

Association for Information Systems AIS Electronic Library (AISeL)

PACIS 2014 Proceedings

Pacific Asia Conference on Information Systems
(PACIS)

2014

ENVIRONMENTALLY SUSTAINABLE BUSINESS PROCESS MANAGEMENT – DEVELOPING A GREEN BPM READINESS MODEL

Nicky Opitz

University of Göttingen, nopitz@uni-goettingen.de

Henning Krüp

University of Göttingen, nopitz@uni-goettingen.de

Lutz Maria Kolbe

University of Göttingen, nopitz@uni-goettingen.de

Follow this and additional works at: <http://aisel.aisnet.org/pacis2014>

Recommended Citation

Opitz, Nicky; Krüp, Henning; and Kolbe, Lutz Maria, "ENVIRONMENTALLY SUSTAINABLE BUSINESS PROCESS MANAGEMENT – DEVELOPING A GREEN BPM READINESS MODEL" (2014). *PACIS 2014 Proceedings*. 12.
<http://aisel.aisnet.org/pacis2014/12>

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 2014 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

ENVIRONMENTALLY SUSTAINABLE BUSINESS PROCESS MANAGEMENT – DEVELOPING A GREEN BPM READINESS MODEL

Nicky Opitz, Chair of Information Management, University of Göttingen, Germany,
nopitz@uni-goettingen.de

Henning Krüp, Chair of Information Management, University of Göttingen, Germany,
nopitz@uni-goettingen.de

Lutz Maria Kolbe, Chair of Information Management, University of Göttingen, Germany,
nopitz@uni-goettingen.de

Abstract

During the last half decade, various theories, concepts, and models have been established to make organizations more environmentally sustainable. The IS community had their share with the Green IS/IT domain. As it turned out most of these concepts took a very functional approach, not making a good fit for business process oriented organizations. To fill this gap the research stream of Green Business Process Management (GBPM) arose. In this paper we develop and discuss various capabilities that organizations should have in order to actually take advantage of GBPM. We call these capabilities GBPM readiness.

Keywords: BPM, Green BPM, Green IS, Resource Based View, Capability, Maturity Model.

1 INTRODUCTION

In recent years, reducing negative influences on the environment has become more popular within the IS community. The terms and theories of Green IT and Green IS are well known in the research field, and broad research has been undertaken to move towards the sustainable use of information technology.

Organizations produce huge volumes of waste while exploiting vast quantities of resources in order to create their output products and services. To reduce a company's impact on the environment, a lot of research in the field of business process management (BPM) is being done. To address sustainability, defined by the Brundtland Commission as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (1987), the BPM research community added the area of green business process management (GBPM) to one of their main focuses. Green BPM argues that sustainability is a major element in the field of business process management (Opitz et al. 2014).

The potential of GBPM has been revealed in the recent scientific literature. Currently there is no model or method to measure an organization's ability to implement GBPM. Therefore, we set up the following research question:

Which abilities does an organization need to set up a sustainable/green business process management, and how can its capability to do so be measured?

To answer these questions, we began with a structured literature review to examine which possibilities the literature already provides for measuring the impact on the environment. Afterwards, we developed a model to evaluate GPBM readiness based on the literature that was found. In a further step, we will evaluate our findings with a quantitative survey.

This article is structured as follows. In the second section we define the basic terms for this paper: business process management, GBPM, and readiness as a capability. In section three we describe our literature review process. The development of the Green BPM readiness model is described in Chapter four. We close this article with a discussion of our results.

2 RELATED RESEARCH

2.1 Business Process Management

Business process management has a long history, beginning with the two antecedents, Shewhart (1986) and Deming (1953). Their aim was to reduce variation in performance by measuring the outcome and analyzing the root causes of low performance. Instead of blaming people for underperformance, they started to blame the process.

Following this idea, Hammer and Champy (1996) consider only end-to-end work that provides an outcome to the organization. They gained better results by examining these bigger processes instead of analyzing every single process. The current holistic view of BPM combines different perspectives and artifacts such as IT resources to optimize the performance of a process (Hammer 2010).

The BPM research community and the IS community have focused on additional value gained by IT for business in recent years. (Brynjolfsson 1993, Lucas 1999, Renkema and Berghou 1997, Remenyi et al. 2007). While IT has been identified as a possibility for supporting business processes, it is hard to value the influence of IT on processes (Wigand et al. 1997). Another role of IT is the enabling of

specific businesses as a technology. As research expands in the field of sustainability, Green IT and Green IS help with developing a more green process design (Seidel et al. 2011).

For the evaluation of the management of processes, there are a lot of measurement models and notations. The maturity model of Rosemann and de Bruin (2005) allows an organization to evaluate their business process performance. The model uses six criteria: culture, methods, technology, people, strategic alignment, and governance. However, to reach the aim of Green business process management, the topics of Green IS and Green IT should be added to this list.

For this paper we follow the definition of Opitz et al. (2014): “From an IS researcher’s perspective, Green BPM is the sum of all IS-supported management activities that help to monitor and reduce the environmental impact of business processes in their design, improvement, implementation or operation stages, as well as lead to cultural change within the process life cycle.” This is the basis definition of Green Business Process Management that will be used.

2.2 Green BPM Readiness as a Capability

“Readiness” as a construct was first used by the US-based National Aeronautics and Space Administration (NASA) in 1988 in defining “technology readiness” (Parasuraman 2000). This idea was adopted by other organizations such as the World Economic Forum, which used it to create their Networked Readiness Index (NRI). The index describes the capability of using information technology in a certain country. Within research, readiness originates from various streams, including organizational change, information systems, business process management, business process reengineering, and innovation (Molla 2011; Clark & Cavanaugh 1997; Grover et al. 1995; Guha et al. 1997; Raymond et al. 1998; Todd 1999). It has gained certain popularity within the e-commerce, e-government, and Green IT contexts through several empirical studies (Tanet et al. 2007; Molla and Licker 2005; Molla et al. 2009).

In this paper we follow the readiness concept of Molla et al. (2009), who use it in their Green IT readiness model. They identify readiness as an indicator of an organization’s capability to deploy, monitor, modify, and enhance processes in a flexible way.

3 METHODOLOGY

3.1 Study Design and Scope

The main goal of this paper is to establish a readiness model for Green business process management. Therefore, we started with a structured literature review following Webster & Watson (2002) and Levy & Ellis (2006).

According to Webster & Watson (2002), a literature review is defined by the time period covered, research subject, and publication outlets searched as boundaries. For this paper, the research subject is Green business process management, which was one of our major search keywords.

The time period is set by the age of our research topic. Because this is still a young sector in the research community, we started in 2009, the year of the first known publication in the sector of GBPM (Ghose et al.).

For a structured literature review, according to Webster & Watson (2002), only high-quality journals and proceedings of major conferences should be used. We argue that for a research field with a short time legacy, such as GBPM, it is important to review all available literature. There are only a few

articles in the high-ranked journals and the major conferences, so this literature review discusses all literature found. In the next section, we present which outlets have been used.

3.2 Search Strategy

Since GBPM is an IS topic as well as a management topic, we decided to review articles based on the VHB rankings on “Business Information Systems and Information Management” with 78 entries and “International Management” with 26 (VHB 2008). The AIS journal ranking is similar in the listing of the top journals, but the VHB ranking also extends the list by major conferences, which is important for our research field.

We found a few articles based on our keywords ‘Green’, ‘Sustainable’, ‘Sustainability’, ‘BPM’, ‘Business Process Management’, ‘BPR’, and ‘Business Process Reengineering’. We also used combinations of these keywords.

After the first searching round, we eliminated the limitation for high-ranked journals and conferences and started to search in databases such as EBSCOhost and Google Scholar, finding a few more articles. We chose articles with a suitable abstract and title and then performed backward and forward searches with two iterations based on the author and references as suggested by Levy & Ellis (2006). We completed this search when there seemed to be no more new literature, and therefore we believe the major articles and conference proceedings were found.

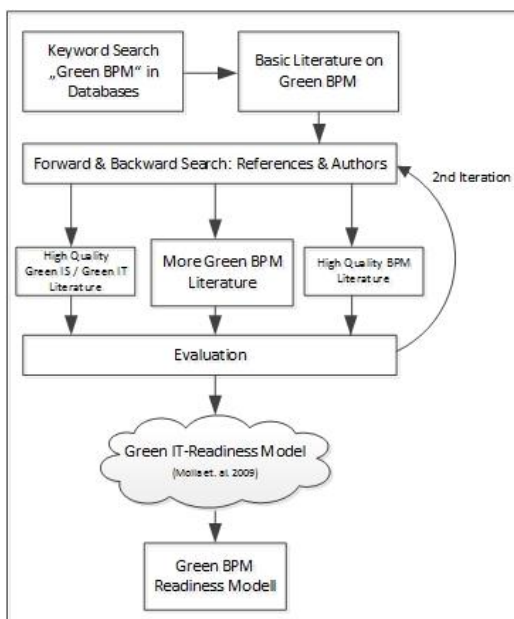


Figure 1. Conceptual research framework

4 FINDINGS

4.1 Sample Profile

Our first search round in various databases, with the previously mentioned keywords, returned 127 articles with a matching title. After reviewing the abstracts, 18 articles in the domain of Green business process management remained. These articles are the foundation for the reference and author forward and backward searches. We conducted two rounds with a total of 26 articles. After beginning the third round, we were not able to find any further articles, which is when Webster & Watson advise that the search end: “You can gauge that your review is nearing completion when you are not finding new concepts in your article set” (2002).

From the total number of found articles only 11 proved to be relevant for GBPM readiness. We conducted a deeper content analysis, looking for core elements for setting up a readiness model. We found that Molla et al. (2009) and their readiness model could be a suitable starting point for our GBPM readiness model.

4.2 Finding a Readiness Model

To answer our research question based on the literature review, we classified the most suitable papers based on the topics ‘attitude’, ‘strategy’, ‘governance’, ‘modeling’, ‘optimizing’, ‘monitoring’, and the green factor.

Green attitude

The green attitude describes the attitude of the company and/or their employees towards ecological sustainability. This is the basic factor for implementing long-term GBPM. Therefore, an awareness of the negative ecological impacts of the business processes must be given, and the optimization towards sustainability of these processes must reduce their negative impact (Molla et al. 2011; Wabwoba et al. 2013). Within the Green BPM readiness model, green attitude measures to which extent the company and its employees are interested in the adoption of or are engaged in GBPM procedures. (Molla et al. 2011; Wabwoba et al. 2013; Seidel et al. 2012; Pernici et al. 2011).

Green strategy

One of the management tasks of GBPM is the elaboration of a green strategy, which must be connected to the business strategy of the company to set up an agenda for the GBPM lifecycle. This is important for reaching middle- and long-term goals, e.g., reducing greenhouse gas levels (Molla et al. 2011; Wabwoba et al. 2013; Rosemann 2007, 649).

Green strategy is the interface between the processes, strategic planning, and controlling. It can be seen as a framework for sustainable acting (Rosemann 2007; Wabwoba et al. 2013; Pernici 2011). The strategy embeds the attitude by using operational actions within the company. In this way, ecological guidelines are defined and the employees are instructed based on the strategy (Meyer and Teuteberg 2012; Wabwoba et al. 2013). Green strategy also determines which technological devices will be used (e.g., Smartmeter) to flank the other green activities. Furthermore, the strategy is involved externally in the “Green service level,” which includes external partners, e.g., vendors or customers, in the green strategy (Rosemann and de Bruin 2004; Nowak et al. 2011b). This is important for acquiring a holistic strategy for the whole lifecycle.

Green governance

As with green strategy, green governance is also part of the management tasks. It represents a model that organizes and manages the actions defined in the strategy (Molla et al. 2011; Wabwoba et al. 2013). Moreover, it defines the management structures, i.e., roles, decision-making authority, responsibilities, and type of controlling of the green actions (Schmidt and Kolbe 2011).

The governance is responsible for the organization of the collaboration of the different external and internal persons that are part of the process, e.g., whether the Chief Information Officer (CIO) is responsible for the implementation of the green strategy or a special Chief Ecological Officer will be implemented within the organizational structure (Molla et al. 2011; Nowak et al. 2011c). The Chief Ecological Officer in this case is a cross-discipline position that is in close contact with the process designers and the system architects (Nowak et al. 2011c). The clearly defined responsibilities are an indicator for GBPM readiness in this domain (Bearingpoint 2012).

In addition, the allocation of budgets and other important resources for GBPM, e.g., technical devices, is part of the governance. Furthermore, green governance is responsible for the definition of the goals and measurement of progress towards them. It makes sure that the planning, implementation, and optimization of business processes are following the sustainability aim (Schmidt and Kolbe 2011). Green business process management readiness in the area of governance measures the level of structuring of the area of authority as well as the performance of the GBPM (Stratos 2007).

Green modeling

Beside the managing tasks of the GBPM, there are some operative parts that influence readiness. The design of the processes is an important part of both BPM and GBPM (Ghose et al. 2009; Meyer and Teuteberg 2012).

The modeling is the visualization of the different workflows, resources used, connections, and responsibilities. Green modeling considers the environmental impact in the process modeling. It sets values and key factors for each unit in the company, so that every unit is able to analyze their business processes based on these ecological values and potentially optimize them to reach their green goals (Houy et al. 2011b; Seidel et al. 2011). On this modeling basis, they are able to reduce, e.g., the greenhouse gas emissions caused by high-energy hardware (Meyer and Teuteberg 2012).

The readiness of green modeling measures the complexity and degree of detail to which the company implements it. This measure explores whether business processes, sub-processes, activities, resources, and ecological key values are modeled. Consumption of resources, waste production, or emission values can be allocated to each process. Various modeling languages can be used to visualize the green factors in the processes, such as Business Process Model and Notation (BPMN) and Event Driven Process Chain (EPC) (Meyer and Teuteberg 2012; Ghose et al. 2010; Seidel et al. 2011; Opitz et al. 2012); based on this visualization, the total carbon footprint can be calculated and simulations for improvements can be created (Opitz et al. 2012).

Green monitoring

Following Nguyen and Slater (2010), "If you can't measure it, you can't manage it," there must be a possibility of monitoring the environmental impact of processes (Meyer and Teuteberg 2012; Nowak 2011b).

Green monitoring measures ecological key performance indicators (KPIs) for each activity of the business process and values these KPIs to determine their environmental impacts (Seidel et al. 2011, Recker 2011). These key ecological indicators (KEIs) are part of the modeling and optimization of the business process, e.g., power usage and water consumption (Meyer and Teuteberg 2012; Nowak 2011b; Opitz et al. 2012). According to Nowak (2011) there are two types of KEIs: dynamic KEIs depend on actual usage, such as the energy consumption of a printer, while static KEIs are

independent of usage, such as a server, which will have a constant consumption. To measure dynamic KEIs, there must be a sensor network to automatically assign the dynamic usage to the right process (Nowak et al. 2011b; Seidel et al. 2011; Watson et al. 2010). Automatic monitoring systems enable a company to set up a warning system that informs the responsible process manager if ecological maximum values are reached (Houy et al. 2010; Watson et al. 2012).

Green monitoring readiness measures the level of KEIs captured in the company i.e., which internal and external partners, processes, and resources are part of the KEIs, and how these factors are considered in the optimization of the processes.

Green optimization

After visualizing business processes and analyzing/evaluating them via KEIs, optimization of the processes concerning the environmental impacts must occur (Seidel et al. 2011; Houy et al. 2011b).

Green optimization is a holistic view of the process. It is not important to change each sub-process for optimization; the optimization of a single part of a process can lead to a better value. One possibility for optimizing the carbon footprint is to replace an entire process, e.g., initializing video-conference tools instead of flying to each meeting. Another method, as mentioned above, is to focus on sub-processes; changing to a more sustainable and green distributor, for example, will change the KEI's value for the whole process (Ghose et al. 2010).

Green optimization readiness values the action on business process improvements and its implementation. The following table shows the classification of our final 11 papers.

Literature	Attitude	Strategy	Governance	Modeling	Optimizing	Monitoring
Ghose et al. (2009)		X		X		X
Houy et al. (2011b)		X		X	X	X
Meyer and Teuteberg (2012)	X	X	X	X	X	
Molla et al. (2011)	X	X	X			
Nowak et al. (2011b)		X		X	X	X
Nowak et al. (2011c)			X	X	X	X
Pernici et al. (2011)	X	X	X	X		
Rosemann and de Bruin (2005)	X	X	X			
Rosemann and de Bruin (2007)	X	X	X			
Seidel et al. (2011)				X	X	X
Wabwoba et al. (2013)	X	X	X			

Table 1. GBPM criteria from publication outlets

Actual BPM is characterized by high complexity as well as a diverse selection of options. Traditional BPM measures values such as time, quality, and cost—the KPIs for analysis and optimization. As sustainability has been gaining more attention in companies, there is a growing request for models to

analyze and optimize KEIs. Therefore, Seidel et al. (2010) extend the “devil’s quadrangle” with the factor “sustainability.”

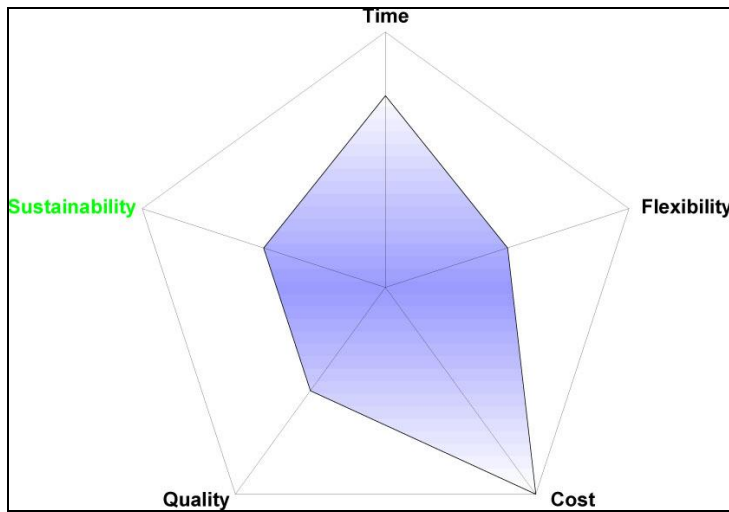


Figure 2. Green business process management: extended devil’s quadrangle

Based on the literature review and the work of Molla et al. (2009), we adapted the Green IT readiness model and added the important GBPM factors described above. **Fehler! Verweisquelle konnte nicht gefunden werden.** presents the factors influencing the GBPM of a company.

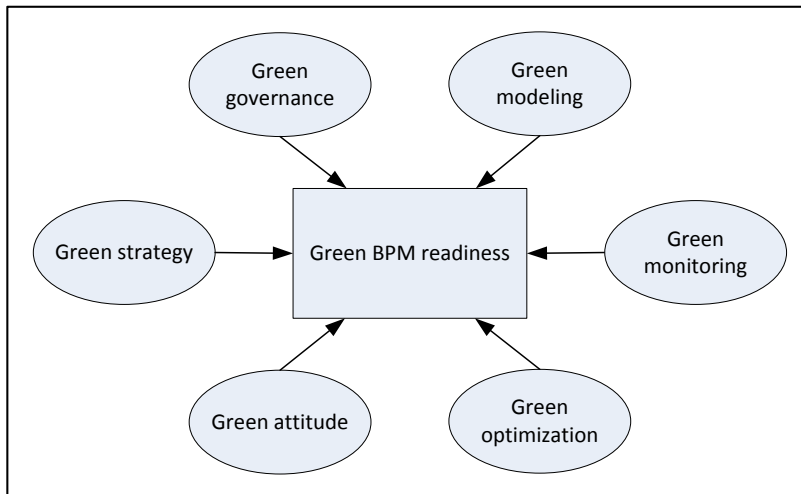


Figure 3. Green business process management readiness model

5 DISCUSSION

The reconciliation of economic and ecological factors is a great challenge for companies in the twenty-first century. Sustainability is gaining importance in consumers’ final purchasing decisions.

For companies, it is not easy to evaluate whether their processes are green because of the increasing complexity described above.

During the past four years, the number of publications in the area of Green business process management has grown continuously, gaining more and more focus in the research community. Initial thoughts, basic concepts, and a precise definition have been recently developed. We want to contribute to the research community by adding a measurement model for a company's readiness for GBPM. Therefore, we conducted a structured literature review to find basic concepts and classes of interests for our readiness model.

Our research question "Which abilities does an organization need to set up a sustainable/green business process management and how can its capability to do so be measured?" could be answered as follows: The most important factor is a green attitude. It defines the initial step towards sustainable processes and enables the next steps in the company's green lifecycle.

Following Rosemann and vom Brocke's lifecycle of business processes (2010), we implemented our classes 'green strategy', 'green governance', 'green modeling', 'green monitoring', and 'green optimization', which extend the basic processes with the 'green' factor. The implementation of sustainability in each process defines the G-readiness of the process and thus the G-readiness of the whole organization.

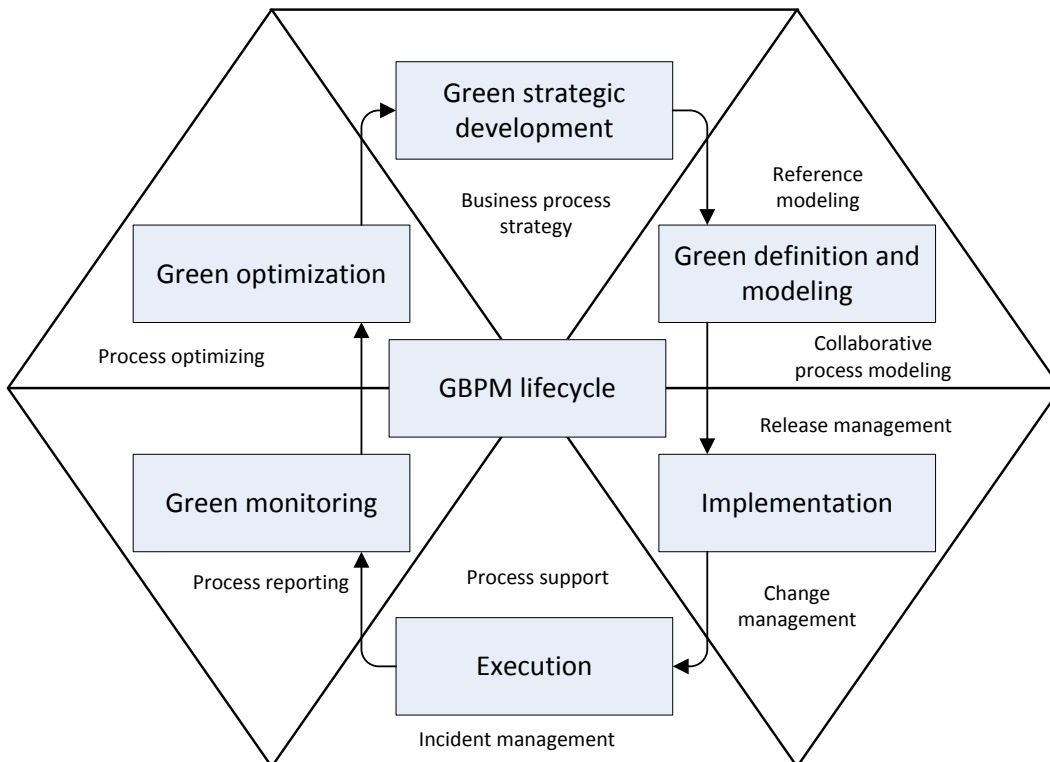


Figure 4. GBPM lifecycle

There are some limitations in our findings. We found a handful articles that we were not able to access because there were no full-text versions available in our databases. Based on the abstracts, we defined them as not crucial for this work. In addition, we lean our argumentations on a literature review, which should be seen as an initial work. In a further step, we will perform a factor analysis to evaluate the model quantitatively.

REFERENCES

- Bearingpoint (2012): Business Process Management Survey 2012, 23.08.2012, <http://www.bearingpoint.com/de-de/7-6008/?&p=353>, 49, 11.08.2013, 22
- Becker, J., Kahn, D. (2008): Der Prozess im Fokus, in: Becker, J., Kugeler, M., Rosemann, M. (Hrsg.): Prozessmanagement. Ein Leitfaden zur prozessorientierten Organisationsgestaltung, 7. Aufl., Springer Gabler, Berlin-Heidelberg, 3-17
- Brundtlandt (1987): Our common future, Oxford University Press, Oxford-New York 1987
- Brynjolfsson, E. (1993): The productivity paradox of information technology. in: Communications of the ACM 36 (12), 67-77.
- Clark, C.E., and Cavanaugh, N.C. (1997): Building change-readiness capabilities in the IS organization: Insights from the Bell Atlantic experience, MIS Quarterly (21:4), 425-456.
- Ghose, A., Hoesch-Klohe, K. L., Hinsche, L., Le, L-S. (2009): Green Business Process Management: a Research Agenda. Australasian Journal of Information Systems, 16(9), 103-117
- Ghose, A., Hoesch-Klohe, K., Le, L-S. (2010): Towards Green Business Process Management, in: Proceedings of the 7th International Conference on Services Computing (SCC), IEEE, Piscataway, New Jersey, USA, 386-393
- Grover, V., Jeong, S.R., Kettinger, W.J., Teng, J.T.C. (1995): The Implementation of Business Process Reengineering. Journal of Management Information Systems (12:1), 109-144.
- Guha, S., Varun, G., Kettinger, W.J., Teng, J.T.C. (1997): Business Process Change and Organizational Performance: Exploring an Antecedent Model, Journal of Management Information Systems (14:1), 119-154.
- Hammer, M. (2010): What is Business Process Management? in: vom Brocke J. and Rosemann (eds.) Handbook on Business Process Management 1: Introduction, Methods and Information Systems, Springer, Berlin, Germany, 3-16.
- Hammer, M., Champy, J. (1996): Business Reengineering – Die Radikalkur für das Unternehmen. 7th edition, Campus. Frankfurt a. M., Germany.
- Houy, C., Fettke, P., Loos, P. (2010): Empirical research in business process management – analysis of an emerging field of research, in: Business Process Management Journal, 16 (2010) 4, 619-661
- Houy, C., Reiter, M., Fettke, P., Loos, P. (2010): Towards Green BPM – Sustainability and Resource Efficiency through Business Process Management, in: Muehlen, M., Su, J. (Hrsg.): 8th International Conference on Business Process Management – BPM Workshops, Hoboken, New Jersey, 2011b, 501-510
- Levy, Y., Ellis, T.J. (2006): A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research, Informing Science Journal, 9, 181-212.
- Lucas, H. C. (1999) Information technology and the productivity paradox. Oxford Univ. Press, New York et al.
- Meyer, J., Teuteberg, F. (2012): Nachhaltiges Geschäftsprozessmanagement – Status Quo und Forschungsagenda, in: Mattfeld, D., Robra-Bissantz, S. (Hrsg): Tagungsband der Multikonferenz der Wirtschaftsinformatik (MKWI), Braunschweig, 1515-1530
- Molla, A., Cooper, V., Pittayachawan, S. (2011): The Green IT Readiness (G-Readiness) of Organizations: An Exploratory Analysis of a Construct and Instrument, in: Communications of the Association for Information Systems, 29 (2011) 4, 67-96
- Nguyen, D. K., Slater, S. F. (2010): Hitting the sustainability sweet spot: Having it all, in: Journal of Business Strategy, 31 (2010) 3, 5–11
- Nowak, A., Leymann, F., Schleicher, D., Schumm, D., Wetzstein, B. (2011): An Architecture and Methodology for a Four-Phased Approach to Green Business Process Reengineering, in: Katzmüller, D., Toja, M. (Hrsg.): Proceedings of the 1st International Conference on Information and Communication on Technology for the Fight against Global Warming (ICT-GLOW), 150-164

- Nowak, A., Leymann, F., Schumm, D (2011): The differences and commonalities between green and conventional business process management, in: Proceedings of the International Conference on Cloud and Green Computing (CGC), IEEE, Sydney, 569-576
- Opitz, N., Ereik, K., Langkau, T., Kolbe, L., Zarnekow, R. (2012): Kick-starting Green Business process Management – Suitable Modelling Languages and Key Processes for Green performance Management, in: Proceedings of the 18th Americas Conference on Information Systems (AMCIS), Seattle, Washington, 9
- Opitz, N., Krüp, H., Kolbe L. M. (2014): Green Business Process Management – A Definition and Research Framework, Hawaii International Conference on System Sciences
- Pernici, B., Aiello, M., vom Brocke, J., Donnellan, B., Gelenbe, E., Kretsis, M. (2011): What IS Can Do for Environmental Sustainability: A Report from CAiSE'11 Panel on Green and Sustainable IS, in: The 23rd International Conference on Advanced Information Systems Engineering (CAiSE'11), London
- Raymond, L., Bergeron, F., and Rivard, S. (1998): Determinants of Business Process Reengineering Success in Small and Large Enterprises: An Empirical Study in the Canadian Context, *Journal of Small Business Management* (36:1), 72-86.
- Recker, J. (2011): Green, Greener, BPM?, *BPTrends*, 5 (2011) 7, 1-8
- Renkema, T. J. W., Berghou, E. W. (1997): Methodologies for information systems investment evaluation at the proposal stage: a comparative review, *Information and Software Technology*, 39 (1), 1-13.
- Remenyi, D., Money, A. H., Bannister, F. (2007): *The Effective Measurement and Management of IT Costs and Benefits*. 3rd Edition, Elsevier, Amsterdam.
- Rosemann, M., de Bruin, T. (2005): Towards A Business Process Management Maturity Model, *European Conference on Information Systems*
- Rosemann, M., de Bruin, T. (2007): Using the Delphi Technique to Identify BPM Capability Areas, in: Proceedings of the 18th Australasian Conference on Information Systems (ACIS), Toowoomba, 42
- Rosemann, M., de Bruin, T., Hueffner, T. (2004): A Model for Business Process Management Maturity, in: Proceedings of the Australasian Conference on Information Systems (ACIS), Hobart, 6
- Rosemann, M., vom Brocke, J. (2010): The Six Core Elements of Business Process Management, *Handbook on Business Process Management 1. Introduction, Methods, and Information Systems*, Springer, Heidelberg et al., 107-126
- Schmidt, N. H., Kolbe L. M. (2011): Towards a contingency model for green IT Governance, in: Proceedings of the 19th European Conference on Information Systems (ECIS), Helsinki, 105
- Seidel, S., Recker, J., vom Brocke, J. (2012): Green Business Process Management, in: Seidel, S., Recker, J., vom Brocke, J. (Hrsg.): *Green Business Process Management. Towards the Sustainable Enterprise*, Springer, Heidelberg et al., 3-15
- Seidel S., vom Brocke J., and Recker J. (2011): Call for action: Investigating the Role of Business Process Management in Green IS, in Proceedings of SIGGreen
- Stratos (2007): *Sustainability Integration into Business Processes. A Study of Leading Canadian and International Companies*
- Todd, A. (1999): Managing Radical Change, *Long Range Planning* (32:2), 237-244.
- VHB. (2008): VHB-Jourqual 2, retrieved from <http://vhbonline.org/service/jourqual/jq2/>.
- Wabwoba, M. F., Wanyembi, G. W., Omuterema, S., Omieno, M. K. K. (2013): Green ICT Readiness Model for Developing Economies: Case of Kenya, in: *International Journal of Advanced Computer Science and Applications*, 4 (2013) 1, 51-65
- Watson, R. T., Howells, J., Boudreau, M.-C. (2012): Energy Informatics: Initial Thoughts on Data and Process Management, in: vom Brocke, J., Seidel, S., Recker, J. (Hrsg.): *Green Business Process Management: Towards the Sustainable Enterprise*, Springer, Berlin-Heidelberg, 147-159

- Webster, J., Watson, R.T. (2002): Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, 26(2), 13-23.
- Wigand, R. T., Picot, A., Reichwald, R. (1997): *Information, Organisation and Management*. John Wiley & Sons, Chichester, UK