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Olga Levina

*Technische Universität Berlin, Germany, olga.levina.1@tu-berlin.de*

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# EXPLORING THE ROLE OF BUSINESS PROCESS MANAGEMENT IN SUSTAINABILITY INITIATIVES

*Research in progress*

Levina, Olga, Technische Universität Berlin, Berlin, Germany, Olga.levina.1@tu-berlin.de

## Abstract

*The sustainability of business activities is gaining increasing importance with organizations putting more effort into this topic. Approaches from the field of Business Process Management (BPM) can support sustainability initiatives. This paper investigates the question raised by BPM researchers about the role of BPM for the transition towards a sustainable enterprise. Online content analysis of 78 case studies is used to derive the context, methods and effects of environmental initiatives across industries. While BPM techniques are foremost implemented and used to achieve cost benefits through more efficient processes, the results of this explorative study indicate they are also applied to promote and achieve an efficient use of resources leading to more sustainable business operations if supported by the top management and a “green” strategy. These results are industry independent and support the research findings in the domains of quality management as well as strategy realization providing BPM researchers and practitioners with insights on the assessment of a transition towards a more sustainable business.*

*Keywords: Business process management, sustainability, green BPM, exploratory study.*

## 1 Introduction

Sustainability has been a topic on business agendas for several decades, from the time when the enterprises realize their impact on and responsibility towards the environment. This “going green” movement has become popular since the companies have realized that they can reduce pollution and increase profits simultaneously. The subject of sustainability is also being increasingly discussed in Information Systems Research (ISR), with green IT and green Business Process Management (BPM) being the topics that gain more and more popularity within the discipline, e.g. (Pernici et al., 2012; Molla, Cooper, and Pittayachawan, 2009; vom Brocke, Seidel, and Recker, 2012; Loos et al., 2011; Nowak et al., 2011; Loeser, 2013; Reiter, Fettke, and Loos, 2014a). BPM experts develop tools and metrics that are aimed at integrating sustainability aspects into the process analysis and (re-) design (Hoesch-Klohe and Ghose, 2012; Wesumperuma et al., 2011; Opitz et al., 2012; Recker, Rosemann, and Gohar, 2011; Nowak et al., 2011) following the conviction that “making processes more sustainable will ultimately lead to making organisations more sustainable” (Pernici et al., 2012).

This paper explores the questions of what managerial methods are used by enterprises to realize sustainability, also known as “green”, initiatives and what role BPM plays in their realization. This paper adopts the following definition of a sustainable business: a sustainable business should “[. . .] meet the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission, 1987). Environmental sustainability is often operationalized using a small set of measurable goals for organizational input/output impacts such as the reduction of energy consumption, reduction or reuse of waste, and reduction of CO<sub>2</sub> contributions. As these goals are opposed to the pressure on organizations toward growth and an overall increased, albeit more efficient, use of resources (Meadows, 1998). Thus, the enterprises would need to implement the green view into their business vision making sustainability initiatives a potential issue for enterprise strategy management to stress its importance.

While this implication remains to be proven, the goal of this paper is to analyze the role that BPM plays in the realization of business sustainability initiatives, i.e. to explore the types of BPM techniques used in sustainability initiatives across industries. Defining this role will allow structuring, introducing and managing sustainability-focused business activities for C-level managers, business process owners and consultants. Therefore, 78 case studies of enterprises that have implemented sustainability or so called green activities into their business are analyzed. As the case studies were derived from the internet and their content was analyzed according to defined criteria, the research method applied here is the online content analysis. The contribution of this paper is twofold: its results add to the discussion on the realization of enterprise sustainability through BPM as well as illuminate the origins of BPM and its relation to enterprise strategy realization for enterprise-wide sustainability management. The paper is structured as follows: First related work on enterprise sustainability and sustainable business process management is briefly reviewed in section 2; the research method and its limitations are presented in section 3. Results of analysis are then described in section 4. Discussion of the findings and outlook on further research towards the definition of BPM role for sustainable business operations finish the paper.

## 2 Related Work

Realizing potentials for a more sustainable business has been a research topic for over a decade now. (Loeser 2013) noticed the particular meaning of the goal definition identified by (Hart 1995) to advance the environmental sustainability of businesses: 1) pollution prevention, achieved through minimization of waste and emissions; 2) product stewardship, addressed by consideration of stakeholder demands and optimization of product lifecycles; 3) sustainable development, accomplished through a reduction of the organization's environmental footprint and commitment to a long-term sustainability vision. This definition of the stages of the environmental strategy is also considered in this paper to assess the strategic maturity of an enterprise.

BPM related aspects that focus on sustainability, i.e. green BPM, as a research topic is increasingly found on the ISR agenda. Opitz, Krup, and Kolbe (2014) define green BPM as “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.” Process metrics play an important role in the assessment of the application results of BPM tools. Reiter, Fettke, and Loos (2014b) introduce a combined approach of IT and BPM for efficient energy use in a process. Cleven, Winter, and Wortmann (2012) discuss the capabilities required to measure and manage sustainability performance on a process level by providing a capability maturity model (CMM) for green process performance management capabilities. Goldkuhl and Lind (2010) address the process design phase by presenting an extended process modelling approach for capturing and documenting the greenhouse gas (GHG) emissions produced during the execution of a business process as well as an accordant analysis method. The calculation methods for the carbon footprint of a process already being explored by e.g. (Recker, Rosemann, and Gohar, 2011; Grimm, Ereik, and Zarnekow, 2013; Pan and Kraines, 2001; Heijungs and Suh, 2006; Cooper and Fava, 2006). Among these works, two general measurement approaches can be distinguished: Cooper and Fava (2006) suggest a bottom-up approach from the process analysis perspective, while Pan and Kraines (2001) describe a top-down perspective incorporated in the environmental input-output analysis. Heijungs and Suh (2006) combine the two approaches. Nowak et al. (2011) present a methodology and architecture for green BPR, providing a starting point for green process analysis and re-design. Further methods for process analysis towards environmental potentials are presented in, e.g. Hoesch-Klohe and Ghose (2012).

### 3 Research Method

To answer the research question about the role of BPM within sustainability initiatives case studies of firms that have already initiated activities to incorporate sustainability into their business have been identified and analyzed. The case studies published online by the performing enterprises themselves or by the consultancies build the set of analysis. To identify the case studies, an internet search using an internet search engine with different sets of keywords was performed. First the keywords “sustainable business case study” were used. The resulting cases have been pre-analyzed with the focus on the information on the realization activities, methods and their adherence to BPM. Cases that did not contain this information have been omitted from the further analysis. The search was repeated using the keywords: “Green initiative case study”, “enterprise sustainability case study”, “sustainable enterprise case study” and “green business process management / BPM case study”. After the pre-selection according to the criteria mentioned above in 78 cases from the years (approx.) 2004- 2013<sup>1</sup> were included for the analysis. The final analysis was performed on these cases using online content analysis method as the cases were found and managed online. The validity of the (online) sources and thus the reliability of the information were proven by researching the publishing source and homepage provider separately. To avoid possible changes in the case study descriptions, the cases were downloaded from the source and stored offline for further analysis. The content analysis was conducted using categories derived during the pre-test. These categories included information on the driving forces behind the sustainability or green initiative, including motives for the case studies and initiating sources within the enterprise. The level of the (potential) changes induced by the initiative within the enterprise (process vs. resource) was in the focus of the analysis. Other aspects of analysis were management methods used to realize the change as well as the effects that the changes induced on the enterprise elements, such as organization, strategy, processes, etc. For a compact representation, the enterprises were grouped in industries. The results of the analysis are shown in tables 1 and 2.

The research method applied here has its limitations. First and foremost secondary sources, i.e. documents describing the transformation on different levels, were used to derive the results. By the rather broad definition of the analysis criteria this challenge was addressed and limited. Also, 78 enterprises with specific characteristics such as: mostly small and middle ones (SME), situated in Australia, Ireland and USA, predominantly from the manufacturing industry (37.2%), were analyzed. The analysis results were derived using content analysis of case study descriptions, thus limiting the amount of specific details. Therefore, this study is exploratory in its nature and its results need further evaluation and affirmation using the empirical tool set. Nevertheless, they provide useful results for BPM researchers and practitioners interested in the implementation of sustainability within a process or enterprise.

### 4 Results of the analysis

The enterprises in the sample set were grouped in industries, resulting in ten industry categories: utility provider (three entities); manufacturing (29 entities), food (eight entities); services (eight entities); entertainment (including shopping, six entities); non-profit organizations (including government and non-governmental institutions, four entities); print (four entities); IT (including software development, data centres, and IT service providers, 12 entities) as well as education and research (four entities). All of the sustainability case studies were initiated top-down, i.e. as a program or a project, from the C-level management of the enterprise. This fact is also reflected in the goals of the case studies (see table 1), whereas the methods for the achievement of the goals are described in table 2.

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<sup>1</sup> The case studies are often dated using the publishing date of the text, omitting the actual timeline of the project.

Goal	Goal/ Industry	Services	Non-profit	IT	Entertainment	Print	Food	Manufacturing	Government	Education	Conglomerate	Utility
A	Env. Aspects: reducing waste, resource usage, GHG emissions	7	4	2	2	4	3	15				
B	Improve operations			2	3		1	6	1	1		
C	A and B			3	3		1	3				1
D	Economic growth without incrementing A			3						2		
E	Cost savings	1		1	1		2	4				
F	A and E			1			1					

Table 1. Industry and goals

Providing more sustainable processes was only set as a goal of a sustainability initiative once by a utility provider.

Table 2 shows the top goals for the case studies, i.e. the goals that were set by the most enterprises in the sample set, and the methods that were used to achieve these goals. In both cases multiple entries were possible. Especially in the enterprises from the manufacturing domain business analysts saw the benefit of Lean Manufacturing (LM) methods not only in enhanced product quality and cost savings. The resulting optimization of resource use and process optimization have also positive effects on environmental metrics such as energy and water use savings, waste reduction and the consequent reduction of GHG emissions that were not anticipated.

The involvement of LM and Six Sigma methods into the sustainability initiatives includes workshops with process owners and workers, enabling an increased awareness of the importance of sustainability efforts and optimization of the resource usage. Also, some companies joined a governmental program to design the strategy and actions towards sustainability (5.1%), while others engaged sustainability consultancies to analyze the status quo and potentials for sustainable development in the business operations (9%).

Method	Goal	A: Env. Aspects: reducing waste, resource usage, GHG emissions	B: Improve operations	C: A and B
Measuring/ Tracing consumption		9		4
Reduce/rethink resource usage		12		
Process redesign		3		
Employee training/ communication		4		2
Audits		5		
Tracking consequences/savings, Reports		2		
Recycling		5	2	1
CIP/LM		3	4	
Consultancy		3	2	
Process automation		3	2	1
Performance analysis		2		
EMS		3		
SCM		4		
Process analysis		1		
Kaizen		2	3	2
Resource optimization/efficient usage			5	

Lean environment:		2	
Process changes		2	
VSM		3	
Process measuring		1	
Process mapping		1	
Consultancy		2	
Benchmarking			2

Table 2. Top goals and methods for their achievement

Among the sample set, the most used method (multiple methods were used in general) to meet a sustainability goal was to re-think and re-design the general usage of resources such as electricity usage for lightning and cooling of the facility, water usage and waste reduction. 30.8% of the enterprises used this method to meet their sustainability goals.

17 enterprises, i.e. 21.8%, put an explicit focus on process management methods. As Kaizen methods, value stream mapping (VSM) and continuous improvement process (CIP) are borrowed by BPM (Conger 2010) they are not included in the count of process-specific methods for sustainability realization. Among the BPM methods that were used for managing the end-to-end processes, process automation is the most deployed method (used by seven enterprises, i.e. by 9%), followed by process changes, including process re-design. Only six enterprises, i.e. 7.7% of the sample set, were ISO 14001 and two, i.e. 2.6%, ISO 9001 certified at the time the case study was conducted. Accordingly, only few enterprises (four, i.e. 5.1%) use an environmental management system (EMS) in their business. The methods of: Key Performance Indicators, process redesign, Continuous Process Improvement; Process virtualization; Industrial ecology method were each chosen once to fulfil the goal C.

The stages towards a sustainable enterprise defined by Hart (1995) were presented in section 2. 70.5% of the enterprises that were analyzed in the sample set named reduction of waste or GHG emissions explicitly as their goal for the sustainability initiative, positioning them on the first level of the sustainability maturity. 11.5% of the enterprises considered product optimization and stakeholder, i.e. customer, public or supply chain (SC) partner, involvement into their sustainability program. The third stage of a sustainable enterprise as defined by Hart, i.e. developing a long-term strategy or vision of the sustainability incorporation into their operations, was aimed for by 5.1% of the enterprises within the sample set. Other companies named cost reduction, operation efficiency, green product development or benchmarking for business strategy development among the goals of their initiative. Moreover, the methods that were applied within the case studies were rarely designed for the identification of sustainability aspects. Six enterprises, i.e. 7.7% of the sample set, used a specific method for sustainability metric management, such as Lean and Green or industrial ecology.

## 5 Discussion of the findings

Findings from this case study analysis indicate that the business community does not seem to have agreed upon a general set of reasonable and practical approaches for an efficient implementation of sustainability issues, as has already been discussed by (Labuschagne, Brent, and van Erck, 2005). Also, the majority of the sustainability initiatives focus on reducing the general resource usage such as electricity stimulated by the expected cost savings. It is noticeable that the initiatives were introduced by the C-level management and promoted through enterprise-wide communication of the achievement, accompanied by employee trainings (in five cases, i.e. 6.4%), while public or market pressure played only a minor role in the decision to involve into sustainability. For the identification of (resource) efficiencies, Kaizen events and CIP initiatives were often used mostly by enterprises from the manufacturing domain that have already implemented Lean Manufacturing or TQM techniques in their processes. A possible conclusion can be that management and implementation techniques for e.g.

TQM and sustainability seem to rely on similar mechanisms. This assumption however constitutes an exciting research topic (Dües, Tan, and Lim, 2013).

Cost savings was the second exclusive goal mentioned by the enterprises from the sample, implying that the environmental benefits that result from the accordant activities are considered as a byproduct of lean or optimization actions rather than the goal itself, while providing a unique proposition to gain customers and market share. Measurement and tracking of the resource usage has shown to be a frequently established first step in the sustainability initiative and also claimed to provide first insights on the importance of the green changes, e.g. in (Powell, 2009). Thus, resource and business activity monitoring and analysis of resource usage can provide a valuable tool for the realization of the sustainability strategy and awareness. Process management techniques, specifically techniques for process optimization, are also shown to result in environmental benefits, i.e. resource usage or waste reduction, without being explicitly focused on designing green processes.

As various industries are present in the sample, indications about favoured managing techniques for green initiatives among the industries can be deviated. It is noticeable that manufacturing companies tend to adopt lean and sustainable benefits but also that service-oriented enterprises financially and environmentally benefit from conscious resource usage by applying and adopting same techniques. Thus, using BPM in such projects is probable to result in partial and limited impacts instead of promoting the long term sustainability vision within the enterprise.

## 6 Summary and Outlook

In this paper, an analysis of real-life sustainability initiatives was conducted. Results of this explorative study offer the conclusion that BPM tools and approaches can provide a basic support for the enterprise transition towards sustainability if they are initiated and supported by upper management. The findings of the case study analysis as well as the research findings investigating strategy implementation implicate that a bottom-up, i.e. process-based, realization of sustainability goals will probably not result in a more sustainable organization as implied in (Pernici et al., 2012), as basic change management techniques need to accompany a successful realization (Trkman, 2010) and integration of the green thinking into the business strategy. This view is also supported by the ISO 14001, where the implication is that the environmental policy is set in the beginning of the Plan-Do-Check-Act cycle.

Future work on the definition of the role of BPM in the transformation of a firm towards sustainability will include the exploration and evaluation of the already suggested potentials of BPM life cycle and methods with sustainability factors as well as conducting case studies and expert interviews to show the plausibility of the top-down approach for a business transformation towards sustainability.

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