Association for Information Systems
AIS Electronic Library (AISeL)

PACIS 2013 Proceedings

Pacific Asia Conference on Information Systems (PACIS)

6-18-2013

Evaluation of Business Processes for Business Process Standardization

Philipp Zellner
University of Applied Sciences, zellnerp@fh-muenster.de

Marcus Laumann
University of Applied Sciences, m.laumann@fh-muenster.de

EVALUATION OF BUSINESS PROCESSES FOR BUSINESS PROCESS STANDARDIZATION

Zellner, Philipp, Institute for Process Management and Logistics, University of Applied Sciences, Muenster, Germany, NRW, zellnerp@fh-muenster.de

Laumann, Marcus, Institute for Process Management and Logistics, University of Applied Sciences, Muenster, Germany, NRW, m.laumann@fh-muenster.de

Abstract

Companies often implement multiple process variants in their organizations at the same time. Often these variants differ widely in terms of efficiency, quality and cycle time. In times of highly volatile global economic markets, companies cannot afford unnecessary redundant business processes. Business Process Standardization has therefore become a major topic in the field of Business Process Management, both in research and practice. Management decisions concerning standardization are difficult and complex, due to limited project budgets, organizational and technological changes as well as the increasing challenges of globalization. Choosing suitable processes for standardization is the essential precondition for streamlining business processes in the first place and therefore for reaping the full benefits of Business Process Standardization. However, there is hardly any tool available that supports the evaluation of business processes for standardization. To close this research gap, we develop an instrument for the evaluation of business processes in the context of Business Process Standardization with the aim to help practitioners in their day-to-day operations. Our research aims at providing the necessary preconditions for companies to profit from the advantages of business process standardization and to support decision-making.

Keywords: Criteria Business Process Standardization, Evaluation of Business Processes, Business Process Management

1 INTRODUCTION

In an age of globalization, companies constantly aim to improve their operational competitive advantage. One way to achieve this objective is through business process management (BPM) and standardization (Manrodt & Vitasek 2004; Gong 2012). Beimborn et al. (2009) argue that firms often use multiple process variants simultaneously and these variants may differ strongly with respect to efficiency, quality and cycle time. Concerning the current highly volatile global economic situation, companies cannot afford redundant business processes with different degrees of efficiency, quality and cycle time. Therefore, Business Process Standardization (BPS) is seen as an innovative and promising approach to enhance the operational efficiency of companies and thus to face the challenges of the present global economic situation (Muenstermann et al. 2009b). BPS has become one of the major topics of companies in the context of BPM. Numerous projects have been realized with the objective of benefiting from BPS. Hadfield (2007) reported that BP was able to save £600m based on a successful process standardization project. Standardizing and streamlining the CRM process in a multinational e-commerce business unit led to increased customer satisfaction while reducing CRM process costs (Muenstermann et al. 2010). Overall, BPS has become a global topic in Business Process Management and companies all around the world are spending large amounts of money on BPS projects (Muenstermann & Eckhardt 2009).

However, the literature shows that the results of BPS projects vary significantly in the degree of success (Hall & Johnson 2009; Schaefermeier et al. 2010; Manrodt & Vitasek 2004). One major reason for unsuccessful BPS projects are missing methods to identify the right processes for BPS (Schaefermeier et al. 2010). Considering the necessary organizational and technological changes, any process standardization is risky and involves high investments. Many process landscapes have historically evolved and often contain a huge variety of business processes with totally different characteristics. Limited project budgets and the increasing challenges of globalization increase the complexity of management decisions in the context of BPS. Managers need to assess whether a process is suitable for BPS before significant investments are carried out. Potential business processes thus need to be evaluated carefully in advance. It is therefore of major importance to provide thoroughly researched tools to decision makers in organizations to support their decision-making processes for BPS projects. However, an essential aspect in this context is the separation of processes which can be standardized from those which are not suitable for BPS (Hall & Johnson 2009; Schaefermeier & Rosenkranz 2011; Muenstermann et al. 2010). A literature review has shown that scientific publications primarily focus on the effects, possible procedures or general objectives of BPS. The current debate fails to establish a systematic approach for business process standardization (Davenport 2005; Hammer & Stanton 1999; Muenstermann & Weitzel 2008; Swaminathan 2001; Schreiber et al. 2010; Ungan 2006; Wuellenweber et al. 2008; Wüllenweber & Weitzel 2007). Taking our cue from literature, feedback from practitioners and our own research experience in the area of BPS, the most important question concerning the standardization of businesses process is:

How to evaluate business processes in the context of BPS?

To answer this question, we will develop a tool for the proper evaluation of business processes in the context of BPS, with the objective of supporting management decisions. From a managerial perspective, our objective is to provide a systematic approach for the evaluation of business processes in the context of BPS. Our developed artefact should enable companies to manage their process landscape more effectively and efficiently with respect to BPS projects. Selecting the right processes for standardization is the essential precondition for streamlining business processes and therefore for fully benefiting from BPS and thereby enhancing the competitive advantage of companies.

The paper is structured as follows: Firstly, we will provide a theoretical foundation of BPS. Secondly, we will briefly explain our research methodology. Based on a qualitative approach derived from

Mayring (2000), essential criteria for the evaluation of BPS projects have been identified and operationalized with the help of a comprehensive literature review. Next, the criteria are transformed into an artefact which enables a systematic investigation of a specific business process and provides a basis for deciding whether the process should be standardized or not. Based on a case study approach, the tool is tested in practice in order to test its usability. The conclusion briefly summarizes our findings.

2 THEORETICAL FOUNDATION

2.1 Brief review of business process evaluation

Evaluation of business processes is broadly discussed in the scientific literature. Its origins go back to the concepts of business process improvement (BPI) and business process reengineering (BPR). Both concepts differ in the degree of process change. BPR is seen as a radical approach with the aim of designing new processes with radical changes whereas BPI contains incremental changes and focuses on continuous improvements (Davenport 1993; Davenport & Short 1990; Harrington 1997 et al.; Hammer & Champy 2007). Both concepts can be seen as subsets of process redesign (Valiris & Glykas 1999). According to the related concept business process evaluation is of different importance. In BPR with its radical changes, process evaluation plays a tangential role compared e.g. to the process design in this approach. In contrast process evaluation plays a central role in BPI-approaches where process evaluation is the basis for continuous improvement (Harrington et al. 1997; Hammer & Champy 2007). Both concepts address the possibility to standardize business processes in order to improve the efficiency of processes. But there is no clear concept which systematically examines whether standardization is a) feasible in the first place and b) a suitable approach to improve the efficiency of the process in focus (Kettinger & Teng 1997; Hammer & Champy 2007; Davenport 2005; Harrington et al. 1997).

2.2 Definition of business process standardization

Most scientific publications introduce the term BPS by first defining the terms *business process and standardization* and finally combining the terms to give *business process standardization*. A review of the literature shows that the construct of BPS is well established by now (Muenstermann et al. 2009a; Muenstermann & Weitzel 2008; Schaefermeier et al. 2010; Beimborn et al. 2009). For this paper we will further develop the term *business process standardization*. Depending on the researcher's field, different aspects of the term are highlighted. In the technical field, for instance, business process standardization is seen as an "explicit or implicit agreement on common specifications for information exchange formats, for data repositories, and processing tasks at the interfaces between interacting supply chain partners" (Gosain et al. 2005). The organizational field understands business process standardization as "defining exactly how a process will be executed regardless of who is performing the process or where it is completed" (Ross et al. 2006). Martin & Bell (2010) stress this point by adding that the standard process can be defined "as the currently best-known method for accomplishing the work. This assumes that it is the […] most efficient method to do the work that meets the required level of quality". Muenstermann et al. (2010) highlight a different aspect of business process standardization by describing it as "the activity of aligning existing variants against a standard process". In this paper, business process standardization is also considered from an organizational point of view. The definition of business processes standardization that is offered here combines elements of the definitions mentioned above: *Business process standardization is the definition of the exact execution of business activities in order to reduce process variants. On the basis of current knowledge, the standard process derived represents the best known method to accomplish the business process with regard to customer expectations. Furthermore, standardized processes can be executed regardless of where or by whom they are performed.*

2.3 Effects of business process standardization

BPS is seen as an innovative and promising approach in BPM towards increased efficiency across the company. Ross et al. (2006), for example, argue that using standard processes for selling products or buying supplies allows companies to measure, compare and improve activities of different business units more easily. From their point of view and in line with Arshad et al. (2010), one major result of BPS is a reduction in variability which can lead to dramatic increases in throughput and efficiency. Lee et al. (2010) were able to demonstrate that BPS positively influences system performance in distributed IS development. Standardized processes enable team members to understand each other´s work more easily, they allow the efficient coordination of activities and support system integration effectively. Soederstroem et al. (2009) contributed another interesting aspect, based on a case in healthcare where BPS led to remarkable improvements in the communication paths in the surgical planning process. Finally BPS has led to a reduction of uncertainty. As a result, lead time was reduced, duplication of work could be avoided and therefore (planning) costs were reduced. Wuellenweber et al. (2008) showed that BPS has a significant impact on the success of outsourcing. From a vendor´s perspective and with regard to production cost economies, the vendor will only be able to achieve an efficient cost basis for generating economies of scale if he can provide a standardized process for reaching many clients. From an outsourcer´s perspective, a standardized process allows a better understanding of how the business operates and how operations can be improved. Standardized business processes facilitate communication and coordination between exchange partners and allow realigning disparate goals and actions for solving day-to-day problems. Finally, Eckhardt (2009) shows in his empirical work, based on two case studies (in the automotive and pharmaceutical industries), that BPS positively affects process time, costs and quality in general. The literature shows that mediating effects, e.g. the reduction of variability and uncertainty, lead to direct effects which positively affect cost, quality and cycle time of business processes.

Increasing efficiency and effectiveness of the business	
direct effects	**indirect effects (mediating)**
• Reduced costs • Reduced cycle time • Improved quality	• Reduction in variability • Reduction in uncertainty • Improvements in coordination • Improvements in communication • Generating economies of scale • Better understanding of each other´s work • Better understanding of own work • Avoiding of duplication of work

Table 1. Benefits of BPS

Nevertheless, negative effects and difficulties concerning BPS need also be mentioned. First, standardized processes might limit local innovation. Second, the transition to a standardized process usually requires that occasionally, from a local point of view, well working processes are removed and replaced by a new standard process. This might be politically difficult and expensive (Ross 2006). Thus, it is even more important to offer companies a sound foundation for the evaluation of processes for BPS. On the basis of the benefits and harms of BPS we will later show whether our research leads to useful decisions.

3 RESEARCH METHODOLOGY

A distinction is usually made between behavioural science research (“problem understanding paradigm”) and design science research (“problem solving paradigm”) (Hevner, et al. 2004; March & Smith 1995). Both approaches are valid and meaningful for business process management research. This paper will apply design science research and use a case study (Yin 2003) in order to contribute to call for IS research to be more relevant to practice (Baskerville & Myers 2004). Our exploratory research

clearly aims at understanding a decision-making process for process standardization in more detail. Our goal is to provide in-depth insights into this issue and to answer questions such as “why” and “how” rather than “how often” and “how many”.

Understanding the decision-making process means making the problem transparent in the first place (Simon 1996). The goal of design science research is utility and this paradigm has its roots in engineering (Simon 1996; Hevner et al. 2004; Vaichnavi & Kuechler 2004). Utility lies in creating new and innovative artefacts, in order to solve identified organizational problems, that is in our case the question how to evaluate business processes in the context of BPS. IT artefacts are defined as constructs (vocabulary and symbols), models (abstraction and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems). Hevner et al. (2004) propose evaluating the IT artefacts created based on seven guidelines which we will apply to our newly developed artefact at the end of our paper.

We carried out a detailed literature review described in section 4 before we tested the utility of our artefact within a case study (compare section 5). Case studies (Yin 2003) use natural language for data collection and analysis and rely heavily on human perceptions. The focus of case studies is on general patterns and they are preferred in exploratory research to answer “how”, “what” or “why” questions (Yin 2003). Case studies are also appropriate in real-life scenarios for an in-depth exploration of a specific phenomenon. These qualitative modes of inquiry are suitable for the proposed research question because this paper aims at exploring the criteria relevant for decision-making in regard to the standardization of business processes. Two interviews in total were carried out. One of the researchers had full access to all process models, information systems, documents and reports and worked in the corresponding company for three years. This ensures to get in-depth insights into decision making processes concerning business process standardization. The observed facts were documented and verified by interviewing the respective process managers on the selected business process. Each interview was transcribed as a case protocol and sent back to the process managers for confirmation to guarantee correctness and completeness. In the case of different opinions concerning the characteristics of the criteria, these differences were discussed and a common characteristic was agreed on. Furthermore, administrative documents (presentations, process models, reports, etc.) and researchers’ field notes formed the basis for developing the artefact that was jointly reviewed and discussed with other researchers.

4 TOOL DEVELOPMENT

4.1 Identification and operationalization of the criteria

Our research is based on an extensive analysis of scientific papers originating from four reputable databases in the field of BPM (IEEEXplore Digital Library; AIS Electronic Library; ACM Digital Library; Emerald). The methodology we used to identify the relevant papers was developed with reference to Reynolds et al. (2003), David & Han (2004) and Newbert (2007). The search terms used were “Business Process Standardization” and “Standardization of Business Processes” as well as in the British notation. These search terms were used to ensure, that the identified criteria can be used to evaluate business processes with regard to its standardization (Zellner 2012). Finally we analyzed 103 scientific publications that were suitable for our research (Zellner 2012). The identification of the criteria was accomplished by the content analysis method developed by Mayring (2000) who argues that this method is appropriate for the development of an inductive category. The procedure of inductive category development led to 34 criteria for the evaluation of business processes in the context of BPS. We consolidated the criteria by eliminating redundancies. For this purpose, we grouped the criteria semantically and deployed a common denotation, as shown in Table 2 Zellner (2012).

Identified Group	Common denotation
"The full benefits of standardization […] if the processes are *repetitive* […] (Seethamraju 2009)."	Transaction frequency
"In a *volume business*, if you have standard business […] this can only lead to efficiency (Grisdale & Seymour 2011)."	Transaction frequency

Table 2. Reduction of the identified criteria

As a next step, we ensured with regard to Eisenfuehr et al. (2010) that the consolidated criteria were independent of each other. This is a necessary precondition in order to use the tool for decision-making processes. The procedure described led to a reduction of the initial criteria so that seven distinct criteria remained. In accordance with Churchill (1979) and Jansen et al. (1990), the criteria were operationalized and their impact on BPS was identified as described in the literature.

Identified Criteria	Operationalized criteria and impact on BPS
Degree of predictability (C1)	The degree of predictability represents the possibility of observing a process in such a way that the necessary actions of the process can be determined ex ante (Lillrank & Matti 2004). The more predictable a process, the better it can be standardized (Martin & Bell 2011).
Degree of tacit knowledge (C2)	Tacit knowledge is the kind of knowledge which can hardly be articulated (Krogh et al. 2000). The lower the degree of tacit knowledge of a process, the better it can be standardized (Schaefermeier et al. 2010).
Involvement of project participants (C3)	Project participants are people who meet periodically throughout the project to discuss common goals and difficulties and work on the project (King 2009). We define a project participant as any kind of party, e.g. divisions, which have to be involved during the project implementation to realize the process successfully. The higher the involvement of project participants, the more effort is needed to standardize a process (Kien & Lian 2009).
Degree of environmental dynamism (C4)	The degree to which forces in the specific and general environments change over time (Jones 2004). The more unstable the environment of a company, the more effort is needed to keep the standard up to date (Neirotti et al. 2011).
Strategic significance of business process (C5)	The strategic significance means the degree of ability of a process to execute the company's strategy in order to realize competitive advantages (Jones 2004). The higher the significance of the business process, the bigger the benefit of business process standardization (Davenport 1993).
Degree of inefficient process variety (C6)	Variety represents different ways to fulfill the same need (Lillrank 2003). We define inefficient process variety as the number of different, inefficient ways to perform a process. The higher the inefficient variation of a process, the bigger the benefit of business process standardization (Ross et al. 2006).
Transaction frequency (C7)	Transaction frequency refers to the rate of occurrence of a transaction (process) (Duan 2007). The higher the transaction frequency, the bigger the benefit of business process standardization (Schaefermeier et al. 2010).

Table 3 . Benefits of BPS

Due to these characteristics and in line with Babbie (2010), the above mentioned criteria can only be observed indirectly. To gather reliable information concerning the actual occurrence of the identified criteria, indicators for each criterion were developed. The identified criteria and indicators were tested in several companies and were discussed within our research community to ensure reliability. The results of the tests led to several alignments and re-tests.

4.2 Development of the decision tool

With regard to the research question and on the basis of the current literature as well as on the basis of feedback from many practitioners, there are two main aspects which have to be taken into account in order to answer the research question. Firstly, those business processes should be standardized which contain characteristics which makes it *possible* to standardize the process. Secondly the respective process should contain characteristics which makes it *useful* to standardize it (Schaefermeier et al. 2010; Schaefermeier & Rosenkranz 2011). The two aspects represent the decision space in which business processes need to be evaluated in the context of BPS. Due to the fact that the aspects were independent of each other, the use of a decision matrix became possible. Decision matrices, such as the Boston Consulting Group matrix, are useful and widely-adopted tools to support decision-making processes in complex and difficult situations (Dan et al. 1985; Armstrong & Brodie 1994). To devise the decision matrix in our case, the next step was to consolidate the identified criteria to two dimensions. Table 4 summarizes the relevant dimensions with the corresponding criteria. The consolidation was done with regard to the reviewed literature described in section 4.1 and was discussed within our research institute.

Degree of anticipation of process execution	**Potential advantage of business process standardization**	
• Degree of predictability (C1) • Degree of tacit knowledge (C2)	• Involvement of project participants (C3) • Degree of environmental dynamism (C4)	• Strategic significance of business process (C5) • Degree of inefficient process variety (C6) • Transaction frequency (C7)

Table 4. Dimensions and criteria of the decision-tool

The dimension *degree of anticipation of process execution* (D_1) consists of two criteria (C1-C2). On this basis it is possible to decide whether a process can be determined and described in detail ex-ante to its execution. Thus we can evaluate whether it is *possible* to standardize a process in the first place. The dimension *potential advantage of business process standardization* (D_2) involves five criteria (C3-C7) which indicate the potential effort (C3 and C4) required to standardize a business process and the potential benefit of a standardized process (C5 – C7). With the help of this second dimension it is possible to evaluate whether it is *useful* to standardize a business process. With regard to the above mentioned two important aspects, we decided to develop two instead of potentially more possible dimensions in order to reduce the overall complexity for management while making decisions about BPS. Based on feedback from practitioners, the tool should be easy to apply and it should be easy to communicate the results. From our point of view the two developed dimensions contain all the relevant information in order to evaluate business processes properly in the context of business process standardization. In a next step a questionnaire was developed in order to gather the required information and to test the tool in real case scenarios. The data collection was carried out through semi-structured interviews. The questions were designed on the basis of the identified criteria and the corresponding indicators. A nine-point Likert scale was used. The questionnaire was pre-tested in several companies and in a research organization to ensure its applicability

Finally, the decision matrix was created. The grading within each dimension was realized by a utility analysis. Each criterion within each dimension needs to be weighted. In this case several methods, e.g. the trade-off method or the direct-ratio method, are possible (Eisenfuehr et al. 2010). It was not possible

to find valid evidence of a difference in importance concerning the weightings of the identified criteria. Accordingly, each criterion in each dimension was weighted equally. We used the same logic in order to define the influence of each characteristic of each criterion correlating to the nine-point Likert scale (high or low). This procedure enables the definition of the boundaries of each dimension

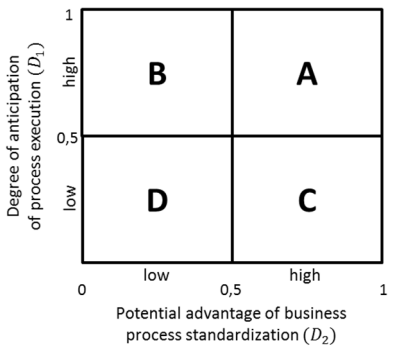

Figure 1. Decision tool for evaluation of business processes

The procedure described led to the matrix depicted in figure 1. As a last step for each of the four options (A-D), recommendations concerning BPS were defined. The following recommendations were given:

- A: Standardize business process with high priority
- C: Do not standardize or standardize business process with low priority
- B+D: Standardize business process with medium priority.

In cells B and D no clear recommendation can be given. In this case, situational factors have to be taken into account such as the current economic situation of the company.

5 CASE STUDY

5.1 Setting

Our case study relates to AGRAVIS, a German trading group in the agricultural trade sector. With about 5,500 employees and 7 billion EUR sales volume, AGRAVIS is one of the leading companies in Germany in this area. AGRAVIS consists of six business areas and three distribution channels. AGRAVIS can be described as a decentralized company whose history is based on many mergers and acquisitions. In 2009, a project was launched in order to standardize invoice management. An analysis of the relevant processes found 42 different practices for booking invoices. Further research showed that the different methods for invoice booking led to many negative effects such as high lead times, numerous interfaces, low process quality, and additional and individual IT requirements. The simple structure of invoice processes and the huge inefficiencies that were identified led to one of the most important projects in AGRAVIS´s history. The subject of the project was business process optimization by means of BPS. Because of the historically grown process landscape and different business areas, the important practical questions were whether it was possible and useful to standardize AGRAVIS´s business processes.

The focus of the project was concerning AGRAVIS´s core business: the trading with agricultural goods. A pilot project was launched and applied in a business area in which the characteristics were representative for the whole group. At the same time, a decision tool was developed and tested in one particular business area, namely SPECIAL ANIMAL FEEDSTUFFs (SPAF). The focus of our investigation was the trading process by which SPAF buys and sells its products. SPAF trades with preliminary products and core products for feeding animals such as pigs and cattle. It is subdivided into four sections which represent different kinds of product groups. Finally the trading process has to deal with different product types and their corresponding suppliers and supply agreements, different modal splits, the usage of internal and external stores as well as the usage of service providers to realize the business within the four sections. This clearly shows the overall complexity of this business process. Trading within the four sections is realized by different sub-units which are not consistently related to each section. Each section has its own sub-units for trading.

5.2 Analysis

This section describes the results of the interviews carried out at AGRAVIS. The trading process was standardized by two process managers. In a first step of the standardization project, the current situation of the trading process was analysed, by carrying out several workshops in which the process participants described their business operations. The results were documented by the process managers and finally evaluated by the process participants to guarantee correctness. In the case of different opinions of the two process managers concerning the characteristics of the criteria, these differences were discussed and a common characteristic was agreed on. These documents and the project-specific knowledge represent the process managers' source of knowledge. Table 5 shows the characteristics found in the course of the case study.

Degree of anticipation of process execution		**Potential advantage of business process standardization**			
Degree of predictability (C1)	high	Involvement of project participants (C3)	high	Strategic significance of business process (C5)	very high
Degree of tacit knowledge (C2)	low	Degree of environmental dynamism (C4)	very low	Degree of inefficient process variety (C6)	high
				Transaction frequency (C7)	very high

Table 5. Observed characteristics of the criteria

The process managers described the trading process as very highly predictable (C1). The necessary actions for process execution could be described ex ante. The process tasks were described as routine and the inputs and outputs of the trading process were well known and predictable before the process was realized. Overall the trading process contains patterns which can be observed in each process execution. One process manager told us that only few exceptions existed where predictability was inhibited.

> *In a few cases, where products are not on stock and have to be produced (i.e. mixed), some actions occur which are hardly predictable in detail, such as calculation and optimization of recipes. In all other cases the trading process is very highly predictable.*

> *Most parts of the business are highly predictable. Of course, there are some exceptions, e.g. in a highly specific unit, but most of the business is simply buying and selling goods and the way it has to be done is very predictable.*

The trading process contains little tacit knowledge (C2). Most of the process tasks could be verbalized by the process employees. The process managers reported that there are some exceptions, e.g. in cases of market forecasts. But in most parts of the trading process the degree of tacit knowledge was seen as low.

> *Of course, there is some tacit knowledge, for instance in cases of market predictions where we have to decide whether we should reduce or increase our stock. Further, there is some tacit knowledge in the order disposition. Nevertheless, most of the trading process can be clearly articulated and verbalized.*

The involvement of project participants (C3) was rated high. In all phases of process standardization, different parties have to be involved. The parties provided important information concerning the business, evaluated work results or offered specialist knowledge, such as system preferences of the IT system.

> *Yes, there are some participants and we need them to gather reliable information about their business and to evaluate our project results.*

Especially in the design workshops and training courses, it is important that most of the employees and a member of the IT department are present. Overall, I would rate the involvement as high.

The degree of environmental dynamism (C4) was rated very low. Some factors, especially in the micro-environment, were identified which influence the trading process. But the change frequency and the corresponding consequence need to adapt the standard process is seen as very low by the process managers.

From my point of view there are only a few factors which might influence the designed standard process, e.g. Incoterms or some specific certifications of our business. And yes, they may be updated sometimes. But I wouldn't say that those updates lead to comprehensive adaptions of the standard process.

I would say we have a very low environmental dynamism. There are no comprehensive changes from my point of view. That's my statement. Of course, there are new customers and new products but that doesn't change our business radically. There isn't much dynamic in the environment.

The strategic significance of the process (C5) is seen as very high. AGRAVIS´s core business is trading with agricultural goods. SPAF is one of AGRAVIS´s core business areas, so it is not surprising that the trading process of SPAF has a high strategic significance.

According to our business strategy the trading process has of course a very high importance for our business.

Another criterion which was studied was the degree of inefficient process variety (C6). Both managers rated it high. In particular, different states of knowledge of the use of the IT system led to different, inefficient process variations.

For realizing the trading process we use a merchandise information system. But there is a different state of knowledge which led to different ways of process execution. And I think we have to unify the knowledge about our merchandise information system to avoid inefficient process variations.

A subsequent review of project documents showed e.g. that, compared to other business units at AGRAVIS, the trading process at SPAF was realized by using different system-documents in the IT-system. It seemed that the usage of the system-documents was arbitrarily and this led to a broad formation of inefficient process variants in each phase of the trading process. The usage of different system-documents was the main source of inefficient process varieties. Furthermore the project documents showed that receipt postings are realized at various times and therefore are not in a uniform way either. Additionally there was no consistent way in price maintenance in the IT-system which led again to later process variants.

Finally, we studied transaction frequency (C7). As the trading process is AGRAVIS´s core business, it is not surprising that the trading process of SPAF has a very high transaction frequency.

We do it every day. It has a high transaction frequency.

5.3 Findings

With regard to the case study analysis and AGRAVIS´s questions, we were able to provide a sophisticated answer based on the artefact we developed. AGRAVIS´s first question was whether a standardization of their business processes was *possible* (D_1). For this purpose we analyzed a trading process. Overall the analyzed trading process contained a *high degree of anticipation of process execution*. On basis of the criteria C1 and C2, the trading process could be characterized as highly predictable since it contained activities which clearly could be verbalized. It also contained clear patterns

and routine activities which made it possible to standardize the trading process. For our first dimension D_1 (consisting of criteria C1 and C2) we calculated the corresponding value based on the following formula: $D_i \sum_{Z=1}^{ni} c_{iz} C_{gi}$

c_{iz} refers to the selected value on the Likert scale (1-9) for criteria z of dimension i; c_{11}= 8 = high (the higher $c_{11}$the better a process can be standardized) and c_{12} = 7 = low (the lower $c_{12}$the better a process can be standardized). C is a constant based on our Likert scale from 1-9: C = 1/9 = 0.11. n_i refers to the number of criteria of dimension with n_1 = 2 (C1 and C2) and n_2 = 5 (C2 - C7). g_i refers to the equal weighting based on the number of criteria of the corresponding dimension; $g_i = 1/n_i$; g_1 = 1/2 = 0.5; $g_2 = 1/5 = 0.2$. Therfore D_1can be calculated as follows: D_1= 8 * 0.11 * 0.5 + 7 * 0.11 * 0.5 = 0.83.

The second question was whether a standardization of AGRAVIS ´s business was *useful* (D_2). The corresponding criteria C3-C7 showed that the *potential advantages of the standardization were high*. The effort required for the standardization was seen as medium while the benefit was seen as high. There was much effort required because of the high involvement of important parties. But the stable character of the relevant environment will prevent regular and comprehensive adjustments and therefore reduce future efforts to keep the standard up to date. The high utility was mainly based on the high strategic significance and the high degree of inefficient process variety. The elimination of the high degree of inefficient process variety will lead to positive effects for SPAF`s trading process. Furthermore, the high transaction frequency will lead to positive multiplier effects. The analysis of the questionnaire and the corresponding utility analysis with regard to C3-C7 led to a value for D_2 of 0.88.

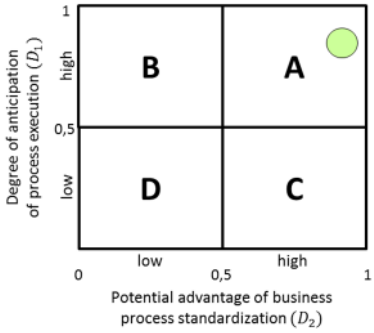

Figure 2. Trade process of SPAF in the decision tool

As for the developed decision tool it became apparent that the high *degree of anticipation of process execution* and the high *potential advantage of business process standardization* led to the recommendation of cell A "Standardize business process with high priority". This shows that the developed decision tool led to applicable results in practice. AGRAVIS is now able to evaluate its business processes within the two decision-making dimensions and the corresponding decision criteria. AGRAVIS now has a sound foundation for the evaluation of further standardization projects. Based on feedback from practitioners and colleagues from the scientific community, we were able to constantly review and improve our tool. In a slightly different configuration, the tool was applied to a trading process in another business area at AGRAVIS. Our tool led to the same recommendation ("Standardize business process with high priority"). The new standard process was implemented via a comprehensive process-guideline and several customizations in the corresponding IT-systems. The implementation was guided by an extensive training of employees to ensure the compliance of the new standard trading process. After implementing the new standard process, a lot of positive effects have been realized within four months. The new standard trading process enabled AGRAVIS to invoice its customers about 10 days earlier (reduction of cycle *time*), which led to remarkable advantages for the company's cash flow. In addition, the standardized trading process led to a productivity gain of 20% in the respective section which enables AGRAVIS to reduce operational *costs* significantly (same amount of work can be operated with 20 % less manpower). Finally, the standard process improved the system usage which led to fewer cancellations of processes in the IT-system (improved *quality*). This shows that the decision, which in our case was based on the developed artefact, was the right one. Furthermore, based on the interviews that were carried out we can confirm that the tool significantly helped decision makers to structure the problem in the first place. Thereby it was possible to base the decision on a theoretically sound method and to properly document the criteria for the decision. Also, the time required to prepare the decision memo was reduced, leading to an overall more efficient decision making-process for BPS. Based on the recommendation of our tool the standardized trading process is currently implemented in SPAF and there are first indications which show similar positive effects. There

is therefore first evidence that our tool can be used to improve decision-making processes for BPS projects. However, further research needs to be carried out and the tool needs to be tested in more cases at different companies and in different industries. In our case, AGRAVIS was able to benefit from the BPS decision in terms of process improvements in cost, quality and cycle time.

6 EVALUATION

The purpose of this paper was the development of a tool for the proper evaluation of business processes in the context of BPS. This was realized by research in accordance with design science research, following the guidelines of design science described by Hevner et al. (2004). To ensure conformity, we set the guidelines in contrast to our procedure and results.

1. Design as artefact: The matrix represents a method which makes it possible to evaluate business processes in the context of standardization before any essential investments are made. The results of the case study show that the designed artefact is viable. Furthermore, the tool was pre-tested in several other companies within the tool development and beyond this case study to ensure applicability.
2. Problem relevance: BPS is currently a very relevant topic in BPM. In section one and two we showed that the current discussion fails to establish a systematic approach for the evaluation of business processes. Furthermore AGRAVIS was affected by the problem of evaluation of business processes in the context of BPS and this shows the relevance of this problem in practice.
3. Design evaluation: Utility, quality and efficacy was shown via a case study approach. Based on interviews at AGRAVIS, the designed artefact led to a clear understanding of relevant process characteristics in regard to BPS. It became possible to clearly argue, that the selected business processes for BPS contain characteristics which justify the invested effort in BPS. Furthermore, managers at AGRAVIS were able to decide more efficiently (in terms of time spent on making the decision) whether a business process is suitable for BPS or not. Based on the interviews which have been carried out, the tool proved to be very useful and easy to understand in a real case scenario. With the help of the tool it became possible to structure the decision making process for BPS at AGRAVIS, to document underlying assumptions properly and to easily communicate the results internally.
4. Research contribution: The developed artefact is the research contribution, since it enhances the decision-making process for the theoretically-sound evaluation of possible business processes for standardization. The identified dimensions, criteria and guidelines on how to devise the decision matrix make the problem transparent and show very clearly “how” to decide in such situations. Based on a detailed literature research, we developed an artefact (combination of identified dimensions, criteria, matrix and guidelines) that can significantly improve and guide the decision making for BPS projects.
5. Research rigour: Our research relies upon rigorous methods. During the construction of the artefact the criteria have been identified via a comprehensive literature review with regard to Mayring´s approach of inductive category development (Mayring 2000). The operationalization of the criteria was based on the recommendation of Churchill (1979) and Jansen et al. (1990). We followed Babbie (2010) to identify the corresponding indicators for the evaluation of the criteria. Finally, our motivation was to answer the question “how” to evaluate business processes in the context of BPS. Two important aspects were derived from our research question and in accordance with Yin (2003) we realized a case study approach to answer the question. Our research results have been evaluated carefully via several instances and we applied the guidelines of Hevner et al. (2004) in order to evaluate our artefact.
6. Design as a search process: The identified dimensions, criteria, indicators and interview guidelines have been tested and reconfigured several times before they were used in the case study. Our tool is based on some simplified assumptions e.g. that the staff is motivated and has

the skills to support the BPS-project. However, it is still necessary to use our artefact in more case studies and to measure ex-post if the predicted benefits have been reaped or not.

7. Communication of research: From our point of view our results are useful for a technology-oriented audience as well as for management-orientated audiences. Technology-oriented audiences may be interested in integrating the artefact into Business Process Management Software. A clear guideline is provided to the rather management-oriented audience on *how* to decide whether a business process should be standardized or not.

Finally our research enables managers to assess whether a process is suitable for BPS before any investments are made. The developed artefact enables companies to manage their process landscapes more efficiently for BPS projects. Thus our research provides the necessary preconditions for companies to fully enjoy the benefits offered by BPS and to face the challenge of the highly volatile global economic situation.

7 CONCLUSION AND FUTURE RESEARCH

In this paper we developed a tool for evaluating business processes in the context of BPS. Based on a literature review, several criteria for the evaluation of processes were developed. With regard to our guiding research questions – How to evaluate business processes in the context of BPS – we identified two critical aspects which have to be taken into account. Those aspects are whether a process contains characteristics which makes it *possible* and *useful* to standardize it. With respect to the identified aspects, we merged the identified criteria to two dimensions which represent the decision space with regard to our research question. The resulting decision matrix was enriched with four recommendations for BPS projects. We tested our tool via a case study approach to ensure its applicability and utility. The results show that our tool leads to useful results in practice. To the best of our knowledge, this is the first systematic decision-tool which enables managers to decide whether a process should be standardized before significant investments are made. Companies and other interested parties may benefit from our research, since the artefact is easy to use and rather self-explanatory. From a theoretical and a practical point of view our research provides a sound foundation to manage process landscape more efficiently. Finally, the developed tool sets the essential precondition for streamlining business processes and therefore to fully benefit from BPS.

Nevertheless, there are some limitations to our research. First of all, we used a qualitative approach which might limit the validity of our results. Although validity in quality research can be strengthened through methodological rigor, the results may depend on the researcher's judgments and interpretation. In this regard, the identification of the criteria may have been affected by our experience or expectations. To enhance the validity of the identified criteria, more sophisticated measurements e.g. quantitative approaches are necessary. This is important to identify further factors (e.g. organization type, size, culture etc.) which may influence the applicability and utility of the tool. Furthermore, the case is the only setting for which our findings are valid at present. For generalization and to further enhance validity, our artefact needs to be utilized in additional cases. This could be helpful to ensure that the artefact leads to different recommendations. The next step is to carry out further case studies in other companies and different sectors to enhance the validity of the artefact. A final step is to integrate the artefact into a process model of BPS to offer companies and other interested parties a comprehensive guideline for BPS projects.

Questionnaire

The predictability of the process is high.	The strategic importance of the process is high.
The proportion of tacit knowledge is high	The involvement of the project participants is high.
The transaction frequency is high.	The corporate environment is highly stable.
The avoidable process variety of the process is high.	

References

Armstrong, J.S. and Brodie, R.J. (1994). Effects of portfolio planning methods on decision making: Experimental results. Internationals Journal of Research in Marketing, 11 (1), 73-84.

Arshad, N.I. and Bosua, R. and Milton, S.K. (2010). Facilitating Information Sharing in Organizations using Electronic Content Management Systems (ECMS): Towards a Model. In Proceedings of the Australasian Conference on Information Systems (ACIS Ed.), Brisbane, Australia.

Babbie, E. (2010). The Practice of Social Research. 12th Edition, Wadsworth, Belmont.

Baskerville, R.L. and Myers, M.D. (2004). Special Issue on Action research in Information Systems: Making IS Research Relevant to Practice-Foreword. MIS Quarterly, 28 (3), 329-335.

Beimborn, D. and Nils, J. and Gleisner, F. and Hackethal, A. (2009). The Role of Process Standardization in Achieving IT Business Value. In Proceedings of the 42nd Annual Hawaii International Conference on System Sciences (Sprague, R.H. Ed.), Waikoloa, Hawaii.

Churchill, G.A. (1979). A paradigm for developing better measures of marketing constructs. XVI (1), Journal of Marketing Research, p. 64-73.

Dan, R and Kesner, I.F. (1985). Organizational Growth: Big Is Beautiful. Journal of Business Strategy, 6 (1), 38-48.

Davenport, T. (1993). Process Innovation. 1st Edition. Harvard Business Review Press, Boston.

Davenport, T. (2005). The Coming Commoditization of Processes. Harvard Business Review, 27 (6), 100-108.

Davenport, T. and Short, J. (1990).The new industrial engineering: Information technology and business process redesign, 31 (4), 11-27.

David, R.J. and Han, S.K. (2004). A systematic assessment of the empirical support for transactional cost economies. Strategic Management Journal, 25 (1), 39-58.

Duan, Z. (2007). The Correspondences of the E-Commerce Models with Various Attributes of E-Commerce Transaction. In Integration and Innovation Orient to E-Society. (Wang. W. and Li, Y. and Duan, Z. and Yan, L. and Li, H. and Yang, X Eds.), p. 630–642, Springer, New York.

Eckhardt, A. (2009). There is something about process standards: An empirical analysis. In Proceedings of the international Conference on Information Resources Management (CONF-IRM Ed.), Dubai, United Arab Emirates.

Eisenfuehr, F. and Weber, M. and Langer, T. (2010). Rational decision making. 1st Edition. Springer, Heidelberg.

Gong, Q. (2012). Enterprise System Consolidation. Stockholm University.

Gosain, S. and Malhotra, A. (2005). Coordinating for Flexibility in e-Business Supply Chains. Journal of Management Information Systems, 21 (3), p. 7-45.

Grisdale, W. and Seymour, L. (2011). Business process management adoption: a case study of a South African supermarket retailer. In Proceedings of the South African Institute of Computer Scientists and Information Technologists Conference on Knowledge, Innovation and Leadership in a Diverse, Multidisciplinary Environment, (SAICSIT Ed.) p. 106-115, Capetown, South Africa.

Hadfield, W. (2007). BP to save 600 million pounds in global IT process standardisation. Computer Weekly, (5).

Hall J.M., Johnson, M.E. (2009). When Should a Process Be Art Not Science?. Harvard Business Review, 31 (3), 58-65.

Hammer, M. and Champy, J. (2007). Reengineering the corporation. 9th Edition. Harper Business, New York.

Hammer, M. and Stanton, S. (1999). How Process Enterprises Really Work. Harvard Business Review, 21 (6), 108-117.

Harrington, J. and Esseling, E. and Nimwegen, H. (1997). Business Process Improvement Workbook. 1st Edition. McGraw-Hill, New York.

Hevner, A.; March, S.; Park, J.; Ram, S. (2004): Design Science in Information Systems Research. MIS Quarterly, Vol. 28, No. 1, pp. 75–105.

Jansen, W. and Dessens, J.A.G. and Priem, H.D. (1990). Operationalization and Measurement. The Primacy of Objective Data. 1st Edition, Swets & Zeitlinger B. V., Amerstdam.

Jones, G. (2004). Organizational Theory, Design, and Change. 4th Edition. Prentice-Hall, Cloth.

Kettinger, W. and Teng, J. (1997). Business Process Change. A Study of Methodologies, Techniques, and Tools. MIS Quarterly Executive, 21 (1), 55-80.

King, V. (2009). Constructing a team: a US perspective. In The Organization and Management of Construction – Volume Two: Managing the Construction Project and Managing Risk, (Langford, D. A. and Retik, A. Eds.), 414-424, Taylor & Francis, New York.

Kien, S.S. and Lian, Y.P. (2009). Building Enterprise Integration Through Enterprise Resource Planning Systems. In Proceedings of the International Conference on Information Systems. (ICIS Ed.), Phoenix, Arizona.

Krogh, G. and Ichijō, K. and Nonaka, I. (2000). Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation. 1st Edition. Oxford University Press, Oxford.

Lee, G. and William, D. and Alberto, E. (2010). The Main and Interaction Effects of Process Rigor, Process Standardization, and Process Agility on System Performance in Distributed IS Development: An Ambidexterity Perspective. In Proceedings of the International Conference on Information Systems (ICIS Ed.), Saint Louis, Missouri.

Lillrank, P. (2003). The quality of standard, routine and nonroutine processes. Organization Studies, 24 (2), p. 215–233.

Lillrank, P. and Liukko, M. (2004). Standard, routine and non-routine processes in health care. International Journal of Health Care Quality Assurance, 17 (1), 39–46.

Manrodt, K.B. and Vitasek, K. (2004). Global Process Standardization: A case study. Journal of Business Logistics, 25 (1), 1-23.

Martin, T. and Bell, J. (2011). New Horizons in Standardized Work. 1st Edition. CRC Press, New York.

March, T.S. and Smith, G. (1995): Design and Natural Science Research on Information Technology. Decision Support Systems, Vol. 15, No. 4, pp. 251–266. Mårtensson, P.; Lee, A.S.: Dialogical Action Research at Omega Corporation. In: MIS Quarterly, 28 (2004) 3, pp. 507-536.

Mayring, P. (2000). Qualitative Content Analysis. Forum Qualitative Social Research, 1 (2), 1-10.

Muenstermann, B. and Eckhardt, A. (2009). What drives business process standardization? A case study approach. In Proceedings of the International Information Resources Management (Conf-IRM Ed.), Dubai, United Arab Emirates.

Muenstermann, B. and Eckhardt, A. and Weitzel, T. (2009a). Join the standard forces - Examining the combined impact of process and data standards on business process performance. In Proceedings of the 42nd Annual Hawaii International Conference on System Sciences (Sprague, R.H. Ed.), Waikoloa, Hawaii.

Muenstermann, B. and Eckhardt, A. and Weitzel, T. (2010). The performance impact of business process standardization. Business Process Management Journal, 16 (1), p. 29-56.

Muenstermann, B. and Joachim, N. and Beimborn, D. (2009b). An empirical evaluation of the impact of process standardization on process performance and flexibility. In Proceedings of the 15th Americas Conference on Information Systems (AMCIS Ed.), San Francisco, California.

Muenstermann, B. and Moederer, P. and Weitzel, T. (2010). Setting up and managing business process standardization - Insights from a case study with a multinational e-commerce firm. In Proceedings of the 43rd Hawaii International Conference on System Sciences (HICSS Ed.),Honolulu, Hawaii.

Muenstermann, B. and Weitzel, T. (2008). What Is Process Standardization? In Proceedings of the International Information Resources Management (Conf-IRM Ed.), Ontario, Canada.

Neirotti, P. and Paolucci, E. and Ragueso, E. (2011). Diffusion of Telework: Myth or Reality? Some Stylized Facts on Telework Diffusion in Italian Firms. In Proceedings of the 10th International Conference on Mobile Business (ICMB Ed.), Como, Italy.

Newbert, S. (2007). Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. Strategic Management Journal, 28 (2), 121-146.

Reynolds, N. and Simintiras, A. and Vlachou, E. (2003). International business negotiations: Present knowledge and direction for future research. International Marketing Review, 20 (3), 236-261.

Ross, J. and Weill, P. and Robertson, D.C. (2006). Enterprise architecture as strategy. Creating a foundation for business execution. 1st Edition. Harvard Business School Press, Boston.

Schaefermeier, M. and Grgecic, D. and Rosenkranz, C. (2010). Factors Influencing Business Process Standardization: A Multiple Case Study. In Proceedings of the 43rd Hawaii International Conference on System Sciences – 2010 (HICSS Ed.), Koloa, Hawaii.

Schaefermeier, M. and Rosenkranz, C. (2011). "To Standardize Or Not To Standardize?"- Understanding the effect of Business Process Complexity on Business Process Standardization. In Proceedings of the 19th European Conference on Information Systems - ICT and Sustainable Service Development (ECIS Ed.), Helsinki, Finland.

Schreiber, B. and Eckhardt, A. and Laumer, S. (2010). Between Cost Efficacy and Limited Innovation - A Scientometric Study of Business Process Standardization (AMCIS Ed.), Lima, Peru.

Seethamraju, J. (2009). Enterprise Systems and Business Process Agility - A Case Study. In Proceedings of the 43rd Hawaii International Conference on System Sciences – 2010 (HICSS Ed.), Waikoloa, Hawaii.

Simon, H.A. (1996). The Sciences of the Artificial. 3rd Edition. MIT Press, Cambridge.

Soederstroem, E. and Ahlfelt, R.M. and Eriksson, N. (2009). Standards for information security and processes in healthcare. Journal of Systems and Information Technology, 11 (3), p. 295-308.

Swaminathan, J.M. (2001). Enabling customization using standardized operations. California Management Review, 43 (3), 125-135.

Ungan, M. (2006). Standardization through process documentation. Business Process Management Journal, 12 (2), p. 135-148.

Vaichnavi, V. and Kuechler, W. (2004). Design Science Research in Information Systems. last time accessed on December 31, 2012. URL: http://www.desrist.org/desrist.

Wüllenweber, K. and Beimborn, D. and Koenig, W. and Weitzel, T. (2008). The impact of process standardization on business process outsourcing success. In: Information Systems Outsourcing (Hirschheim, R. and Heinzl, A. and Dibbern, J. Eds.), p. 211-224, Springer, Heidelberg.

Wüllenweber, K. and Weitzel, T. (2007). An empirical exploration of how process standardization reduces outsourcing risks. In Proceedings of the 40th Annual Hawaii International Conference on System Sciences (HICSS Ed.), Big Island, Hawaii.

Vaichnavi, V. and Kuechler, W. (2004). Design Science Research in Information Systems. last time accessed on December 31, 2012. URL: http://www.desrist.org/desrist.

Valiris, G. and Glykas, M. (1999). Critical review of existing BPR methodologies. Business Process Management Journal, 5 (1), 65-86.

Yin, R.K. (2003). Case Study Research: Design and Methods. 4th Edition. Thousand Oaks, California.

Zellner, P. (2012). Criteria for the evaluation and selection of business processes in the context of business process standardization. In Proceedings of the 3rd International Conference on Business and Economics (ICBE Ed.), Capetown, South Africa.