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Abstract

Purpose – Business process change (BPC) initiatives are complex endeavors, which require many different sets of capabilities from the organization (e.g. IT, change management, project management capabilities). This study aims to examine which capabilities matter for successful BPC.

Design/methodology/approach – The paper posits that a structured analysis of case studies will help in identifying the capabilities relevant for BPC. Against this background, the paper adopted a case survey methodology, which combines the richness of case studies with the benefit of analyzing large quantities of data. The paper identified and analyzed 130 case studies reporting the past BPC project experiences.

Findings – The results show that project management, change management and IT capabilities have a positive impact on BPC project performance. IT capabilities also have a positive impact on the final process performance. Thus, IT capabilities matter for both BPC project and process performance.

Research limitations/implications – The study had a few limitations, such as the use of secondary data. More so, assigning numbers to qualitative data unduly simplifies the complex phenomena under investigation and may leave out some of the richness of case research.

Practical implications – The findings provide considerable support for determining which capabilities practitioners need to leverage and develop when improving their business processes.

Originality/value – The study makes a number of contributions. It fills a gap in the literature concerning which capabilities matter for successful BPC. The paper offers a theoretical explanation of the effects of capabilities on the BPC project and process performance. Another contribution is methodological, in that the paper adopted the case survey method, which is still new to information systems research.

Keywords Research methods, PLS, Capabilities, Process management, Business process change, Resource-based theory, Case survey methodology

Paper type Research paper

1. Introduction

Business process change (BPC)[1] has been on the agenda of organizations for decades (Hammer and Champy, 1993). The latest Gartner surveys show that improving business process performance is still a top priority of CIOs (Hill and McCoy, 2011; Lopez, 2011). However, many organizations are daunted by the challenges and risks that BPC imposes (Hill and McCoy, 2011). Most companies no longer have the luxury of funding BPC projects that may not succeed. Yet, the high failure rates of BPC projects show that not much clarity exists among practitioners and researchers on the factors impacting BPC success (Hammer and Champy, 1993; Al-Mashari *et al.*, 2001; Trkman, 2010).

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Resource based theory (RBT) suggests that inter-firm performance differences can be ascribed to non-imitable and non-substitutable organizational resources and capabilities being heterogeneously distributed among firms (Barney *et al.*, 2011). Accordingly, performance differences between BPC projects – why some fail while others succeed – can be attributed to differences in resources and capabilities. Research shows that the resources, which are needed for a successful BPC project, do not present a source of competitive advantage by themselves but are rather mere input factors (Melville *et al.*, 2004). Important for the success of a BPC project and the performance of the improved business process is that the organization possesses the necessary capabilities to select, deploy, and organize these resources. BPC initiatives are complex endeavors, which require many different sets of capabilities from the organization (e.g. IT, change management, project management capabilities). In accordance with the RBT, we argue that whenever a BPC project fails certain capabilities must be lacking (Barney *et al.*, 2011). Consequently, organizations undergoing BPC need to develop and leverage those capabilities pertaining to the success of such change projects. However, this is a difficult task considering that not much clarity exists on which capabilities matter for BPC. Thus, we seek to answer the following research question:

RQ1. Which capabilities matter for successful BPC?

Researchers have provided valuable insights of past BPC projects (Kettinger and Grover, 1995; Huizing *et al.*, 1997; Guha *et al.*, 1997; Teng *et al.*, 1998; Markus and Grover, 2008; Trkman, 2010). The BPC research field builds on a wealth of knowledge derived from a large number of case studies. All of these case studies provide comprehensive reviews of past failures and successes. This rich pool of knowledge has remained largely unexploited. We posit that a structured analysis of these case studies will help in identifying the capabilities relevant for BPC. Against this background, we adopted a case survey methodology, which combines the richness of case studies with the benefit of analyzing large quantities of data (Rivard and Lapointe, 2012).

The paper is organized as follows. After discussing the theoretical basis, we introduce the variables relevant for our research model and the corresponding hypotheses. In the method section, we discuss our approach for building a case database that includes 130 case studies reporting past BPC project experiences. More so, we show how the case studies were coded and analyzed statistically. Following the presentation of results, we discuss the research limitations and draw some final conclusions.

2. Theoretical background

The RBT provides an appropriate theoretical frame for analyzing BPC capabilities. To motivate the selection of our measurement variables and their latent variables, we begin by summarizing the core concepts of the RBT. Next, we define the concept BPC, show how it relates to other concepts and discuss the important impact factors.

2.1 Resource-based theory

The RBT is widely recognized as a powerful management theory for understanding and explaining organizational performance differences (Barney *et al.*, 2011). According to the paradigm of the RBT, organizations achieve long-term competitive advantages based on certain, e.g. valuable, inimitable, and rare, resources and capabilities (Barney, 1986, 1991; Wernerfelt, 1995). The RBT explains the differences in performance – at the process level – in terms of types of resources and capabilities. Ray *et al.* (2005) argue that resources and capabilities can only be of value if they are exploited in the firm's processes.

Penrose (1959) first introduced the idea that firms are a collection of their productive resources. She defined resources as "the physical things a firm buys, leases, or produces for its own use, and the people hired on terms that make them effectively part of the firm" (Penrose, 1959). Other definitions are more inclusive by defining resources as the "assets, capabilities, organizational processes, firm attributes, information, knowledge, etc." (Barney, 1991) or "anything which could be thought of as a strength or weakness of a given firm" (Wernerfelt, 1995). According to Kraaijenbrink *et al.* (2009), these loose and all-inclusive definitions of the core concept of the RBT present a major weakness, because it does not allow for distinctions between resources as inputs to the firm and the capabilities that enable a firm to deploy these inputs. Other researchers have pointed out the necessity to define the distinction between the terms resource and capability (Amit and Schoemaker, 1993; Kraaijenbrink *et al.*, 2009; Makadok, 2001). Helfat and Peteraf (2003) assert that the heterogeneity of resources and capabilities constitutes one of the cornerstones of the RBT.

For the purposes of this paper, we follow the distinction of resources and capabilities put forth by Amit and Schoemaker (1993) and Makadok (2001). In line with Amit and Schoemaker (1993), we define the "firm's resources as stocks of available factors that are owned or controlled by the firm". In contrast, capabilities refer to a firm's capacity to select, deploy, and organize resources (Amit and Schoemaker, 1993; Kraaijenbrink *et al.*, 2009). Likewise, capabilities can be defined as repeatable patterns of actions (Wade and Hulland, 2004) or coordinated sets of tasks (Helfat and Peteraf, 2003).

2.2 Business process change

BPC has its roots in business process reengineering (BPR) and total quality management (TQM). Hammer and Champy (1993) define BPR as the fundamental rethinking and radical redesign of business processes. Research shows that the implementation of BPR often results in fundamental changes of the organization's structure, culture and processes (Al-Mashari and Zairi, 2000; Cao *et al.*, 2001). Considering these extensive organizational changes, it is not surprising that many reengineering efforts fail to achieve their goals (Trkman, 2010). However, whenever BPR is carried out successfully, dramatic improvements in critical efficiency and effectiveness measures such as cost, quality, service and time can be achieved (Sharafi *et al.*, 2011; Jurisch *et al.*, 2012a). For instance, the reengineering of Mobil Oil Australia resulted in reduced costs and increased customer orientation (Martin and Cheung, 2002). Huq and Martin (2006) reported improved information sharing, increased efficiency and higher employee motivation as the benefits of an IT-driven approach to BPR implementation. Past experiences also show that all BPR implementations are effectively change management programs (Zairi and Sinclair, 1995; Cao *et al.*, 2001). Hence, BPR not only necessitates top management support but also bottom-up employee empowerment (Paper *et al.*, 2001).

BPR, business process innovation (BPI) or business process transformation (BPT) are frequently used synonymously for the same phenomenon. According to Grover and Markus (2008) these variations in name of essentially the same concept were part of a bandwagon effect. All BPR, BPI and BPT projects are radical, revolutionary, and one-time undertakings (Davenport, 1993; Hammer, 1990; Grover *et al.*, 2000; Grover and Markus, 2008).

TQM is considered to be an integrated and more evolutionary approach for process improvement (Bucher and Winter, 2007). Furthermore, TQM aims at improving quality of products and services in all departments and functions (Koch, 2011). Similarly to continuous process improvement (CPI), Six Sigma has been promoted as a more continuous organizational change and improvement method (Sidorova and Isik, 2010). Contrary to CPI, Six Sigma projects rely on statistical methods to identify problems. Six Sigma projects include the designing, improving, and monitoring of business processes with the goal of reducing costs and enhance throughput times (Revere *et al.*, 2004; Nave, 2002). Chiarini (2012b) showed in a case study carried out at a public Italian hospital that Six Sigma cannot only lead to a reduction of financial costs but also to an improved work situation for employees. In fact, employees involved in Six Sigma projects often feel positive changes in many aspects of job satisfaction (Schön *et al.*, 2010). Nonetheless, Six Sigma just like BPR can be highly cost-intensive and favor short-term improvements over other results (Chiarini, 2012a).

While both approaches, revolutionary (e.g. BPR, BPT, BPI) and evolutionary (e.g. TQM, CPI, Six Sigma), share the common goal of improving processes, they are also frequently used complementary (Grover and Markus, 2008). Margherita and Petti (2010) posit that many projects are only labeled as BPR while they are in fact "normal improvement activities which are unlikely to bring radical innovation within the organization". Against this background, BPC can be viewed as a management concept that involves any type of process change – revolutionary (radical) or evolutionary (continuous) (Grover *et al.*, 2000; Grover and Markus, 2008). Figure 1 shows the central elements of BPC.

Research shows that various factors impact the success of BPC projects (Jurisch *et al.*, 2012b). These factors that need be present whenever organizations conduct important changes, but they are rather independent from the approach selected (e.g. BPR or TQM)

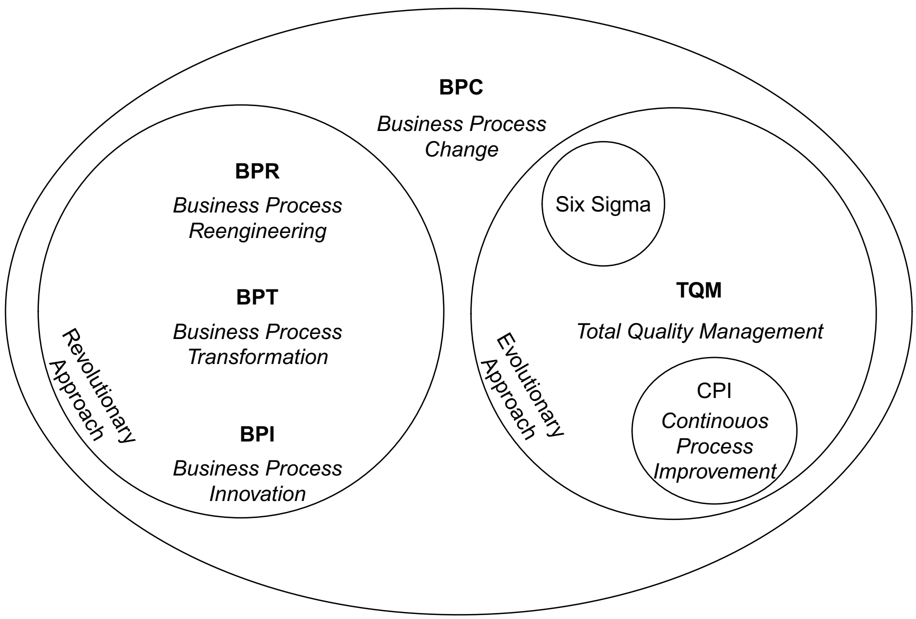

Figure 1.
Central elements of business process change

(Margherita and Petti, 2010). These factors can either be resources (Melville *et al.*, 2004) or capabilities (Niehaves *et al.*, 2011; Trkman, 2010) as well as the organizational structure, strategy and culture (Brock and Boonstra, 2008; Sarker *et al.*, 2006; Grover and Markus, 2008). The structure and culture of an organization determine the patterns of interactions in which a BPC project is embedded in. Both the organizational structure and culture are rather stable concepts and thus hard to change (Lewis, 1999). Hence, the scope of BPC initiatives is frequently to not only improve the business processes, but also on changing the organizational structure and culture in order for the organization to adopt to changes in the business environment (Grover and Kettinger, 1995).

Resources in the context of BPC projects are technological resources (e.g. hardware and software), human resources (e.g. intelligence, experience and relationships), and other resources that can be traded (e.g. assets, raw materials, patents, and licenses) (Grover and Kettinger, 1995; Karimi *et al.*, 2007; Teng *et al.*, 1996). Researchers conceded that technical, human or other resources, by themselves, do not pose a source of competitive advantage for an organization but are rather mere input factors (Melville *et al.*, 2004). Resources only add to the performance of a firm whenever they are used to "do something" (Ray *et al.*, 2004). Hence, in order for a BPC project to succeed and for the business process to perform, it is important that the organization possesses the necessary capabilities to select, deploy, and organize these resources.

The kind of capabilities available to an organization directly impact the success of a BPC project and the performance of the changed business processes (Ray *et al.*, 2004; Saeed *et al.*, 2005). The most frequently referred to capabilities in the BPC literature are change management (CM) capabilities (Ahmad *et al.*, 2007), project management (PM) capabilities (Lynn Crawford, 2006), business process management (BPM) capabilities (Trkman, 2010; Mathiesen *et al.*, 2011) and information technology (IT) capabilities (Melville *et al.*, 2004; Grover *et al.*, 1995). However, previous research does not address which of these capabilities impact the BPC project success as a whole and the performance of the improved business processes.

3. Research model and hypotheses

In the following sections we shortly introduce the dependent and independent variables as well as the corresponding hypotheses. It needs to be noted that the selection of capabilities was limited to main and most frequently discussed ones in BPC literature (Kettinger and Grover, 1995).

3.1 Business process performance

From a RBT perspective, business processes offer a framework through which to examine the point of direct capability exploitation (Melville *et al.*, 2004). In accordance with Ray *et al.* (2004), we define the business process performance as our dependent variable. This level of analysis offers an appropriate way to examine the kinds of capabilities impacting BPC.

The measurement of business process performance is crucial for achieving sustainable improvement (Trkman, 2010). The performance of the changed business processes is measurable through efficiency and effectiveness criteria (Neely *et al.*, 1995). Organizations strive to improve the performance of their business processes to achieve the maximum of output with a minimum of input (Nippa and Picot, 1995). This relation is measured by efficiency (Thommen and Achleitner, 2006), which is defined as the extent of capabilities used and needed to achieve the desired result – output per unit of input (Davenport, 1993). According to Harrington (1991), the effectiveness of a business process is defined as the extent to which the output of a process meets the needs and requirements of its customers.

3.2 BPC project performance

Since BPC is commonly project driven or part of a broader strategic initiative, the variable project performance assumes a central role in the proposed research model. A lack of capabilities can have a negative impact on BPC implementation and might prevent projects from succeeding (Niehaves, 2010). The success of a BPC project presents a multi-dimensional construct, which can be measured through classical project performance criteria (i.e. time, budget, and scope) but also through the overall project completion (Yetton *et al.*, 2000; Gemino *et al.*, 2008).

The causal linkage between project performance and business process performance has remained rather unexplored in BPC literature. Syamil *et al.* (2004) identified a relation between business process performance and project performance in product development processes. Nidumolu (1995) distinguishes between process and project performance when analyzing the effect of coordination and uncertainty on the success of software projects. Drawing on these observations, we theorize that the success of BPC projects consists of the project performance and the business process performance. If the project fails to meet its objectives (e.g. in time, budget, and scope) or is abandoned, the changed business process is also likely not to meet its performance goals. Thus, we hypothesize:

H1. The higher the BPC project performance, the higher the business process performance.

3.3 Business process management capabilities

Process-oriented literature views business process management (BPM) as "a structured approach to analyze and continually improve fundamental activities such as manufacturing, marketing, change management and other major elements of a company's operation" (Zairi, 1997, p. 64). BPM capabilities refer to a set of techniques, which integrate, build, and reconfigure an organization's business processes (Niehaves and Henser, 2011). In that BPM capabilities comprise the methods, techniques, and practices employed by an organization aimed at better stewardship of business processes. Depending on the objectives of the BPC these methods can be either revolutionary (e.g. BPM, BPI, BPT) and/or evolutionary (e.g. TQM, CPI, Six Sigma) (Guha *et al.*, 1997).

Insufficient documentation or knowledge (e.g. BPM methodologies, standards, and best-practices) about the overall business process context of an organization may impede effective BPC (Niehaves and Henser, 2011). Hence, a lack of adequate BPM capabilities can result in a weak BPC project and process performance. Therefore, we formulate the following hypotheses:

H2. The better the BPM capabilities, the higher the BPC project performance.

H3. The better the BPM capabilities, the higher the business process performance.

3.4 Project management capabilities

The causal linkage between project management and project success has been discussed from a BPC perspective (Kettinger and Grover, 1995), in literature on IS project success (Gemino *et al.*, 2008; Wallace *et al.*, 2004) and in research on ERP-systems implementations (Karimi *et al.*, 2007; Umble *et al.*, 2003). Karimi *et al.* (2007) operationalize PM capabilities through the tools and techniques employed by the organization for the project. PM capabilities, encompassing the body of knowledge, tools and techniques employed by the PM personnel, have a major impact on project performance and on business process performance (Crawford, 2005, 2006). The identified causal relation between PM capabilities and project and business process performance leads to the formulation of the following hypotheses:

H4. The better the PM capabilities, the higher the BPC project performance.

H5. The better the PM capabilities, the higher the business process performance.

3.5 Change management capabilities

Launching a BPC initiative is not likely to succeed if the people and the organization are unprepared for and incapable of change. This is particularly important when considering that BPC can introduce new tools, technologies, work practices, roles and responsibilities among the staff. CM capabilities refer to the practices employed on a BPC project to ensure that changes are carried out in a visible, controlled, and orderly way. In that sense, CM capabilities comprise communication and motivational activities, undertaken to govern the effects of BPC systematically (Kettinger and Grover, 1995). It is imperative for an organization undergoing BPC to build the necessary CM capabilities to manage the changes introduced effectively. Thus, we hypothesize:

H6. The better the CM capabilities, the higher the BPC project performance.

H7. The better the CM capabilities, the higher the business process performance.

3.6 IT capabilities

IT capabilities refer to the practices of an organization employed to mobilize and deploy IT-based resources (Bharadwaj, 2000; Kim *et al.*, 2011). IT capabilities are not only found to be positively related to firm performance (Bharadwaj, 2000; Ravichandran and Lertwongsatien, 2005), but also to the successful execution of business processes (Melville *et al.*, 2004; Ray *et al.*, 2005). Ray *et al.* (2005) posit that only through the application of IT capabilities like flexible IT infrastructure and shared knowledge can organizations increase their process performance.

BPC projects often rely on an essential enabling IT core. Consequently, BPC projects cannot be implemented until the necessary technology and associated information systems have been successfully deployed (Piccoli and Ives, 2005). These imperatives provide the foundation for the final two hypotheses:

H8. The better the IT capabilities, the higher the BPC project performance.

H9. The better the IT capabilities, the higher the business process performance.

4. Research method

As this study's objectives was to identify which capabilities matter for BPC project performance and which matter for the final process performance, an in-depth perspective such as that offered by case studies was deemed appropriate. To meet our objectives, we needed a relatively large sample of rich cases. Operationally, conducting such a large number of original case studies is very resource-intensive and difficult to achieve. Consequently, and given the availability of high-quality cases on BPC projects, we adopted a case survey strategy (Larsson, 1993). Case surveys "integrate qualitative studies, transforming qualitative data into (semi-) quantitative data, using a coding scheme and expert judgments by multiple coders" (Newig and Fritsch, 2009, p. 4).

The case survey method represents a powerful method for identifying and testing patterns across case studies (Lucas, 1974; Larsson, 1993). It integrates findings from diverse case studies by using coded variables to test relationships derived from a research model. More so, case surveys emphasizes "theory development and hypothesis testing, replicable and reliable measures, resolution of coding discrepancies, and data analysis techniques operating within the constraints of the hypothesized relationships and the sample" (Bullock and Tubbs, 1990).

The case survey method is particularly suited for our research due to the following criteria proposed by Larsson (1993):

- the research area comprises a huge number of case studies (i.e. cases of BPC projects) (Yin and Heald, 1975);
- the unit of analysis is the organization (i.e. the organization conducting the BPC project) (Jauch *et al.*, 1980);
- a broad range of impact factors is of interest (i.e. BPM, PM, CM and IT capabilities) (Jauch *et al.*, 1980); and
- it is difficult to do structured primary research across cases in this research domain.

In accordance with Larsson (1993), our meta-case analysis follows three major steps:

(1) we selected existing case studies relevant to our research question;

(2) to convert the qualitative case descriptions into quantified variables, we developed a coding scheme and used multiple raters to code the case studies; and

(3) we will statistically analyzed the data that emerged from the coding procedure.

4.1 Case selection

For the case sample collection, we applied a detailed screening of literature. We used the key words "business process" and "case study". After the initial literature screening, we identified more than 5,000 references. These were found through traditional channels (e.g. libraries), conference proceedings, online database services (e.g. Emerald, EBSCO, Science Direct and Google Scholar), consulting journals, and other web search tools. To determine the relevance of these articles, we further explored titles, abstracts, and keywords. After this step, the identified 5,000 references were further reduced to 217 case studies.

The selection process was further refined along specific criteria to ensure the quality of the material selected and allow for an in-depth analysis of each case and comparisons across cases (Lucas, 1974; Yin and Heald, 1975). The criteria were:

- that the case reported on the capabilities needed in a BPC project;
- that it reported evidence of the project and process performance; and
- that the narrative provided a rich description of the events.

However, we excluded cases that fulfill these criteria when:

- no or very little information about the case was available; and
- no or very little information about the capabilities for the success of the BPC initiative was available.

The final sample included 130 case studies published between 1992 and 2012. The majority (86) were from articles published in scholarly journals, mostly in information systems, but also in other domains including management, medicine, and operations management. Of the remaining 44 cases, 16 were from conference proceedings, four from PhD theses, 22 from book sections, one from a magazine article and one from a working paper. The cases vary in terms of sectors (e.g. finance, health, education, and manufacturing) and types of BPC projects (e.g. business process reengineering, business process transformation, business process innovation, continuous process improvement, Six Sigma, etc.). The final sample consists of a wide set of international BPC initiatives, 93 in private and 37 in public organizations. The articles span the years 1993-2012 and have an average length of 14 pages.

4.2 Coding

The coding scheme "documents and guides the conversion of qualitative case study data into quantified variables" (Larsson, 1993, p. 1530) and thus stands as the core element of a meta-case analysis. In line with Larsson (1993), our coding scheme comprises variables that represent the aspects of the study design (e.g. IT capabilities, PM capabilities, etc.) and control variables relevant to the studied phenomenon (e.g. involvement of external (consulting) experts). In accordance with Albers and Götz (2006), we established multi-item scales (at least two items) for each latent variable. The coding scheme comprises six latent variables and four control variables with 19 items. We selected a five-point Likert scale to code our variables and capture the complexity of the model.

Two experienced raters independently coded each case study with the list of codes. Before they started coding the selected case studies, both raters coded several pilot cases to become familiar with our coding scheme and compared their coding for calibration purposes. Coding disagreements were reconciled by adopting a consensus approach. Together we reviewed the final coding of each episode and discussed any discrepancies until we had reached a consensus; this helped eliminate individual disparities (Bullock and Tubbs, 1990). Resolving discrepancies in this way is said to be a "superior way to correct coding mistakes" (Larsson, 1993, p. 1521). After both raters completed the coding, we used Krippendorf's (1980) Alpha to determine inter-rater reliability. Krippendorf's alpha was 0.77, suggesting substantial agreement between the raters.

4.3 Data analysis

The partial least squares (PLS) procedure (Wold, 1985), which uses component-based estimation, has gained significant popularity in IS research since the 1990s (Compeau and Higgins, 1995; Chin, 1998). Due to the following criteria, we relied on PLS instead of LISREL to analyze the data (Chin and Newsted, 1998; Chin, 1998):

- the hypotheses are grounded in specified impact factors;
- the epistemic relationships between the latent variables and its measures are both formative and reflective; and
- the sample size is relatively small.

More so, PLS is suitable if a more explorative analysis close to the empirical data is appropriate and preferred. It also allows researchers to determine the relationships between the factors of interest and the measures underlying each construct. These may result in a simultaneous analysis of two parts:

(1) how well the measures relate to each construct; and

(2) whether the hypothesized relations are empirically true.

PLS provides more accurate estimates of the paths among constructs, which are usually biased by measurement error when using techniques such as multiple regressions (Diamantopoulos, 2006). We employed SPSS and SmartPLS 2.0 M3 to assess the measurement and the structural model.

5. Results

The PLS technique facilitates the exploration of two models of a structural equation model, the measurement (outer) model, examining the relations of measurement variables and their latent variables, and the structural (inner) model, examining the latent variables to each other (Diamantopoulos, 2006).

For the analysis we followed Hair *et al.*'s (1998) two-step procedure: step 1 necessitates the testing of the quality of the measurement models including reflective and formative indicators. If successful and the latent constructs prove valid and reliable, step 2 necessitates the assessment of the structural model. This assures that the quality of the structural relationships is assessed on the basis of a set of measurement instruments with desirable psychometric properties. The following section provides:

- the results of the measurement model; and
- the results of the structural model.

5.1 Measurement model

According to Chin (1998), PLS models with reflective and formative constructs have well-defined and widely accepted assessment criteria. We applied four assessment criteria for the measurement model with reflective constructs (Chin, 1998): content validity, indicator reliability, composite reliability, and discriminant validity.

To verify *content validity*, we conducted an explorative factor analysis (Krafft *et al.*, 2005). In order to identify the loadings and the variance, we used direct oblimin rotations. The accumulated explained variance yielded 55.76 per cent and the indicators of each construct charge on one factor. Thus, content validity was successfully verified. The *indicator reliability* relies on the expectation that latent variable variance should explain at least 50 per cent of the indicator. Therefore, the factor loadings of latent manifest variables should be above 0.70 (Carmines and Zeller, 1979). The factor loadings were mostly beyond the acceptable value of 0.70, except for seven indicators. However, we had no indicator that was below the limit of 0.4 and thus did not eliminate them (Hulland, 1999). The *composite reliability* reflects the internal consistency of the indicators measuring a particular factor (Fornell and Larcker, 1981). Bagozzi and Yi (1988) recommend that the value of the internal consistency should be at least 0.60. Thus, composite reliability was successfully verified, because the internal consistency of the four constructs was at least 0.60 (Table I). The *discriminant validity* refers to the appropriate patterns of inter-indicators of a construct and other constructs (Gefen *et al.*, 2000). The average variance extracted (AVE) value is for two constructs below (PM and IT capabilities) and for two constructs (BPM and CM capabilities) beyond the level of 0.50 (Fornell and Larcker, 1981). Although Rodgers and Pavlou (2003) state that values below this level are inadequate, the elimination of these constructs is not recommended.

Construct	Items	Sources	Loadings	AVE	Composite reliability
BPM capabilities	The organization collected measurements to control and monitor business processes	Mathiesen *et al.* (2011), zur Muehlen and Ting-Yi Ho (2005), Grover (1999)	0.659	0.569	0.696
	The organization applied BPM methods, tools and techniques for business process design and change	Mathiesen *et al.* (2011), zur Muehlen and Ting-Yi Ho (2005)	0.697		
PM capabilities	The PM team defined a realistic scope for the change project	Karimi *et al.* (2007)	0.672	0.451	0.694
	The PM team managed project risks and implemented proper measures to address them	Crawford (2005)	0.414		
	The PM team applied PM methods, tools and techniques to plan and manage the change (e.g. project plan, frequent team meetings, etc.)	Karimi *et al.* (2007)	0.629		
CM capabilities	The employees understood how the change would affect them	Huizing *et al.* (1997), Markus and Grover (2008)	0.511	0.717	0.882
	The employees were satisfied with the quality of the information provided on the change	Kotter (1996)	0.973		
	The employees were satisfied with the amount of information provided on the change	Kotter (1996)	0.891		
IT capabilities	The necessary hardware, software and other technologies were in place for the purposes of the change project	Melville *et al.* (2004)	0.749	0.452	0.600
	The IT infrastructure including hardware, software, and other technologies played a significant role in the change project	Massetti and Zmud (1996), Ray *et al.* (2005)	0.681		
	The different computing systems and software applications of the departments involved were linked physically or functionally throughout the change project	Teng *et al.* (1998), Reich and Benbasat (2000)	0.699		

Table I.
Factor loadings, AVE, and composite reliability

In accordance with Fornell and Larcker (1981), the crucial value is the squared root of the AVE value for each construct. This should be higher than the correlations between it and all other constructs (Fornell and Larcker, 1981). We verified discriminant validity successfully, since our data analysis disclosed that the squared roots were higher for all construct. As an excerpt of the performed tests, Table I exhibits the factor loading, the AVE and the composite reliability.

We applied three assessment criteria for the measurement models with formative constructs: indicator relevance, multicollinearity, and nomological validity or rather the relevance of indicators (Chin, 1998).

Indicator relevance determines which indicators contribute most substantially to the construct (Sambamurthy and Chin, 1994). Thus, we had to compare each indicator's weight. Note, contrary to the elimination of indicators with marginal factor loadings (less than a level of 0.40) in reflective measurement models, the elimination of formative indicators with marginal weight is not recommended, because it may be a constituent part of the construct. In addition to the statistical value it is necessary to consider the indicator's content (Bollen and Lennox, 1991). Due to this fact, we refrained from eliminating indicators.

To verify *multicollinearity*, which indicates the indicator's degree of linear dependency, we examined both the indicator's correlation matrix and the variance inflation factors (VIF). The correlation coefficients were partially high (i.e. the highest correlation coefficient was 0.877). However, multicollinearity did not actually bias the results as all VIF were below the recommended level of 10 (Eckey *et al.*, 2001).

The *nomological validity* and relevance of indicators (Sambamurthy and Chin, 1994) were also verified using PLS software. Bootstrapping with 2,000 resamples (Efron and Tibshirani, 1993) was performed for testing the statistical significance of path coefficients using *t*-tests. All *t*-values were highly significant (i.e. at least 2.767 (Table II)).

In summary, the statistical analysis demonstrates empirical support for the reliability and validity of the scales of the measurement models.

5.2 Structural model

To assess the explanatory and predictive power of the structural model, we employed the criteria recommended in PLS literature (Chin, 1998): the R^2-values, the effect size f^2, and the extent of significance and β-coefficients.

The central criterion for evaluating the structural model is the level of explained variance R^2 of the dependent constructs. R^2-values of 0.67, 0.33, or 0.19 for endogenous

Name of construct	Items	Weight	*t*-value
BPC project performance	The project was a success	0.462	2.767**
	Indicate the extent to which the change project was completed in comparison with the original scope (e.g. "totally abandoned" or "smoothly completed")	0.562	3.418***
Process performance	The process efficiency was improved	0.636	4.546***
	The process effectiveness was improved	0.551	3.823***

Notes: Significant at: $^{*}p < 0.05$, *t*-value = 1.960; $^{**}p < 0.01$, *t*-value = 2.576; $^{***}p < 0.001$, *t*-value = 3,291; weight – PLS algorithm path weighting scheme; *t*-value: bootstrapping with 130 cases, 2,000 subsamples; n.s. = not significant

Table II.
Nomological validity and relevance of indicators

latent variables are substantial, moderate, or weak, respectively, (Chin, 1998). Both R^2 of our structural values are moderate with 0.523 (project performance) and 0.529 (process performance). To estimate the extent β-coefficients, we conducted the PLS path algorithm procedure. For the significance of the path coefficients, we performed the bootstrapping re-sampling technique with 2,000 resamples (Efron and Tibshirani, 1993).

The effect size f^2 investigates the substantive impact of each independent variable on the dependent variable (Cohen, 1988). Values of 0.02, 0.15, and 0.35 indicate a small, medium, or large impact (Chin, 1998). The effect size f^2 for the structural model was conducted by re-running several PLS estimations, excluding in each run one of the explaining latent constructs. The results of the effect sizes show a small, medium, and large impact of the independent variables on the dependent variables (from −0.004 till 0.495) (Table III).

Figure 2 shows the results of the analysis with estimated path coefficients and associated *t*-values of the paths (Chin, 1998). Our results show that PM (H_2), CM (H_6) and IT capabilities (H_8) have a positive impact on BPC project performance. IT capabilities also have a positive impact on the final process performance (H_9). BPM capabilities appear to have neither an influence on the BPC project performance nor on the process performance (H_1 and H_2). The BPC project performance has a positive impact on the final process performance (H_1).

6. Discussion

Our principle concern of this study was to examine which capabilities impact BPC project and process performance. The empirical results provide a tentative support for the RBT. We show that certain capabilities directly influence the project and process performance, while others have no impact.

The results of the literature on IT capabilities and BPC success have produced contradicting results. While some researchers assert that IT capabilities pose an important catalyst and enabler for BPC (Trkman, 2010), others contend that IT capabilities may not necessarily be a critical success factor (Kettinger and Grover, 1995; Guha *et al.*, 1997; Grover, 1999). Besides the ongoing debate on the business value of IT, the effect of IT on business performance has in fact been contested (Karimi *et al.*, 2007; Radhakrishnan *et al.*, 2008). For instance, the relationship between IT investment and firm

Correlation		β	*t*-value	Significance	f^2
H_1	Project → Process performance	0.717	8.461	***	0.495
H_2	BPM capabilities → BPC project performance	−0.144	1,317	n.s.	0.044
H_3	BPM capabilities → Process performance	−0.022	0.333	n.s.	0
H_4	PM capabilities → BPC project performance	0.440	4.572	***	0.317
H_5	PM capabilities → Process performance	−0.157	1.355	n.s.	0.036
H_6	CM capabilities → BPC project performance	0.217	2.762	**	0.080
H_7	CM capabilities → Process performance	0.035	0.376	n.s.	−0.004
H_8	IT capabilities → BPC project performance	0.276	4.156	***	0.136
H_9	IT capabilities → Process performance	0.137	1.995	*	0.038

Notes: Significant at: $^{*}p < 0.05$, *t*-value = 1.960; $^{**}p < 0.01$, *t*-value = 2.576; $^{***}p < 0.001$, *t*-value = 3.291; β – PLS algorithm path weighting scheme; *t*-value – bootstrapping with 130 cases, 2,000 subsamples; n.s. = not significant

Table III. Path coefficients, *t*-values, and effect sizes

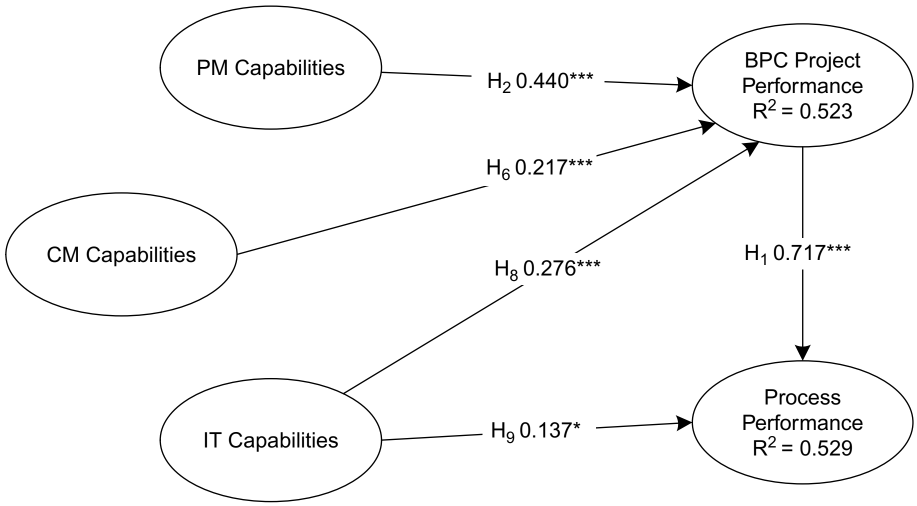

Figure 2.
Capabilities impacting BPC project and process performance

Notes: Significant at: **p*<0.05, *t*-value 1,960; ***p*<0.01, *t*-value 2,576; ****p*<0.001, *t*-value 3,291; n.s. – not significant

performance through an input-output perspective is well described in production function and process-oriented models (Melville *et al.*, 2004). Particularly, process-oriented models offer helpful insights on how IT can provide business value through the use of business processes. Melville and colleagues (Melville *et al.*, 2004) also introduce a process-level model, which depicts that IT capabilities and complementary organizational resources have to be combined into a business process which than yields business process performance. Recently, Trkman (2010) has also argued that the value of IT for successful BPC should be measured at the process level, since the prime effects of IT are in fact expected to be realized at the process level (Melville *et al.*, 2004). Our results support these findings. Based on the analysis of 130 case studies, we can show that IT capabilities are indeed very important for both, the BPC project and process performance.

Our study highlights several new issues with regard to BPC. Surprisingly, the empirical test shows that BPM capabilities have no direct impact on project or process performance, while past research suggests that BPM capabilities constitute a key success factor in BPC implementations (Trkman, 2010; Niehaves and Henser, 2011). However, theory also suggests that BPM capabilities are dynamic capabilities (Trkman, 2010). Our results show that BPM as a dynamic capability has no direct impact on the success of a project. Rather dynamic capabilities reconfigure other (operational) capabilities and thus their resources, which impact the success (Helfat and Peteraf, 2003). Other conceptualizations emphasize the nature of these capabilities, "a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness" (Zollo and Winter, 2002, p. 340). Niehaves *et al.* (2011) posit that BPM capabilities adapt the operational capabilities to the environment. Hence, the impact of BPM capabilities on the BPC project and process performance might be mediated by other capabilities (e.g. IT, CM or PM capabilities) and therefore not directly measurable. Even though this relation can be easily contested, it might be much harder to assess the impact of dynamic capabilities in a quantitative study. Instead, qualitative studies might be more suitable for assessing the impact of BPM as a dynamic capability on other operational capabilities.

Another interesting discovery of our analysis is that over 50 per cent of all analyzed BPC projects relied on the support of external experts (consultants). For future BPC research, the involvement of external experts could provide an interesting control variable. In addition, the question that needs to be explored is which of the PM, IT and CM capabilities are specific to the external experts and which are specific to the organization. This aspect is particularly important when considering the strong relation between project and process performance. It needs to be guaranteed that not only the external experts' possess the capabilities to successfully complete the BPC project, but also that the organization itself possesses the capabilities for executing the changed business process successfully. Hence, a strong need exists for building the necessary organization specific capabilities.

7. Conclusion

Some limitations of our study must be acknowledged. The first limitation stems from the use of secondary data, meaning that the cases we selected had not been written with the specific purpose of studying which capabilities matter for successful BPC. However, due to the care with which we selected – and excluded – cases, we are confident that the cases in our sample were indeed narrations of the experiences of BPC projects, and that they provided sufficient data for appropriate coding and analysis. A second limitation is that assigning numbers to qualitative data "unduly simplifies the complex phenomena under investigation" and may leave out some of the richness of case research (Larsson, 1993, p. 1519). However, the use of a large number of cases (here, 130 cases) compensates for such information loss (Larsson, 1993). More so, the coding procedure of case survey method carries a certain degree of subjectivity, which we tried to reduce by assessing inter-coder reliability. Another limitation has to do with the theoretical incompleteness of the identified capabilities. According to Molloy *et al.* (2011) the question of how to measure capabilities is "simultaneously very important to RBT yet very difficult to conceptualize and validly assess". But since we primarily relied on predefined and tested constructs, we are confident that our items measure what they are supposed to measure. The last limitation refers to the focus of our analysis on the main capabilities listed in BPC literature. We are aware that additional capabilities (e.g. learning or integration) might also impact the success of a BPC initiative. Nonetheless, due to limitations imposed by the research method and by the information reported in the case studies, we could not assess these additional capabilities. Future research should analyze the effect of additional capabilities on BPC project and process performance.

Our study makes a number of contributions. First, it fills a gap in the literature concerning which capabilities matter for successful BPC. Although much has been written about critical impact factors for BPC the literature is surprisingly mute which specific capabilities matter for BPC project and process performance. Our results show that PM, IT and CM capabilities have a direct impact on BPC project performance. IT capabilities also directly impact the process performance. The analysis also disclosed that a strong relation between the project and the final process performance exists. These discoveries can serve to help practitioners in planning their BPC projects more carefully. The second contribution of our study is that it offers a theoretical explanation of the effects of capabilities on the BPC project and process performance. This explanation is anchored in our content analyses of the 130 case studies that constituted our sample and is enriched by the fact that we enfolded extant literature. The third contribution of our study is methodological, in that we adopted a research method – the case survey – that combines the benefits of analyzing a large quantity of data with those of conducting an in-depth analysis of qualitative data.

Note

1. The term business process change comprises both radical and continues approaches (Grover *et al.*, 2000).

References

Ahmad, H., Francis, A. and Zairi, M. (2007), "Business process reengineering: critical success factors in higher education", *Business Process Management Journal*, Vol. 13 No. 3, pp. 451-469.

Albers, S. and Götz, O. (2006), "Messmodelle mit Konstrukten zweiter Ordnung in der betriebswirtschaftlichen Forschung", *DBW*, Vol. 66 No. 6, pp. 669-677.

Al-Mashari, M. and Zairi, M. (2000), "Revisiting BPR: a holistic review of practice and development", *Business Process Management Journal*, Vol. 6 No. 1, pp. 10-42.

Al-Mashari, M., Irani, Z. and Zairi, M. (2001), "Business process reengineering: a survey of international experience", *Business Process Management Journal*, Vol. 7 No. 5, pp. 437-455.

Amit, R. and Schoemaker, P.J.H. (1993), "Strategic assets and organizational rent", *Strategic Management Journal*, Vol. 14 No. 3, pp. 33-46.

Bagozzi, R.P. and Yi, Y. (1988), "On the evaluation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 16, pp. 74-94.

Barney, J.B. (1986), "Strategic factor markets: expectations, luck, and business strategy", *Management Science*, Vol. 32 No. 10, pp. 1231-1241.

Barney, J.B. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Barney, J.B., Ketchen, D.J. and Wright, M. (2011), "The future of resource-based theory: revitalization or decline?", *Journal of Management*, Vol. 37 No. 5, pp. 1299-1315.

Bharadwaj, A.S. (2000), "A resource-based perspective on information technology capability and firm performance: an empirical investigation", *MIS Quarterly*, Vol. 24 No. 1, pp. 169-196.

Bollen, K.A. and Lennox, R. (1991), "Conventional wisdom on measurement: a structural equation perspective", *Psychological Bulletin*, Vol. 110 No. 2, pp. 305-314.

Brock, E.O.D. and Boonstra, A. (2008), "Supporting the creation of business re-engineering ideas", *Business Process Management Journal*, Vol. 14 No. 3, pp. 307-326.

Bucher, T. and Winter, R. (2007), "Realisierungsformen des Geschäftsprozessmanagements – Eine explorative Klassifikationsanalyse", *Proceedings of the 8th Wirtschaftinformatik Conference, Karlsruhe*, pp. 695-712.

Bullock, R.J. and Tubbs, M.E. (1990), "A case meta-analysis of gainsharing plans as organization development interventions", *The Journal of Applied Behavioral Science*, Vol. 26 No. 3, pp. 383-404.

Cao, G., Clarke, S. and Lehaney, B. (2001), "A critique of BPR from a holistic perspective", *Business Process Management Journal*, Vol. 7 No. 4, pp. 332-339.

Carmines, E.G. and Zeller, R.A. (1979), *Reliability and Validity Assessment*, Sage, Beverly Hills, CA.

Chiarini, A. (2012a), *From Total Quality Control to Lean Six Sigma: Evolution of the Most Important Management Systems for the Excellence*, SpringerBriefs in Business, Springer, Milan.

Chiarini, A. (2012b), "Risk management and cost reduction of cancer drugs using lean Six Sigma tools", *Leadership in Health Services*, Vol. 25 No. 4, pp. 318-330.

Chin, W. (1998), "partial least squares approach for structural equation modeling", in Marcoulides, G.A. (Ed.), *Modern Methods for Business Research*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 295-336.

Chin, W. and Newsted, P.R. (1998), "Structural equation modeling analysis with small samples using partial least squares", in Hoyle, R.H. (Ed.), *Statistical Strategies for Small Sample Research*, Sage, Thousand Oaks, CA, pp. 307-342.

Cohen, J. (1988), *Statistical Power Analysis for the Behavioral Science*, Lawrence Erlbaum Associates, Hillsdale, NJ.

Compeau, D.R. and Higgins, C.A. (1995), "Computer self-efficacy: development of a measure and initial test", *MIS Quarterly*, Vol. 19 No. 2, pp. 189-211.

Crawford, L. (2005), "Senior management perceptions of project management competence", *International Journal of Project Management*, Vol. 23 No. 1, pp. 7-16.

Crawford, L. (2006), "Developing organizational project management capability: theory and practice", *Project Management Journal*, Vol. 37 No. 3, pp. 74-97.

Davenport, T.H. (1993), *Process Innovation – Reengineering Work Through Information Technology*, Harvard Business School Press, Boston, MA.

Diamantopoulos, A. (2006), "The error term in formative measurement models: interpretation and modeling implications", *Journal of Modeling in Management*, Vol. 1 No. 1, pp. 7-17.

Eckey, H.F., Kosfeld, R. and Draeger, C. (2001), *Ökonometrie*, Gabler Verlag, Wiesbaden.

Efron, B. and Tibshirani, R.J. (1993), *An Introduction to the Bootstrap*, Chapman & Hall, New York, NY.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18, pp. 39-50.

Gefen, D., Straub, D. and Boudreau, M.C. (2000), "Structural equation modeling and regression: guidelines for research practice", *Communications of the ACM*, Vol. 4 No. 7, pp. 1-80.

Gemino, A., Reich, B.H. and Sauer, C. (2008), "A temporal model of information technology project performance", *Journal of Management Information Systems*, Vol. 24 No. 3, pp. 9-44.

Grover, V. (1999), "From business reengineering to business process change management: a longitudinal study of trends and practices", *IEEE Transactions on Engineering Management*, Vol. 46 No. 1, pp. 36-46.

Grover, V. and Kettinger, W.J. (1995), *Business Process Change: Reengineering Concepts, Methods, and Technologies*, Idea Group Publishing, London.

Grover, V. and Markus, L.M. (2008), *Business Process Transformation*, M.E. Sharpe, Armonk, NY.

Grover, V., Kettinger, W.J. and Teng, J.T.C. (2000), "Business process change in the 21st century", *Business & Economic Review*, Vol. 46 No. 2, pp. 14-18.

Grover, V., Jeong, S.R., Kettinger, W.J. and Teng, J.T.C. (1995), "The implementation of business process reengineering", *Health Care Management Review*, Vol. 12 No. 1, pp. 109-144.

Guha, S., Grover, V., Kettinger, W.J. and Teng, J.T.C. (1997), "Business process change and organizational performance: exploring an antecedent model", *Journal of Management Information Systems*, Vol. 14 No. 1, pp. 119-154.

Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998), *Multivariate Data Analysis*, Prentice-Hall, Englewood Cliffs, NJ.

Hammer, M. (1990), "Reengineering work: don't automate, oliberate", *Harvard Business Review*, Vol. 68 No. 4, pp. 104-112.

Hammer, M. and Champy, J. (1993), *Reengineering the Corporation – A Manifesto for Business Revolution*, HarperCollins, New York, NY.

Harrington, H.J. (1991), *Business Process Improvement – The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness*, McGraw-Hill, New York, NY.

Helfat, C.E. and Peteraf, M.A. (2003), "The dynamic resource-based view: capability lifecycles", *Strategic Management Journal*, Vol. 24 No. 10, pp. 997-1010.

Hill, J.B. and McCoy, D.W. (2011), *Key Issues for Business Process Management 2011*, Gartner Inc., Stamford, CT.

Huizing, A., Koster, E. and Bouman, W. (1997), "Balance in business reengineering: an empirical study of fit and performance", *Journal of Management Information Systems*, Vol. 14 No. 1, pp. 93-118.

Hulland, J. (1999), "Use of partial least squares (PLS) in strategic management research: a review of four recent studies", *Strategic Management Journal*, Vol. 20 No. 2, pp. 195-204.

Huq, Z. and Martin, T.N. (2006), "The recovery of BPR implementation through an ERP approach: a hospital case study", *Business Process Management Journal*, Vol. 12 No. 5, pp. 576-587.

Jauch, L.R., Osborn, R.N. and Martin, T.N. (1980), "Structured content analysis of cases: a complementary method for organizational research", *The Academy of Management Review*, Vol. 5 No. 4, pp. 517-525.

Jurisch, M.C., Ikas, C., Palka, W., Wolf, P. and Krcmar, H. (2012a), "A review of success factors and challenges of public sector BPR implementations", *Proceedings of 45th Hawaii International Conference on System Sciences* (*HICSS*), IEEE, Maui, pp. 2603-2612.

Jurisch, M.C., Palka, W., Cuno, J., Wolf, P. and Krcmar, H. (2012b), "An integrative model of IT-enabled business process change: causal structures in theory, research and practice", *Proceedings of 45th Hawaii International Conference on System Sciences* (*HICSS*), IEEE, Maui, pp. 4297-4306.

Karimi, J., Somers, T. and Bhattacherjee, A. (2007), "The impact of ERP implementation on business process outcomes: a factor-based study", *Journal of Management Information Systems*, Vol. 24 No. 1, pp. 101-134.

Kettinger, W.J. and Grover, V. (1995), "Special section: toward a theory of business process change management", *Journal of Management Information Systems*, Vol. 12 No. 1, pp. 9-30.

Kim, G., Shin, B., Kyu Kim, K. and Lee, H.G. (2011), "IT capabilities, process-oriented dynamic capabilities, and firm financial performance", *Journal of the Association for Information Systems*, Vol. 12 No. 7, pp. 487-517.

Koch, S. (2011), *Einführung in das Management von Geschäftsprozessen*, Springer, Berlin.

Kotter, J.P. (1996), *Leading Change*, Harvard Business School Press, Boston, MA.

Kraaijenbrink, J., Spender, J.C. and Groen, A.J. (2009), "The resource-based view: a review and assessment of its critiques", *Journal of Management*, Vol. 36 No. 1, pp. 349-372.

Krafft, M., Götz, O. and Liehr-Gobbers, K. (2005), "Die Validierung von Strukturgleichungsmodellen mit Hilfe des Partial-Least-Squares (PLS)-Ansatzes", in Bliemel, F. *et al.* (Eds), *Handbuch PLS-Pfadmodellierung*, Schäffer-Poeschel Verlag, Stuttgart.

Krippendorf, K. (1980), *Content Analysis: An Introduction to Its Methodology*, Sage, Beverly Hills, CA.

Larsson, R. (1993), "Case survey methodology: quantitative analysis of patterns across case studies", *The Academy of Management Journal*, Vol. 36 No. 6, pp. 1515-1546.

Lewis, R. (1999), *When Cultures Collide*, Nicholas Brealey Publishing, London.

Lopez, J. (2011), *Executive Advisory: In Comparing Gartner's Board, CEO and CIO Surveys, CIOs Take Last Year's Challenge and Build for Growth*, Gartner Inc., Stamford, CT.

Lucas, W.A. (1974), *The Case Survey Method: Aggregating Case Experience*, RAND Corporation, Santa Monica, CA.

Makadok, R. (2001), "Toward a synthesis of the resource based and dynamic capability views of rent creation", *Strategic Management Journal*, Vol. 22, pp. 387-401.

Margherita, A. and Petti, C. (2010), "ICT-enabled and process-based change: an integrative roadmap", *Business Process Management Journal*, Vol. 16 No. 3, pp. 473-491.

Markus, M.L. and Grover, V. (2008), *Consolidating Knowledge on the Journey of Business Process Transformation*, M.E. Sharpe, Armonk, NY.

Martin, I. and Cheung, Y. (2002), "Change management at Mobil Oil Australia", *Business Process Management Journal*, Vol. 8 No. 5, pp. 447-461.

Massetti, B. and Zmud, R.W. (1996), "Measuring the extent of EDI usage in complex organizations: strategies and illustrative examples", *MIS Quarterly*, Vol. 20 No. 3, pp. 331-346.

Mathiesen, P., Bandara, W. and Delavari, H. (2011), "A comparative analysis of business analysis (BA) and business process management (BPM) capabilities", *Proceedings of the European Conference on Informations Systems, Helsinki, Finland*, pp. 1-12.

Melville, N., Kraemer, K.L. and Gurbaxani, V. (2004), "Information technology and organizational performance: an integrative model of IT business value", *MIS Quarterly*, Vol. 28 No. 2, pp. 283-322.

Molloy, J.C., Chadwick, C., Ployhart, R.E. and Golden, S.J. (2011), "Making intangibles 'tangible' in tests of resource-based theory: a multidisciplinary construct validation approach", *Journal of Management*, Vol. 37 No. 5, pp. 1496-1518.

Nave, D. (2002), "How to compare Six Sigma, lean and the theory of constraints", *Quality Progress*, Vol. 35 No. 3, pp. 73-78.

Neely, A., Gregory, M. and Platts, K. (1995), "Performance measurement system design: a literature review and research agenda", *International Journal of Operations & Production Management*, Vol. 15 No. 4, pp. 80-116.

Newig, J. and Fritsch, O. (2009), "The case survey method and applications in political science", paper presented at the APSA 2009 Meeting, Toronto, 3-6 September, pp. 3-6.

Nidumolu, S. (1995), "The effect of coordination and uncertainty on software project performance: residual performance risk as an intervening variable", *Information Systems Research*, Vol. 6 No. 3, pp. 191-219.

Niehaves, B. (2010), "Open process innovation: the impact of personnel resource scarcity on the involvement of customers and consultants in public sector BPM", *Business Process Management Journal*, Vol. 16 No. 3, pp. 377-393.

Niehaves, B. and Henser, J. (2011), "Boundary spanning practices in BPM: a dynamic capability perspective", *Proceedings of the AMCIS*, pp. 1-11.

Niehaves, B., Plattfaut, R. and Sarker, S. (2011), "Understanding dynamic is capabilities for effective process change: a theoretical framework and an empirical application", *Proceedings of the International Conference on Information Systems* (*ICIS*)*, Shanghai*, pp. 1-11.

Nippa, M. and Picot, A. (1995), *Prozeßmanagement und Reengineering: Die Praxis im deutschsprachigen Raum*, Campus-Verlag, Frankfurt.

Paper, D.J., Rodger, J.A. and Pendharkar, P.C. (2001), "A BPR case study at Honeywell", *Business Process Management Journal*, Vol. 7 No. 2, pp. 85-99.

Penrose, E.T. (1959), *The Theory of the Growth of the Firm*, Wiley, New York, NY.

Piccoli, G. and Ives, B. (2005), "Review: IT-dependent strategic initiatives and sustained competitive advantage: a review and synthesis of the literature", *MIS Quarterly*, Vol. 29 No. 4, pp. 747-776.

Radhakrishnan, A., Zu, X. and Grover, V. (2008), "A process-oriented perspective on differential business value creation by information technology: an empirical investigation", *Omega*, Vol. 36 No. 6, pp. 1105-1125.

Ravichandran, T. and Lertwongsatien, C. (2005), "Effect of information systems resources and capabilities on firm performance: a resource-based perspective", *Information Systems*, Vol. 21 No. 4, pp. 237-276.

Ray, G., Barney, J.B. and Muhanna, W.A. (2004), "Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view", *Strategic Management Journal*, Vol. 25 No. 1, pp. 23-37.

Ray, G., Muhanna, W.A. and Barney, J.B. (2005), "Information technology and the performance of the customer service process: a resource-based analysis", *MIS Quarterly*, Vol. 29 No. 4, pp. 625-652.

Reich, B.H. and Benbasat, I. (2000), "Factors that influence the social dimension of alignment between business and information technology objectives", *MIS Quarterly*, Vol. 24 No. 1, pp. 55-82.

Revere, L., Black, K. and Huq, A. (2004), "Integrating Six Sigma and CQI for improving patient care", *The TQM Magazine*, Vol. 16 No. 2, pp. 105-113.

Rivard, S. and Lapointe, L. (2012), "Information technology implementers' responses to user resistance: nature and effects", *MIS Quarterly*, Vol. 36 No. 3, pp. 897-920.

Rodgers, W. and Pavlou, P. (2003), "Developing a predictive model: a comparative study of the partial least squares vs. maximum likelihood techniques", working paper, Graduate School of Management, University of California, Riverside, CA.

Saeed, K., Malhotra, M. and Grover, V. (2005), "Examining the impact of interorganizational systems on process efficiency and sourcing leverage in buyer-supplier dyads", *Decision Sciences*, Vol. 36 No. 3, pp. 365-396.

Sambamurthy, V. and Chin, W. (1994), "The effects of group attitudes toward alternative GDSS designs on the decision-making performance of computer-supported groups", *Decision Sciences*, Vol. 25 No. 2, pp. 215-241.

Sarker, S., Sarker, S. and Sidorova, A. (2006), "Understanding business process change failure: an actor-network perspective", *Journal of Management Information Systems*, Vol. 23 No. 1, pp. 51-86.

Schön, K., Bergquist, B. and Klefsjö, B. (2010), "The consequences of Six Sigma on job satisfaction: a study at three companies in Sweden", *International Journal of Lean Six Sigma*, Vol. 1 No. 2, pp. 99-118.

Sharafi, A., Jurisch, M., Ikas, C., Wolf, P. and Krcmar, H. (2011), "Bundling processes between private and public organizations: a qualitative study", *Information Resources Management Journal*, Vol. 24 No. 2, pp. 28-45.

Sidorova, A. and Isik, O. (2010), "Business process research: a cross-disciplinary review", *Business Process Management Journal*, Vol. 16 No. 4, pp. 566-597.

Syamil, A., Doll, W.J. and Apigian, C.H. (2004), "Process performance in product development: measures and impacts", *European Journal of Innovation Management*, Vol. 7 No. 3, pp. 205-217.

Teng, J., Fiedler, K.D. and Grover, V. (1998), "An exploratory study of the influence of the IS function and organizational context on business process reengineering project initiatives", *Omega*, Vol. 26 No. 6, pp. 679-698.

Teng, J.T.C., Grover, V. and Fiedler, K.D. (1996), "Developing strategic perspectives on business process reengineering: from process reconfiguration to organizational change", *Omega*, Vol. 24 No. 3, pp. 271-294.

Thommen, J.-P. and Achleitner, A.-K. (2006), *Allgemeine Betriebswirtschaftslehre – Umfassende Einführung aus managementorientierter Sicht*, Gabler Verlag, Wiesbaden.

Trkman, P. (2010), "The critical success factors of business process management", *International Journal of Information Management*, Vol. 30 No. 2, pp. 125-134.

Umble, E.J., Haft, R.R. and Umble, M.M. (2003), "Enterprise resource planning: implementation procedures and critical success factors", *European Journal of Operational Research*, Vol. 146 No. 2, pp. 241-257.

Wade, M. and Hulland, J. (2004), "Review: the resource-based view and information systems research: review, extension, and suggestions for future research", *MIS Quarterly*, Vol. 28 No. 1, pp. 107-142.

Wallace, L., Keil, M. and Rai, A. (2004), "How software project risk affects project performance: an investigation of the dimensions of risk and an exploratory model", *Decision Sciences*, Vol. 35 No. 2, pp. 289-321.

Wernerfelt, B. (1995), "The resource-based view of the firm: ten years after", *Strategic Management Journal*, Vol. 16 No. 3, pp. 171-174.

Wold, H. (1985), "Partial least squares", in Kotz, S. and Johnson, N.L. (Eds), *Encyclopedia of Statistical Sciences*, Wiley, New York, NY, pp. 581-591.

Yetton, P., Martin, A., Sharma, R. and Johnston, K. (2000), "A model of information systems development project performance", *Information Systems Journal*, Vol. 10, pp. 263-289.

Yin, R.K. and Heald, K.A. (1975), "Using the case survey method to analyze policy studies", *Administrative Science Quarterly*, Vol. 20, pp. 371-381.

Zollo, M. and Winter, S.G. (2002), "Deliberate learning and the evolution of dynamic capabilities", *Organization Science*, Vol. 13 No. 3, pp. 339-351.

zur Muehlen, M. and Ting-Yi Ho, D. (2005), "Risk management in the BPM lifecycle", BPM 2005 Workshops, LNCS 3812, Springer, Berlin, pp. 454-466.

Further reading

Barney, J.B. (1990), "The debate between traditional management theory and organizational economics: substantive differences or intergroup conflict?", *Academy of Management Review*, Vol. 15 No. 3, pp. 382-393.

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3. Viktorija Skvarciany, Juris Iljins. 2015. The role of change management in trust formation in commercial banks. *Verslas: Teorija ir Praktika* **16**:4, 373-378. [CrossRef]
4. Vahid Javidroozi, Hanifa Shah, Adrian Cole, Ardavan AminiTowards a City's Systems Integration Model for Smart City Development: A Conceptualization 312-317. [CrossRef]
5. Teija Aarnio. 2015. The Strengthened Business Process Matrix - A Novel Approach for Guided Continuous Improvement at Service-Oriented SMEs. *Knowledge and Process Management* **22**:3, 180-190. [CrossRef]
6. Mir Hossein Hosseinioun, Monireh HoushmandBusiness process-based modeling of enterprise communication network 1-6. [CrossRef]
7. Amit V. Deokar, Surendra Sarnikar. 2014. Understanding process change management in electronic health record implementations. *Information Systems and e-Business Management* . [CrossRef]