

The Core Capabilities of Green Business Process Management – A Literature Review

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Abstract. Environmental sustainability has become a key concern of contemporary organizations, due to the impact of their operations on the environment. Organizations can be seen as sets of business processes that aim to generate business value, and business process management can play a significant role in designing and implementing more environmentally sustainable processes. Green BPM is the discipline that integrates sustainability-related thinking into business process management. In this paper, we present the results from a literature review on Green Business Process Management. Using the six core elements of BPM – Strategic Alignment, Governance, Methods, Information Technology, People, and Culture – as an analytical lens, we identify key capabilities required in Green BPM. Based on our analysis, we derive a Green BPM lifecycle to identify relevant methods, techniques, and approaches that can be applied to help organizations design improved business processes that exert a minimal impact on the natural environment.

Keywords: Green BPM, Environmental Sustainability, Core Elements of BPM, Green BPM Lifecycle, Literature Review.

1 Introduction

Environmental Sustainability is one of the various concerns of contemporary organizations, and sustainability is now often seen as an explicit performance dimension, in addition to traditional ones such as cost, time, and quality [1]. Sustainability has become increasingly important as organizations need to comply with rules and policies with regards to their operations and their consequences on the natural environment [2].

Organizations can be seen as sets of business processes operating to generate business value. The enterprise's business processes play an important role in contributing to the carbon footprint an organization emits [3]. Therefore, as BPM focuses on the understanding and improvement of an enterprise's business processes [4], it can be a significant enabler towards more environmentally sustainable organizations. Furthermore, Green BPM is the discipline that integrates sustainability-related thinking into business process management.

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In this paper, we present the results from a literature review on Green Business Process Management. Prior literature reviews on the topic can be found [5], [6], [7]. However, this study takes into account a different approach to analyze the current state of Green BPM research. Using the six core elements of BPM [8] – Strategic Alignment, Governance, Methods, Information Technology, People, and Culture – as an analytical lens, we identify key capabilities required in Green BPM. This study also differs from previous literature reviews as it depicts a Green BPM lifecycle, which encompasses diverse methods and techniques derived from the literature. Our essential research question is:

What is the current state of Green BPM research?

The remainder of this paper is structured as follows. Section 2 provides an overview on the concepts of Green BPM and green business process, as well as on the six core elements of BPM. Section 3 describes the methodology used for the literature review. Section 4 presents the main findings from the analysis of the literature. Section 5 presents the Green BPM lifecycle derived from literature. Potentials for future research are disclosed in Section 6. Finally, Section 7 concludes with a summary of the results.

2 Research Background

2.1 What is Green BPM?

We firstly present the concepts of sustainability and BPM, which are followed by a definition of Green Business Process Management. Sustainability is commonly defined as the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [9]. Business process management can be defined as the discipline that provides appropriate concepts, methods, and tools to model, implement, operate, and monitor business processes [10]. Different yet similar definitions of Green BPM can be found. They commonly build on the business process lifecycle from “classical” BPM, and add the ecological factor. Examples are the “dedicated consideration paid to the environmental consequences of these business processes” [11], the optimization of business processes considering the ecological dimension [12], and the aim to support environmental objectives [13].

Thus, one can understand Green BPM as the discipline that provides appropriate concepts, methods, and tools to support business process modeling, implementation, execution, monitoring, and continuous change with dedicated consideration of the environmental impact of these business processes.

2.2 What is a Green Business Process?

The execution of a business process has always a certain impact on the environment [12]. Business processes play thus an important role in contributing to the carbon footprint of an organization [3]. As a business process transforms inputs into outputs, the renewable and non-renewable inputs as well as the type and environmental quality of the outputs determine the sustainability of a business process [14]. In this line of thought, the extent of renewable inputs as well as the extent of emissions (outputs) that can be kept within the assimilative capacity of the environment should be maximized, while the extent of non-renewable inputs and the extent of emissions (outputs) that exceed the assimilative capacity of the environment should be minimized [14].

Therefore, a green business process is an environmentally conscious business process that is necessary, efficient, effective, agile, and measurable in the context of an organization [3] and delivers organizational value with a minimal impact on the natural environment [14]. Additionally, from a more technological perspective, an energy-aware business process is a service-based business process that considers functional and non-functional requirements, as well as specific annotations for guiding energy assessment [15].

In summary, one can understand that an environmentally sustainable (green) business process is a business process that generates business value with minimal impact on the environment, thus without compromising the environmental resource availability for future generations.

2.3 The Six Core Elements of Business Process Management

In this study, we consider the model of BPM capabilities [8] (Table 1) to analyze the literature on Green BPM in terms of its contributions related to the six core elements of BPM: strategic alignment, governance, methods, information technology, people, and culture. This model seems very appropriate for this study as all these elements represent critical success factors for BPM in an organization [8]. Therefore, each element should be considered by organizations seeking success with BPM [8]. For each element, distinct capability areas were identified, as shown in Table 1. The six core elements can be described as follows [8]:

- **Strategic Alignment:** The complete cycle of BPM needs to be tightly linked with the overall strategy of the organization, enabling continuous improvement and achievement of business goals.
- **Governance:** BPM Governance establishes pertinent and straightforward accountability for different levels of BPM. In addition, it provides support to the design of decision-making and compensation processes to manage process-related actions in business process management.
- **Methods:** Set of instruments and techniques that enable and support consistent actions along the BPM lifecycle.

- **Information Technology:** IT-based solutions are the software, hardware, and information systems that enable and support BPM activities.
- **People:** Individuals and groups who continuously develop and apply their BPM-related skills and knowledge in order to enhance business performance.
- **Culture:** Culture is the collective beliefs and values that define BPM-related attitude and behavior in order to enhance business performance.

Table 1. The six core elements of BPM [8]

<i>Strategic Alignment</i>	<i>Governance</i>	<i>Methods</i>	<i>Information Technology</i>	<i>People</i>	<i>Culture</i>
Process Improvement Planning	Process Management Decision Making	Process Design & Modeling	Process Design & Modeling	Process Skills & Expertise	Responsiveness to Process Change
Strategy & Process Capability Linkage	Process Roles and Responsibilities	Process Implementation & Execution	Process Implementation & Execution	Process Management Knowledge	Process Values & Beliefs
Enterprise Process Architecture	Process Metrics & Performance Linkage	Process Monitoring & Control	Process Monitoring & Control	Process Education	Process Attitudes & Behaviors
Process Measures	Process-Related Standards	Process Improvement & Innovation	Process Improvement & Innovation	Process Collaboration	Leadership Attention to Process
Process Customers & Stakeholders	Process Management Compliance	Process Program & Project Management	Process Program & Project Management	Process Management Leaders	Process Management Social Networks

3 Methodology

We conducted a structured literature review [16] to answer our research question presented in Section 1. The subject of this literature review is environmentally sustainable business process management. Therefore, the search terms were “Green”, “Sustain*”, “BPM”, “Business Process Management”, “Business Process”, and “Process”. *Google Scholar* was the main search engine used for the literature search, but *ScienceDirect* and *ABI/INFORM Complete* were also considered to corroborate the search process. The terms *Green IT* and *Green IS* were excluded from the search, since we aimed to find BPM-related papers exclusively. Initially, we retrieved 52 papers that we considered relevant for this study based on their title and abstract. However, we did not have access to full-text of ten papers, thus these ones were excluded for further analysis. The final set contained 42 articles selected for deeper

analysis, as they were identified to be relevant to our study, and we had access to their full content.

Based on the framework described on the previous section, we classified the literature according to its main coverage content. For each source, the categorization took into account frameworks, models, and propositions related to Green BPM. A paper that, for instance, simply mentions that strategic alignment is important in BPM, or that Information Technology plays a critical role in delivering process innovation, would *not* be categorized in the Strategic Alignment and Information Technology capability areas, respectively.

4 Findings

The analysis of the literature led us to two main categories of papers: (i) papers that provide a more general view on Green Business Process Management (10), such as literature reviews, or papers presenting holistic approaches covering many aspects of business process management; and (ii) papers with a focus on one or more specific areas of interest for Green BPM (32). Additionally, 67% of the papers analyzed were conceptual in nature.

The papers classified as *General* present: (i) differences and commonalities between green and conventional business process management [2]; (ii) a literature review on Green BPM [5]; (iii) a literature review and research framework for Green BPM [6]; (iv) a literature review on Green BPM [7]; (v) an introduction to and a framework for Green BPM research and practice [11]; (vi) an approach that utilizes a BPM framework in order to transform and manage business processes for a Green Telecommunications company [17]; (vii) ways to manage sustainability in the face of unordered business processes [18]; (viii) opportunities and challenges of Green BPM based on conceptual considerations [19]; (ix) a Green BPM readiness model [20]; and (x) the role of business process management in green initiatives [21].

With regards to the core elements of BPM, this study shows that most of the papers (54%) are focused on *Methods* (See figure 1). *Methods* and *Information Technology* together represent more than 80% of the literature. Our analysis thus shows that Green BPM research has been mainly focusing on the process lifecycle, aiming to find answers related to issues in the design, measurement, and improvement of processes in terms of environmental sustainability.

Green BPM and the Six Core Elements of BPM

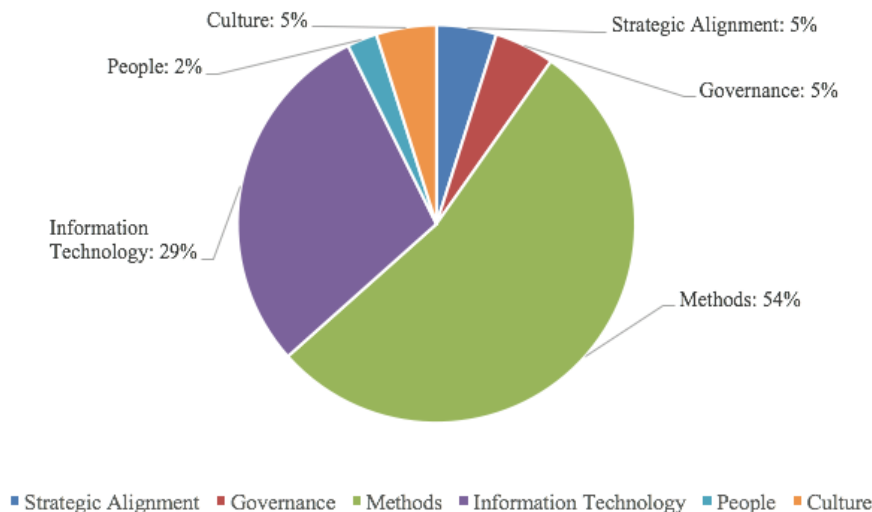


Figure 1. Green BPM Research on the lens of the six core elements of BPM

Table 2. (Green) Strategic Alignment

<i>Topic</i>	<i>Authors</i>
Business Motivation Model	[22]
Green Performance Indicators (GPIs)	[15]
Key Ecological Indicators	[2], [23], [24], [25]
Sustainability Indicators	[26], [27]
Process Architecture	[22]
Sustainability Balanced Scorecard (SBSC)	[28]

Table 3. (Green) Governance

<i>Topic</i>	<i>Authors</i>
Roles and Responsibilities	[2]
Process Performance Management	[29]
Process-related Standards	[30]

Table 4. (Green) Methods

<i>Topic</i>	<i>Authors</i>
Green Business Process Patterns	[12], [25], [31], [32]
Annotations	[15], [33]
Emission Annotations	[4], [34]
PMapping extension	[35]
Extensions of process modeling notations	[26], [36], [37]
Evaluation of process modeling notations	[38]
Activity-Based Emission (ABE)	[36], [39]
Green Activity Based Management (ABM)	[40]
Process Viewing Patterns	[24]
Enterprise Topology Graph (ETL)	[25]
Business Process Simulation	[26], [37]
Process SEER	[4], [34]
Abnoba Framework	[2], [5], [28], [41]

Table 5. (Green) Information Technology

<i>Topic</i>	<i>Authors</i>
Sustainability aware software system engineering framework	[27]
Evaluation of process modeling tools	[38]
Functional affordances of information systems	[14]

Energy Informatics	[42]
Process Mining	[13]
Geographic Information Systems (GIS)	[33]
<i>Topic</i>	<i>Authors</i>
New functionalities for process modeling and analysis tools	[34]
Process Simulation tools	[13]
Process Automation	[12]
IT solutions for Process Monitoring & Control	[25]
Energy-aware business processes	[15]
Conceptual integration model for the energy consumption of business processes, applications, and IT devices	[10]
Semantic Process Benchmarking	[43]
Cloud Patterns	[23]

Table 6. (Green) People

<i>Topic</i>	<i>Authors</i>
Collaborative Green Business Process Management	[44]
Process Education	[3]

Table 7. (Green) Culture

<i>Topic</i>	<i>Authors</i>
Responsiveness to process change	[45]
Process attitudes and behaviors for small and medium enterprises	[46]

5 Green BPM and the Process Lifecycle

Based on the literature review, we derived a **Green BPM lifecycle** (Figure 2 - adapted from [47]), which considers the methods, techniques, and approaches yielded through our literature analysis. The model represents a non-exhaustive rack of items found in the literature. This lifecycle model thus identifies which methods, techniques, and approaches might be selected and combined according to the specific business context, and under consideration of the environmental, process-related goals of an organization. Some of the methods present in the lifecycle (e.g. Process Viewing Patterns, process automation) are not exclusively designed for Green BPM. Nonetheless, we assume that, whether combined with other techniques or not, they might support the overall enterprise-wide process management framework, thus being able to contribute to making business processes more environmentally sustainable. We believe that the Green BPM lifecycle can serve as a framework for future studies in this field, and we thus encourage its empirical application and evaluation.

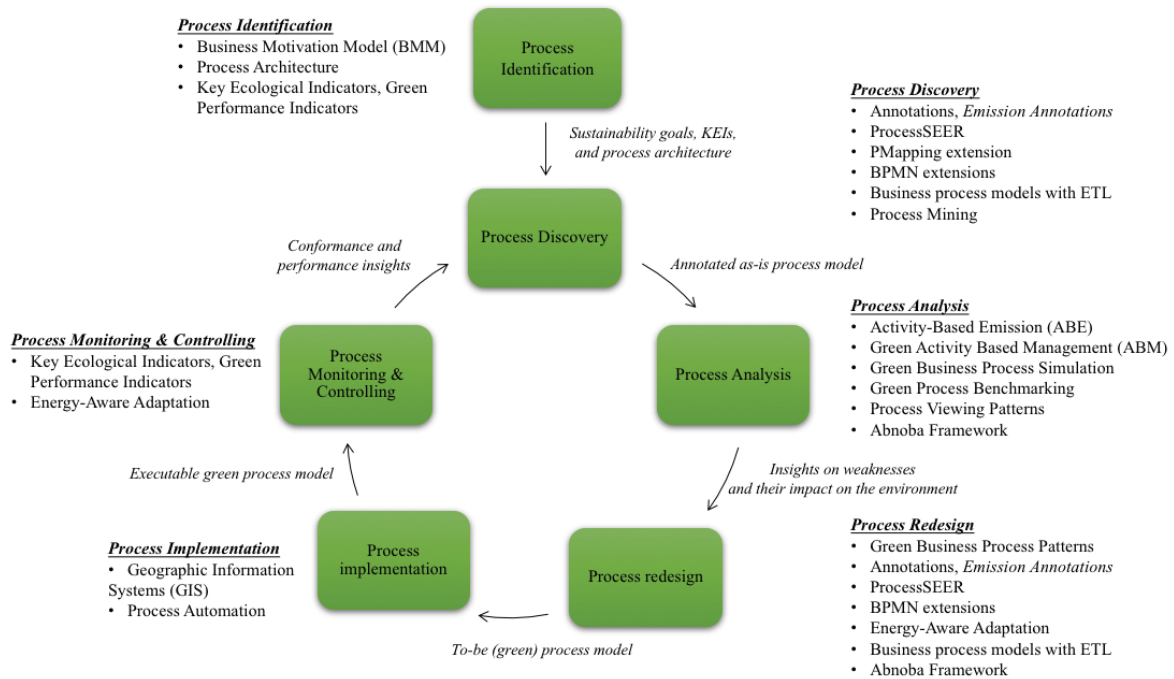


Figure 2. Green BPM lifecycle (Adapted from [47])

6 Research Agenda

From the literature analysis, we found several approaches that integrate sustainability-related thinking into business process management. Since most of the papers are conceptual, we believe that future research should focus on empirical studies that propose and evaluate methods, techniques, and initiatives that can be applied to all six core areas of BPM, and that can support organizations in the execution of business processes leading to as little impact as possible on the natural environment.

Strategic Alignment is mostly considered in terms of *Process Measures*, with environmentally sustainable performance indicators [2], [15], [23], [24], [25], [26], [27]. However, little or no attention has been paid to the other capability areas within this core component of BPM (e.g., process improvement planning, etc. – see Table 1). Future studies might focus on the alignment of Green BPM with the overall strategy of an organization. So, how could organizations address the trade-off between economic and environmental goals in their strategy? How to consider environmental characteristics of processes in the *Enterprise Process Architecture*? Which sustainability factors should be acknowledged in a *Process Improvement Plan*?

We found several **Methods** that can support the adoption of Green BPM and help organizations reduce the negative impact of their business processes. Nevertheless, there was no paper classified in the *Process Program & Project Management*

capability area, and little attention has been paid to *Process Implementation & Execution*. So, how can sustainability factors be embedded into executable business process specifications? Which methods and approaches should be used for the management of green BPM projects?

Even though some relevant research on **Information Technology** as an enabler of Green BPM exists, there is still a lack of explicit focus on the process lifecycle. This is the case, for example, of process modeling tools that incorporate green process modeling notation extensions (e.g. BPMN, EPC) or BPM systems that consider ecological characteristics. How should these extensions be described in order to facilitate their implementation by BPM software vendors? Which tools could facilitate the management of green initiatives? We strongly encourage more in-depth research on solutions that support the mining, modeling, analysis, simulation, implementation, and monitoring of green business processes, thus providing means of integration and incorporation of sustainability factors within those information systems.

Our analysis indicates that research has paid little attention to **Governance, People, and Culture** in green business process management. We thus argue that there is still a need for studies on Green BPM that address these areas in more detail. In the context of *Governance*, what would be appropriate methods to measure an organization's Green BPM maturity? How to design structured and consistent decision-making processes to guide sustainability-related actions? When considering *People*, what are the *Process Skills and expertise* necessary in a sustainable BPM approach? For *Process Education* initiatives, what needs to be considered in a Green BPM education curriculum? In terms of *Culture* in Green BPM, what are the essential values and attitudes for meeting Green BPM objectives? What is the role of social networks in Green BPM?

7 Conclusion

This study aimed to analyze the current state of research on Green BPM. To that end, we conducted a literature review, which comprised several studies on Green Business Process Management that were categorized according to the six core elements of BPM. We found that most of the contributions were presented as conceptual studies and that the majority of papers were focused on methods and techniques that consider sustainability factors in business process management. We contributed with the description of the Green BPM lifecycle based on the methods, techniques, and approaches derived from the analysis of the literature. We argued that the Green BPM lifecycle can serve as a framework for future studies that aim to apply, combine, and compare methods that can be utilized in each phase of the business process management lifecycle to help organizations become more environmentally sustainable, thus reducing their impact on the environment. We discussed key gaps regarding Green BPM that emerged from our analysis, and suggested avenues for future research for each core element. We argued that future research should consider all six elements of BPM, and should evaluate and propose means to address the

environmental impact of business processes. Furthermore, this study is not without limitations. First, we did not have access to full-text versions of all papers, so some relevant contributions might not have been included in this study. Having access to full-text papers for all literature found could have disclosed additional Green BPM approaches. Second, the paper coding was conducted by only one person, which might have led to biased paper classification. It might have been better if two researchers had been involved working on a pair coding mode. Still, by using the criteria provided by the BPM maturity model [8] the author took care to base the coding on formal concepts derived from the literature.

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References

1. Vom Brocke, J., Seidel, S., & Recker, J. (Eds.). (2012). *Green Business Process Management: Towards the Sustainable Enterprise*. Springer.
2. Nowak, A., Leymann, F., & Schumm, D. (2011). The Differences and Commonalities between Green and. In *Proceedings of the International Conference on Cloud and Green* (pp. 569-576). IEEE Computer Society.
3. Lan, Y. C. (2012). *Reengineering a Green Business*. *International and Interdisciplinary Studies in Green Computing*, 1.
4. Hoesch-Klohe, K., Ghose, A., & Lê, L. S. (2010, July). Towards green business process management. *2010 IEEE International Conference on Services Computing*.
5. Gohar, S. R., & Indulska, M. (2015). Business process management: saving the planet?. In *Australasian Conference on Information Systems (ACIS)*.
6. Opitz, N., Krüp, H., & Kolbe, L. M. (2014b, January). Green Business Process Management--A Definition and Research Framework. In *System Sciences (HICSS), 2014 47th Hawaii International Conference on* (pp. 3808-3817). IEEE.
7. Stolze, C., Semmler, G., & Thomas, O. (2012). Sustainability in Business Process Management Research—a Literature Review.
8. Rosemann, M., & vom Brocke, J. (2015). The six core elements of business process management. In *Handbook on Business Process Management 1*. Springer.
9. World Commission on Environment and Development (WCED) (1987) *Our Common Future*, Oxford University Press, UK and New York.
10. Reiter, M., Fettke, P., & Loos, P. (2014, January). Towards Green Business Process Management: Concept and Implementation of an Artifact to Reduce the Energy Consumption of Business Processes. In *System Sciences (HICSS), 2014 47th Hawaii International Conference on* (pp. 885-894). IEEE.
11. Seidel, S., Recker, J., & vom Brocke, J. (2012). Green business process management. In *Green Business Process Management* (pp. 3-13). Springer.

12. Nowak, A., Leymann, F., Schleicher, D., Schumm, D., & Wagner, S. (2011a, October). Green business process patterns. In Proceedings of the 18th conference on pattern languages of programs (p. 6). ACM.
13. Lubbecke, P., Reiter, M., Fettke, P., & Loos, P. (2015, January). Simulation-based Decision Support for the Reduction of the Energy Consumption of Complex Business Processes. 2015 48th Hawaii International Conference on (pp. 866-875). IEEE.
14. Seidel, S., & Recker, J. (2012, January). Implementing green business processes: the importance of functional affordances of information systems. Proceedings of the 23rd Australasian Conference on Information Systems 2012 (pp. 1-10). ACIS.
15. Cappiello, C., Fugini, M., Ferreira, A. M., Plebani, P., & Vitali, M. (2011, August). Business process co-design for energy-aware adaptation. 2011 IEEE 7th International Conference on Intelligent Computer Communication and Processing.
16. Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS quarterly*, xiii-xxiii.
17. Balachandran, R. (2010). Business Processes Management for a Green Telecommunications Company. Handbook of Research on Green ICT: Technology, Business and Social Perspectives: Technology, Business and Social Perspectives, 197.
18. Hasan, H. (2012). Unordered business processes, sustainability and green IS. In *Green Business Process Management* (pp. 39-58). Springer.
19. Houy, C., Reiter, M., Fettke, P., & Loos, P. (2011, January). Towards Green BPM–Sustainability and resource efficiency through business process management. In *business process management workshops* (pp. 501-510). Springer.
20. Opitz, N., Krüp, H., & Kolbe, L. M. (2014a). Environmentally sustainable business process management—developing a green bpm readiness model.
21. Seidel, S., vom Brocke, J., & Recker, J. C. (2011). Call for action: investigating the role of business process management in green IS. *Sprouts: Working Papers on Information Systems*, 11(4).
22. Rozman, T., Draghici, A., & Riel, A. (2015). Achieving Sustainable Development by Integrating It into the Business Process Management System. In *Systems, Software and Services Process Improvement* (pp. 247-259). Springer.
23. Nowak, A., Leymann, F., & Mietzner, R. (2011c). Towards green business process reengineering. In *Service-Oriented Computing* (pp. 187-192). Springer.
24. Nowak, A., Leymann, F., Schumm, D., & Wetzstein, B. (2011d). An architecture and methodology for a four-phased approach to green business process reengineering. In *Information and Communication on Technology for the Fight against Global Warming* (pp. 150-164). Springer.
25. Nowak, A., Binz, T., Leymann, F., & Urbach, N. (2013, September). Determining Power Consumption of Business Processes and their Activities to Enable Green Business Process Reengineering. In *Enterprise Distributed Object Computing Conference (EDOC), 2013 17th IEEE International* (pp. 259-266). IEEE.
26. Betz, S. (2014). Sustainability aware Process Management using XML-Nets. In *Proceeding of the 28th EnviroInfo Conference, Oldenburg*.
27. Betz, S., & Caporale, T. (2014, December). Sustainable Software System Engineering. In *Big Data and Cloud Computing (BdCloud), 2014 IEEE Fourth International Conference on* (pp. 612-619). IEEE.
28. Houy, C., Reiter, M., Fettke, P., Loos, P., Hoesch-Klohe, K., & Ghose, A. (2012). Advancing business process technology for humanity: Opportunities and challenges of green BPM for sustainable business activities. In *Green Business Process Management* (pp. 75-92). Springer.

29. Cleven, A., Winter, R., & Wortmann, F. (2012). Managing process performance to enable corporate sustainability: a capability maturity model. In *Green Business Process Management* (pp. 111-129). Springer.
30. Lange, M. I., & PMP, P. (2013). Consideration of sustainable development principles in process management.
31. Nowak, A., Binz, T., Fehling, C., Kopp, O., Leymann, F., & Wagner, S. (2012). Pattern-driven green adaptation of process-based applications and their runtime infrastructure. *Computing*, 94(6), 463-487.
32. Nowak, A., & Leymann, F. (2013, December). Green Business Process Patterns--Part II (Short Paper). In *2013 IEEE 6th International Conference on Service-Oriented Computing and Applications* (pp. 168-173). IEEE.
33. Zhu, X., Zhu, G., vanden Broucke, S., & Recker, J. (2015). On Merging Business Process Management and Geographic Information Systems: Modeling and Execution of Ecological Concerns in Processes. In *Geo-Informatics in Resource Management and Sustainable Ecosystem* (pp. 486-496). Springer.
34. Ghose, A., Hoesch-Klohe, K., Hinsche, L., & Le, L. S. (2010). Green business process management: A research agenda. *Australasian Journal of Information Systems*, 16(2).
35. RT White, G., & James, P. (2014). Extension of process mapping to identify "green waste". *Benchmarking: An International Journal*, 21(5), 835-850.
36. Recker, J., Rosemann, M., Hjalmarsson, A., & Lind, M. (2012). Modeling and analyzing the carbon footprint of business processes. In *Green Business Process Management* (pp. 93-109). Springer.
37. Wesumperuma, A., Ginige, J. A., Ginige, A., & Hol, A. (2011). A Framework for Multi-Dimensional Business Process Optimization for GHG Emission Mitigation.
38. Opitz, N., Erek, K., Langkau, T., Kolbe, L., & Zarnekow, R. (2012). Kick-starting Green Business Process Management--Suitable Modeling Languages and Key Processes for Green Performance Measurement.
39. Recker, J., Rosemann, M., & Gohar, E. R. (2011, January). Measuring the carbon footprint of business processes. In *Business process management workshops* (pp. 511-520). Springer.
40. Wesumperuma, A., Ginige, A., Ginige, J., & Hol, A. (2013). Green activity based management (ABM) for organisations. In *24th Australasian Conference on Information Systems (ACIS)* (pp. 1-11). RMIT University.
41. Hoesch-Klohe, K., & Ghose, A. (2010, December). Carbon-aware business process design in Abnoba. In *International Conference on Service-Oriented Computing* (pp. 551-556). Springer.
42. Watson, R. T., Howells, J., & Boudreau, M. C. (2012). Energy Informatics: Initial thoughts on data and process management. In *Green Business Process Management* (pp. 147-159). Springer.
43. Gräuler, M., & Teuteberg, F. (2013). Experimental Evaluation of a Process Benchmarking Tool in a Green Business Process Management Context. In *Wirtschaftsinformatik* (p. 68).
44. Jakobi, T., Castelli, N., Nolte, A., Stevens, G., & Schönau, N. (2014). Towards Collaborative Green Business Process Management. In *EnviroInfo* (pp. 683-690).
45. Gautier, P., Fry, C., Fedrigo, C., Hild, P., & Takagi, A. (2012, January). How to assess a green process: the green ROI. In *ISPIM Conference Proceedings* (p. 1).
46. Baggia, A., Leskovar, R., Delibašić, B., & Petrović, N. Opportunities of sustainable business practices in SME's.
47. Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2013). *Fundamentals of business process management* (Vol. 1, p. 2). Springer.