A Scientometric Study of Business Process Standardization

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ABSTRACT

While process standardization is a usual component in companies' daily BPM toolkit research and practice still struggle to determine and realize the particular value and impact of process standardization for process performance especially independently from its drawbacks. As the basic idea of process standardization in research is spread across different fields a complete overview on this topic and its related benefits and drawbacks especially in Information Systems research is still missing. Therefore within this approach we provide a scientometric study including all publications of the JAIS ranking, the LSE ranking of IS top journals, the WKWI list for 2008 and the power publication approach for IS top journals. In total 80 peer-reviewed research articles of different fields such as information systems and management, different outlets, as proceedings and journals were identified and analyzed due to their methodology, relevancy, spreading and content.

Keywords

Process Standardization, Process Performance, Scientometrics, Meta-Analysis

INTRODUCTION

In a more output focused and IT supported corporate environment business process management (BPM) has gained more and more importance as a crucial factor for companies' performance and process efficiency. A major component of a process owner's BPM toolkit is process standardization of processes inside of organizations (Davenport 2005, Wuellenweber, Beimborn, Weitzel and Koenig 2008).

In this context Davenport declared that process standardization has the potential to improve processes concerning "the objectives Cost Reduction, Time Reduction, Output Quality and Quality of Work concerning life, learning and empowerment" (Davenport 2005). For example Ramakumar and Cooper (2004) state, "To achieve operational excellence and flexibility in a global value chain, process standardization is critical." The literature contains several examples of progress that could be achieved through process standardization. "Within a company, standardization can facilitate communications about how the business operates..." (Davenport 2005).

According to Ramakumar and Cooper (2004) process standardization can be narrowed down to the "critical features of such a standardized process which must include common definitions of metrics, a common language that maintains the integrity of business rules, process logic and data, and the flexibility to rapidly change and configure these processes as business challenges evolve" (Ramakumar and Cooper 2004).

At first glance process standardization seems to be the solution for many problems. On closer examination, it turns out there are many obstacles between the vision and the reality of process standardization. "Unfortunately, fragmented quality systems, inconsistent quality processes across the value chain and lack of corporate-wide visibility into quality performance create a challenging barrier to the implementation of standardized processes" (Ramakumar and Cooper 2004).

As one can see there is a lot of knowledge what process standardization might positively and negatively affects however this knowledge is widely spread across different research fields and domains. For this reason the aim of our scientometric analysis is to provide a first overview of all positive and negative arguments around process standardization in literature and to visualize their spreading and frequency across different fields and outlets. Within our approach we solely focus on the

standardization of internal processes inside the organization. External standardization in markets and industries was not observed in this entire approach.

The remainder of this approach is as follows. After the introduction we describe our scientometric research method and explain how the literature research was conducted. In the subsequent section, the results of the scientometric study are presented. The fourth section then critically discusses the benefits and drawbacks of process standardization according to their appearance in research literature. Finally, the last section concludes all findings and pinpoints interesting facts for further research.

METHODOLOGY

Within this section we firstly explain the characteristics of scientometrics and then elucidate in detail how the literature review was undertaken.

The characteristics of scientometrics

The main reason for choosing scientometrics as our research method was its particular adequacy for our literature-focused research approach as it provides the right answers on where and how IS researchers publish their contents. In general scientometrics could be defined as the quantitative study of research (Davis 2001) or the scientific study of the scientific process (Lowry, Romans and Curtis 2004). Concerning the differences between scientometrics and surveys Hunter, Schmidt and Jackson (1982) highlighted the major distinction that a survey is used to collect data about individuals' behavior or opinion while scientometrics focuses on the published article itself including author, outlet, methodology, etc. and not the observed individuals (Hunter et al. 1982). With tools as citation or meta-analysis a scientometric study analyses research articles concerning its authors, paper abstracts, texts and references. Gene V. Glass (1976) one of the pioneers of the meta-analysis refers to literature reviews like scientometrics as "*the analysis of analyses*". He defines them as "*the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings*". It provides a sensible and rigorous alternative to casual and narrative discussions of research studies (Glass 1976). For our case this research method makes sense due to the rapidly expanding and changing research literature on process standardization. Overall scientometrics are considered to become highly important for Information Systems research in near future (Straub 2006). Detailed information about the way we accessed the included journals is described in the following subsection.

The database search process

The overall starting point for our literature search process was a definition of the search terms and positively or negatively related attributes. Here we solely concentrated our search process on the most relevant expressions around process standardization. The respective search terms here for are listed in Table 1. Starting with single expressions as "process standardization" we enhanced our search process by adding more and more search terms in the following steps such as "improvement", "positive effect" or "benefit".

In the second step of our search process we refined and focused our undertaken approach on specific journal and conference rankings, containing both academic and practitioner journals. The following rankings were chosen as they depict the most prominent and last published ones. The search terms discussed above and listed in Table 1 were used for the searching mechanism in all journals and conference proceedings. All of these journals and conferences are either listed in "WKWI list 2008 for Journals, Proceedings und Lecture Notes" (WKWI 2008), in the "Global Journal Prestige and Supporting Disciplines: A Scientometric Study of Information Systems Journals" (Lowry et al. 2004), in the "The ranking of top IS journals: a perspective from the London School of Economics" (Willcocks, Whitley and Avgerou 2008) or in "A Publication Power Approach for Identifying Premier Information Systems Journals" (Holsapple 2008). In addition, the ACM Digital Library was browsed as well with the aforementioned two search terms in Table 1.

All papers found through this search process were individually reviewed by the leading author and then crosschecked by the additional two authors concerning their relevance for the overall topic process standardization and then sorted into different categories. The categories were positively related (Pro), negatively related (Contra) or papers with both positive and negative aspects (Pro&Contra). Papers not relevant for this context were dismissed after individual reviewing. Overall 80 papers were considered relevant in the context of process standardization. A list of all findings is provided within Table 5 in the appendix. The precise analysis of all 80 articles with its related results is presented within the following section.

Search terms	
"process standardization" and/or "standardized process" and/or "process standard"...etc. +	
Positively related	Negatively related
"improvement"	"failure"
"innovation"	"limited innovation"
"qualification"	"disqualification"
"positive effect"	"negative effect"
"advantage"	"disadvantage"
"driver"	"inhibitor"
"benefit"	"drawback"
"solution"	"problem"
"upside"	"downside"
"motivation"	"lower motivation"
"enlargement"	"reduction"
+ etc. (in total more than 50 each positively and negatively related search terms)	

Table 1. Terms of the search process in the literature databases

RESULTS

In this section the results of the scientometric study are presented. It is subdivided into three segments. The first segment provides a list of considerable authors, research objects, a time series, and a methodology distribution of the related articles. The second segment analyses which journals play an important role for research in process standardization, and the third segment examines the papers coupled with their respective categories.

The following results are all based on the findings of those 80 papers extracted after the individual manually reviewing. Table 5 includes all 80 findings with information about author, date of publication and outlet. Interestingly in total the ratio of papers with a positive attitude towards process standardization to papers with a negative attitude is about 11 to 1. In consequence, most of the results are presented in percentage to compensate this asymmetrical distribution. This ratio is probably biased by two general factors: firstly, it seems obvious that it is easier to publish a positive result rather than a negative one and secondly, the researchers with a bad attitude towards process standardization are less likely to search the field for evidence supporting their view than those with a positive attitude.

General findings

In general it is always interesting for researchers to be aware which authors intensively deal with or focus on a specific topic as process standardization in a particular field as Information Systems. These authors involved in the topic of business process standardization are listed in alphabetical order in Table 2 below. Each of the respective authors which were considered in this analysis has published at least two articles in peer-reviewed publications.

Authors		
Cotteleer, M.J.	Markus, M.L.	Ryans, J.K.
Davenport, T.H	Nidamarthi, S.	Twomey Lamb, C.
Griffith, D.A.	Perez-Alvarez, C.	Venkatesh, V.
Karandikar, H	Rhodes, D.H.	Watad, M.

Table 2. Important Authors

Following the identification of relevant process standardization authors the research objects related to process standardization are examined. This is important to analyze how process standardization has been discussed in Information Systems research so far and to observe which general IS topics are related to process standardization. Additionally it is interesting to see if process standardization is addressed as just one aspect related to system implementation, business process outsourcing and process modelling or if it is the main research object described and examined in the articles. To determine what kind of research objects are dominant in the field of process standardization, the findings were clustered into ten different categories according to the major fields of IS research. Each category comprises between three and twelve of the total 80 papers.

The largest category with 37% observes process standardization as main content in the article as for example its definition, configuration or conceptual framing. 15% of all papers discuss the impact of process standardization on actual and potential users. Every tenth paper debates process standardization in terms of business activities and process performance. In 8% of all findings process standardization is investigated according to its relation and importance for outsourcing. Articles including the role of process standardization for process redesign, process modelling and systems implementation are counted for each 6% as well as project management, ERP and knowledge research for each 4% of the overall sample. The distribution of the clusters is depicted in Figure 1.

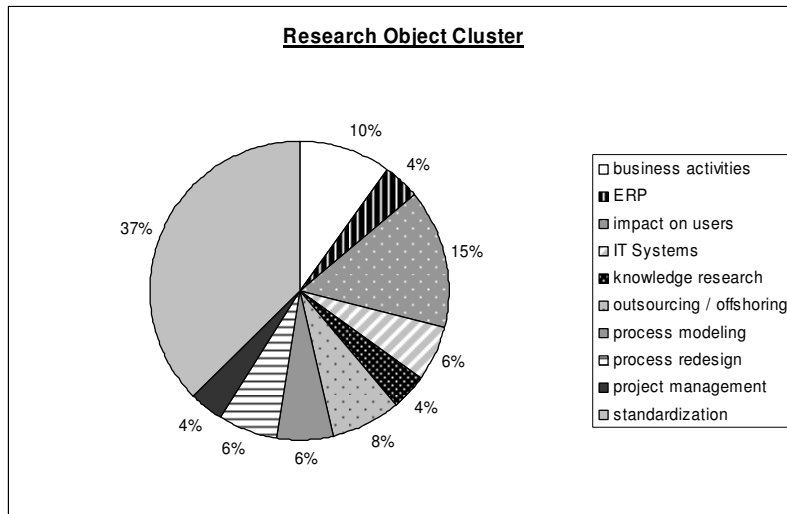


Figure 1. Research object cluster

After the analysis concerning the research object in process standardization related papers we now depict in Figure 2 when exactly these papers were published. As one can see we found the first process standardization related IS article in 1986 so the examined topic of process standardization in Information Systems research spreads over almost the last 25 years. It started in the Eighties with just one article related to business process standardization. Already between 1990 and the year 2000 the number of published IS articles on process standardization increased to nine. However as the frequency time series clearly shows the majority of all process standardization related IS papers were published in the last five years. However, whether there is a trend to increase research in this field, or not, is ambiguous since the number of papers published in 2008 is

obviously smaller than it was in 2005, 2006 and 2007. As this analysis was performed in early 2009 it only takes into consideration papers published the first quarter of 2009. Hence it is not possible to meaningfully interpret the slight downturn in 2008. Figure 2 now shows the whole distribution of all papers found during the scientometric study according to their publication date.

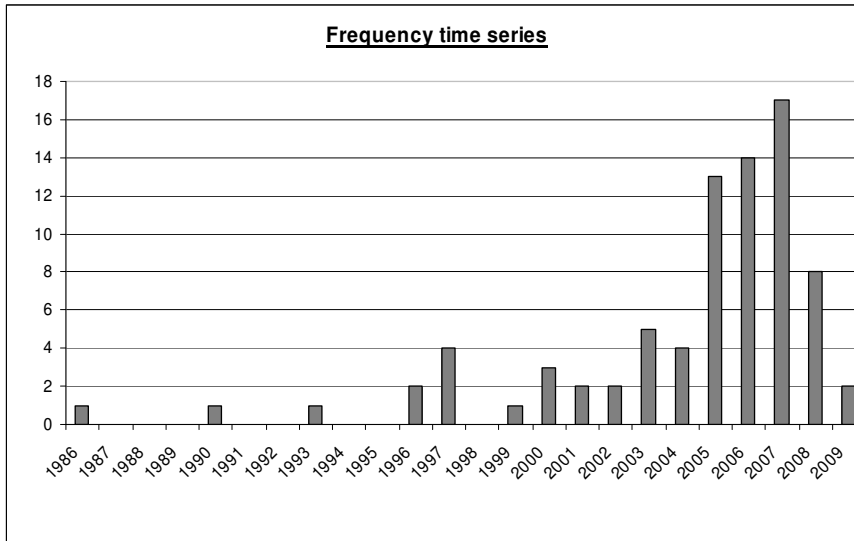


Figure 2. Frequency time series

After the depiction of the quantitative distribution of all process standardization related IS approaches over time in Figure 2 we now observe what kind of methodology these research approaches had. The category “Literature review and discussion” contains all papers with focus on literature research and overview; “Empirical survey” includes all papers where IT users and process owners were questioned with the help of a questionnaire; “Case study” specifies papers which analyse business cases; in “Experimental design” hypotheses were tested under laboratory conditions; and “Essay” includes all papers that are written in a more practitioner oriented style lacking the typical parameters of a scientific publication.

As one can see in Figure 3 four out of ten IS articles related to process standardization are literature reviews and discussions. Precisely 23.75% are empirical surveys with IT users and process owners in companies. Almost 19% of all papers are essays. Case studies were in 15% the chosen research method and laboratory experiments in 2.5% of all papers found within this scientometric study.

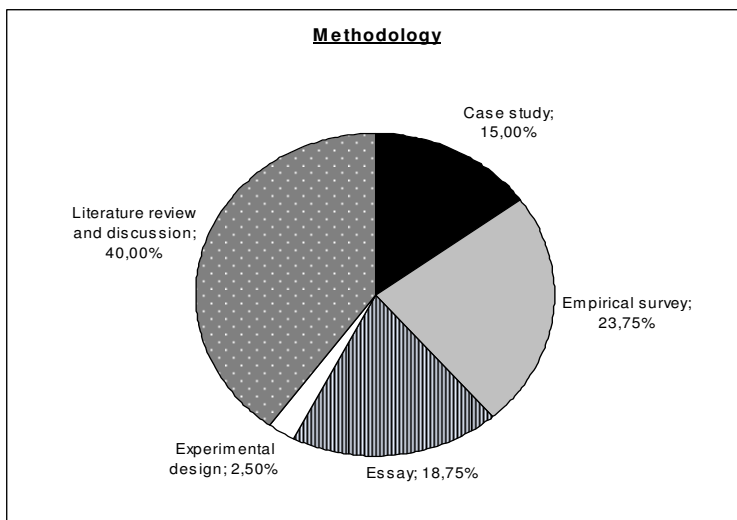


Figure 3. Methodology disposition

Following the classification of all articles found in this study due to their research object cluster, frequency time series and methodology disposition we observe the journal and conference proceedings where the articles were found in the following subsection.

Outlet related findings

In general, it can be said that it is always interesting to know which publications support which kind of articles and which journals are leading in a certain field. Therefore, this section elaborates which journals and conference proceedings are important for process standardization publications and their respective categories.

The following Table 3 provides a list of journals and conference proceedings with two or more Information Systems articles including the term process standardization and shows how the respective papers are distributed in the categories of positively (Pro) or negatively (Contra) evaluated papers. It could be seen that with five publications in ACM conferences this outlet heads the list of major process standardization publications. In total four process standardization related articles were published in MIS Quarterly and each three in the Business Process Management Journal, Harvard Business Review, the Journal of Operations Management and the Sloan Management Review. The complete distribution of all process standardization related papers is provided in the following Table 3.

Publication	Overall	Pro	Contra
Proceedings of the ACM	5	4	1
MISQ	4	4	
Business Process Management Journal	3	3	
Harvard Business Review	3	3	
Journal of Operations Management	3	2	1
Sloan Management Review	3	2	1
California Management Review	2	2	
Information Systems and e-Business Management	2	2	
Information Systems Frontiers	2	2	
Information Systems Research	2	2	
JITSR	2	2	
Journal of Manufacturing Technology Management	2	2	
Standard View	2	2	

Table 3. Major process standardization outlets

The general aim of our paper was to provide an overview on the status of process standardization in research so we do not get around on discussing the benefits and drawbacks of process standardization in literature. As the particular benefits of process standardization are still controversially discussed (Ramakumar and Cooper 2004) we will examine in the next section how research articles approaching process standardization positively (“Pro”) and negatively (“Contra”) are spread over the different publication and methodological categories.

Distribution related to methodology and content

This section contemplates the general content categories “Pro” for a positive discussion of process standardization, “Contra” for a negative discussion and ”Pro&Contra” for papers that contain both positive and negative aspects of process standardization. For the first analysis of this section the articles were clustered in four groups determining the relevance of process standardization for the overall approach (see Figure 4). The first cluster is denominated “main subject”. It groups all approaches that primarily cover process standardization as main topic. The second cluster “important factor” includes all papers in which process standardization plays a significant role for a process, a task or an individual. The third cluster is

called “goal, aim”, the papers in this cluster describe approaches with a standardized process as general intent. Finally the cluster “side note” consists of articles mentioning process standardization without going into depth.

Figure 4 depicts that the distribution of “Pro” has more than 20% articles discussing process standardization as main subject. Each 17% of all articles regard process standardization as an important factor or the set goal. The largest part of this cluster with more than 40% mentions process standardization without going into depth. Articles containing both positive and negative aspects grapple with process standardization predominately as main subject (more than 30%) or important factor (rigorously 50%). Interestingly in the category “Contra” the majority (more than 80%) are side notes while it does not include any papers with process standardization as the main topic.

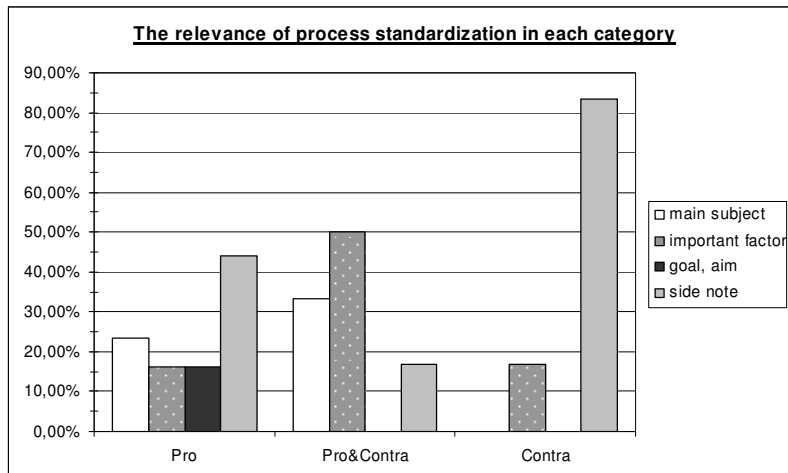


Figure 4. The relevance of process standardization

Regarding the distribution of methodological categories the dominance of literature reviews for “Pro” and “Pro&Contra” rated articles is obvious. Around two thirds of all “Pro&Contra” articles are literature reviews and precisely 40% of all “Pro” articles. Essays make process standardization in less than 20% of all “Pro” and “Contra” articles as subject of discussion. The largest portion of “Contra” articles belongs to empirical surveys with more than 30% but also more than 20% of all “Pro” articles base on empirical data. Case studies are denoted by a balanced ratio between “Pro”, “Contra” and “Pro&Contra” articles. Finally laboratory experiments account as research method in more than 15% of the “Contra” articles and solely 2% of the “Pro” articles. All results are visualized in the following Figure 5.

In the following section we conclude our results and what they implicate for the discussion on benefits and drawbacks of process standardization as well as future Information Systems research.

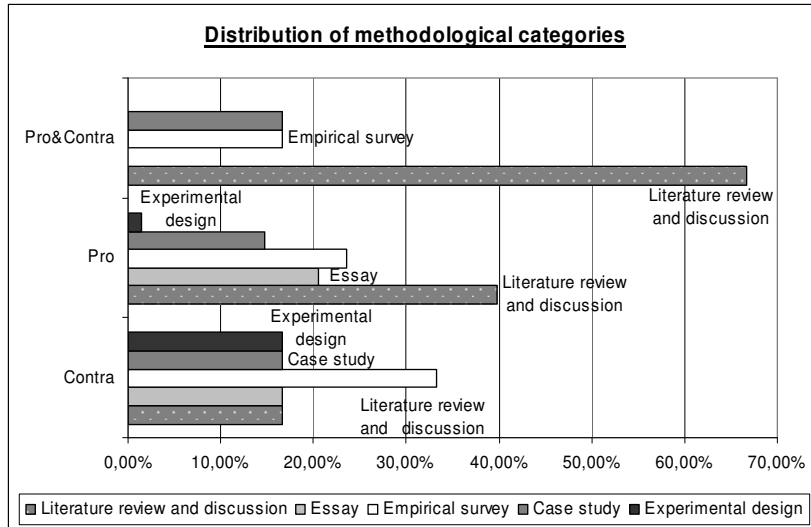


Figure 5. Distribution of methodological categories

DISCUSSION

This section outlines the findings about process standardization, elaborates its benefits and drawbacks and presents selected findings.

Within the scientometric study the following quotes were found regarding the benefits provided by process standardization.

In 1986, Haley already discovered that *“any organization can be managed efficiently, if it can be divided into different functions, each based on standardized work process.”* (Haley 1986). Moreover, *“process standardization provides immense benefits when based on clear market requirements”* (Swaminathan 2001). Another advantage is mentioned by Shi and Voss who emphasize: *“Due to standardized workflows within the system even exception handling is assumed to be more streamlined especially when faced by employees who are new to specific situations”* (Shi and Voss 2008).

A further point to be mentioned in this connection is that manufacturing processes can strongly profit from process standardization. *“Modularization [enabled by process standardization] has brought dynamic cost advantages to manufacturing and financial services. The cost advantages accrue from unbundling resources and pooling capacities”* (Shi 2007). Concerning mass customization Selladurai outlines that *“mass customization is facilitated through the use of process standardization”* (Selladurai 2003).

In the practice of outsourcing process standards could revolutionize how businesses work. They could dramatically increase the level and breadth of outsourcing and reduce the number of processes that organizations decide to perform for themselves. (Davenport 2005). This is concluded by Wuellenweber et al. (2008) *“Process standardization has a significant impact both directly and indirectly on outsourcing success”* (Wuellenweber et al. 2008).

Despite the fact that process standardization has a lot of potential for efficiency improvement, there is still room for improvement in practice. Most professionals explain this phenomenon with problems arising from process standardization on the individual employee level. The following quotes exemplify this: *“The high levels of process standardization do not let employees use their human capital in ways that can improve operational performance”* (Batt, Doelgast, Kwon and Agrawal 2005). *“...little attention is paid to the consequences of such a regime on the everyday working practices of and relations among team members”* (Cefkin, Owensby and Blumberg 2007). *“Process standardization may imply job inflexibility and reduced quality of jobs and work perception.”* (Molema, Groothuis, Baars, Kleinschiphorst, Leers, Hasman and van Merode 2007). *“Complying with standard processes may reduce the time available for sales”* (Cefkin et al. 2007).

Another hindrance of process standardization is the difference in local requirements. *“Process standardization can create problems if the process requirements of different units are dissimilar”* (Volkoff 2005). *“Regional differences in process requirements may have been so great that the expectation of process standardization was unrealistic.”* (Bendoly and Cotteleer 2007).

In order to provide an overview the following Table 4 visualizes all major benefits and drawbacks of business process standardization found in our scientometric study.

Process standardization	
Identified benefits and drawbacks in alphabetical order	
Benefits	control function, cost reduction, determination of outsourcing capabilities, documentation, enhanced innovation, facilitated mass customization, facilitated outsourcing, information sharing, measurability, outsourcing success, simplified decision making, streamlined system, time reduction, transparency
Drawbacks	differing local requirements, employee inflexibility, “everyday regime”, job inflexibility, limiting options for customization, lower autonomy, lower human capital, minimizing creativity, reduced quality, reduced service quality, reduced time for sales

Table 4. Benefits and drawbacks of process standardization

CONCLUSION

IS research on process standardization speeded up over the last five years with an increasing number of IS publications. For these IS publications literature reviews are the preferred methodology for research approaches on process standardization. A majority of the articles discusses process standardization as main part, additionally its impact on users as well as its general business value. Important outlets for process standardization publications are ACM related publications, MISQ and BPMJ. Furthermore this paper showed that there is currently a great distance between the vision, described in academia, and the reality of process standardization, revealed by empirical studies. The distribution of pro and contra IS publications on process standardization is very asymmetric in favour of the pro-side and it is not clear if there is a trend to increase research. The outcomes of some empirical studies suggest that the common picture of the still very early research on process standardization does not always hold true. To conclude, the opinions about process standardization and how to develop standard processes are very diverse and the scientific basis is still too lean to sustain common standards.

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APPENDIX

No.	Year	Authors	Journal	Methodology
1	2007	Bala and Venkatesh	Information Systems Research	Case study
2	2008	Balakrishnan et al.	Journal of Operations Management	Literature review
3	1997	Baldo et al.	StandardView	Essay
4	2005	Batt et al.	Brookings Trade Forum	Empirical survey
5	2007	Bendoly and Cotteleer	Journal of Operations Management	Experimental design
6	2007	Boh and Yellin,	Journal of Management Information Systems	Literature review
7	2006	Bradford and Brown	ACM Proceedings	Empirical survey
8	2007	Cefkin et al.	ACM Proceedings	Empirical survey
9	1999	Chroust	Proceedings of Systems Integration'99	Literature review
10	2006	Cotteleer	Production and Operations Management	Empirical survey
11	1990	Davenport	Sloan Management Review	Literature review
12	2005	Davenport	Harvard Business Review	Essay
13	1996	David and Rothwell	International Journal of Industrial Organization	Literature review
14	2006	Davies et al.	Sloan Management Review	Essay
15	2003	de Vries et al.	MISQ Special Issue	Case study
16	2005	Ergazakis et al.	Intelligent Systems in Accounting, Finance and Management	Literature review
17	1997	Feitzinger, E.; Lee; H.L.	Harvard Business Review	Essay
18	2005	Florent, C.	DRUID Tenth Anniversary Summer Conference	Case study
19	2000	Gersten et al.	ACM Proceedings	Essay
20	2004	Ginsburg	Communications of the Association for Information Systems	Case study
21	2007	Glassey	Decision Support Systems	Literature review
22	2008	Greenberg et al.	Business Process Management Journal	Literature review
23	2003	Griffith et al.	Journal of International Marketing	Empirical survey
24	2000	Griffith et al.	Journal of International Business Studies	Empirical survey

25	2007	Haimowitz and Warren	Standards Council of Canada	Empirical survey
26	1986	Haley	Strategic Management Journal	Literature review
27	2009	Hall and Johnson	Harvard Business Review	Essay
28	2007	Heinrich et al.	Information Systems and e-Business Management	Literature review
29	2004	Holck and Jørgensen,	Australasian Journal of Information Systems	Case study
30	2005	Johansen et al.	Journal of Engeneering and Technology Management	Literature review
31	2007	Karandikar and Nidamarthi	Journal of Manufacturing Technology Management	Literature review
32	2006	Karandikar and Nidamarthi	Journal of Manufacturing Technology Management	Empirical survey
33	2001	Kinga and Sethi	Information & Management	Empirical survey
34	2009	Ko et al.	Business Process Management Journal	Literature review
35	1996	Kondo	Training for Quality	Literature review
36	1993	Krum and Rau.	Journal of International Marketing	Empirical survey
37	2008	Lam and Black	Journal of Business & Economics Research	Empirical survey
38	2002	Lee et al.	Computers & Security	Empirical survey
39	2003	Markus and Christiaanse	Information Systems and e-Business Management	Literature review
40	2006	Markus et al.	MIS Quarterly	Literature review
41	2005	Milosevic and Patanakul	International Journal of Project Management	Literature review
42	2007	Mithas and Whitaker	Information Systems Research	Literature review
43	2007	Molema et al.	Health Care Management Science	Case study
44	2006	Mutschler and Reichert	Technical Report, University of Twente	Empirical survey
45	2008	Øgland, P.	Proceedings of the 31st ISRS	Case study
46	2004	Perez-Alvarez and Watad	Academy of Inf. and Management Science Journal	Experimental design
47	2007	Perez-Alvarez and Watad	Proceedings of the Academy of Entrepreneurship	Literature review
48	2006	Phelps	Control Engineering	Essay
49	1997	Phillips	Communications of the ACM	Essay
50	2004	Ramakumar and Cooper	Quality	Essay
51	2006	Recker	BP Trends	Essay
52	2006	Regan	ACM Queue	Essay
53	2005	Ross	Enterprise Systems	Essay
54	2000	Ross and Vitale	Information Systems Frontiers	Empirical survey
55	2005	Roy et al.	Construction Management and Economics	Literature review
56	2006	Sako	Oxford Review of Economic Policy	Literature review
57	2007	Scheruhn et al.	arXiv eprint by SAO/NASA ADS	Empirical survey
58	2003	Selladurai	Omega	Empirical survey
59	2002	Seppanen and Kumar	Proceedings of the 2002 Winter Simulation Conf.	Case study
60	2008	Shi and Voss	Journal of Telecommunications and IT	Literature review
61	2007	Shi	California Management Review	Literature review
62	2006	Slaughter et al.	MIS Quarterly	Case study
63	2008	Stratman	Journal of Operations Management	Literature review
64	1997	Succi et al.	StandardView	Essay

65	2001	Swaminathan	California Management Review	Essay
66	2005	Timbrell et al.	Journal of Universal Computer Science	Literature review
67	2006	Tochtermann et al.	Proceedings of the OCG eGovernment Conference	Literature review
68	2007	Twomey Lamb and Rhodes	Proceedings Conference on Systems Engineering Research	Case study
69	2007	Twomey Lamb and Rhodes	INCOSE International Symposium	Literature review
70	2006	Ungan	Business Process Management Journal	Literature review
71	2007	Venkatesh	Decision Sciences	Literature review
72	2005	Volkoff et al.	European Journal of Information Systems	Literature review
73	2005	Vuksic and Spremic	Journal of Computing and Information Technology	Case study
74	2005	Weill and Ross	Sloan Management Review	Essay
75	2003	Whanga et al.	Pacific Asia Conference on Information Systems	Case study
76	2008	Woolley and Hobbs	Australasian Conference on Information Systems	Empirical survey
77	2008	Wuollenweber et al.	Information Systems Frontiers	Empirical survey
78	2007	Zammuto et al.	Organization Science	Literature review
79	2005	Zhao et al.	Electronic Markets	Literature review
80	2006	Zhu et al.	MIS Quarterly	Empirical survey

Table 5. List of all findings during the scientometric study