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An empirical evaluation of the impact of process standardization on process performance and flexibility

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ABSTRACT

This paper argues that business process standardization, as part of BPM activities, is an effective way to improve business process flexibility and performance. We develop and empirically evaluate a theoretical model of the differential impact of business process homogenization and optimization on business process flexibility and performance. The analysis based on data from 85 large firms shows a strong and highly significant influence of process standardization on business process flexibility and performance. This paper is among the first to propose a research model and empirical operationalization to analyze the twofold impact of process standardization on business process flexibility and performance. For practitioners the paper provides actionable recommendations on how to apply the findings to their management context.

Keywords

Business process standardization, business process performance, business process flexibility, PLS

INTRODUCTION

Flexibility is one of the most important non-financial goals of many firms. Challenges like the recent global financial crisis force firms to seek for instruments to reshape their business in order to both, survive the crisis and also to prepare for a fast restart, and ideally faster than competitors. Adaptability to turbulent environments requires building and sustaining flexibility. In the IS literature, IT resource flexibility is often discussed using a Dynamic Capabilities View. Coming from a BPM (Business Process Management) perspective, we extend this view by focusing on *business process flexibility*, i.e., both the scope of the available options a firm can choose from in order to react to changes in its environment, and the speed with which a firm can perform the adaptation to the new environmental conditions (cf. Parthasarthy and Sethi, 1992). This process flexibility is also significantly influenced by the customizability of the underlying IT (cf. Nidumolu and Knotts, 1998). The challenge, thus, is to disclose business process flexibility drivers.

Motivated by recent BPM research on *business process standardization* as an important instrument to reshape the business structure and to realize efficiency potentials (Hadfield, 2007) and by empirical insights from a 2008 survey revealing that in 34% of the 1,000 largest companies in Germany the main goal of process standardization activities was/is to increase business process flexibility (cf. Figure 1 below, details in later sections), we look deeper into the role of standardization as part of BPM and a possible flexibility driver. Standardizing existing variants of a process ensures that activities are performed in the same way in e.g., all branches of an organization[1]. In order to react to changes in its environment it is easier

[1] Process management comprises two layers: 'process design' and 'process operations'. Before a process along different locations or product variants can be successfully *operated* it has to be carefully *designed*. The layer of investigation in this paper is 'process design' and not 'process operations'. While on the 'process design' layer business process flexibility is the ability to easily and quickly redesign a process, on the 'process operations' layer flexibility means

for a firm to modify the previously standardized process in all branches in contrast to separately alter many unstandardized and distinct process variants. Consequently, business process standardization can be seen as a driver for business process flexibility.

This complements a recent research stream on the drivers and outcomes of process standardization (Bala and Venkatesh, 2007; Hall and Johnson, 2009; Muenstermann and Weitzel, 2008; Sánchez-Rodríguez et al., 2006; Stetten et al., 2008; Venkatesh, 2006; Wuellenweber et al., 2008). Since process standardization helps to identify and avoid process inefficiencies and to generate economies of scale by process bundling; usually these works find operational efficiency potentials, i.e. increased *process performance*, to be the primary outcome from process standardization. But, since BPM increasingly focuses not only on operational performance measures (cost, time, quality) but rather on "softer" dimensions like process flexibility, robustness, or business agility, it is also important to investigate the role of process standardization regarding such strategic flexibility goals (Shaw et al., 2007). Hence, combining these two aspects of operational efficiency potentials on the one hand and strategic flexibility goals on the other, we aim at answering the following research questions:

What is the impact of business process standardization on business process performance?

What is the impact of business process standardization on business process flexibility?

To explore the relationship between business process standardization on the one hand and business process performance and flexibility on the other, we develop a research model (section 'model development') that is empirically evaluated in a subsequent step (sections 'approach' and 'results'). The paper closes with a discussion of the key findings and managerial implications, limitations and possible areas of further research (section 'conclusion').

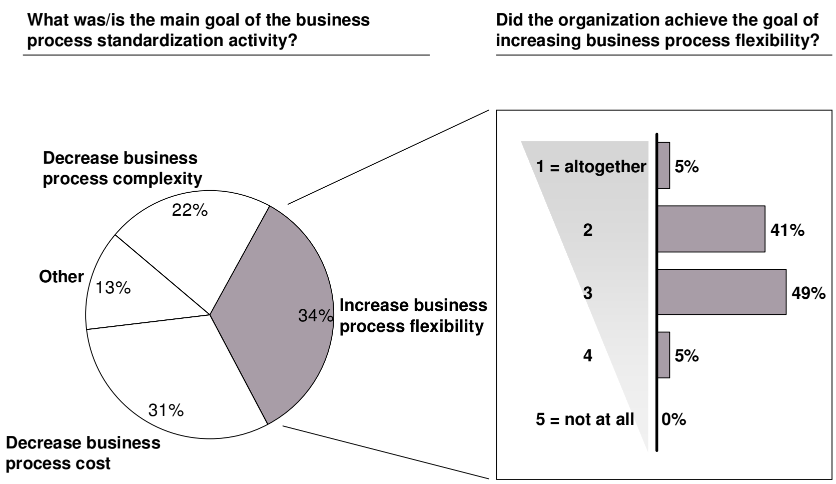

Figure 1: Stated main goals for performing business process standardization activity (left) and degree of goal achievement (right)

MODEL DEVELOPMENT

Business process standardization and business process performance

Davenport and Short define a *business process* as a "set of logically related tasks performed to achieve a defined business outcome" (Davenport and Short, 1990, p. 12). According to Hammer and Champy business processes consist of transformations of inputs to outputs – consequently they define a business process as "a collection of activities that takes one or more inputs and creates an output" (Hammer and Champy, 1993, p. 35).

Various works of the BPM field propose business process standardization to be a major source of efficiency gains in operations. Generally, *standards* "are documents, established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context" (ISO, 1996). Standardization then is defined as the diffusion and adoption of

that the process is designed in a way that exceptions in e.g., demand can be handled (e.g. by allowing and enabling situational and ad hoc decision making). This operational aspect of flexibility, which focuses on certain *instances* of the process rather than on the process design itself, is out of scope of this paper.

a standard. Accordingly, *business process standardization* can be defined as adopting a standard process to accomplish the business process result.

Over the last years, business process standardization enjoyed increasing attention from both researchers and practitioners alike. On the one hand, already in 2006, Venkatesh nominated process standardization as one of "three broad future research directions" (Venkatesh, 2006, p. 497) and thereby entailed a significant increase in related publications to date (cf. this paper's introduction), on the other hand, among practitioners, business process standardization gained in importance as selective newspaper articles (Hadfield, 2007; Mitchell, 2006) and e.g., research on widely used workflow and modeling notations (zur Muehlen, 2004; zur Muehlen and Recker, 2008) show. However, hardly ever a concise definition of business process standardization or an accurate analysis of drivers and consequences of business process standardization have been provided. Hence, von Stetten et al. declare that "there is not much relevant literature to be found. Although some ideas can be borrowed from the rich business process improvement literature from the nineties, only a very limited number of papers exist treating 'business process standardization' solely" (Stetten et al., p. 2).

Approaching a definition of business process standardization, Muenstermann and Weitzel propose a definition of business process standardization as a two-staged approach consisting of a) homogenization and b) optimization (Muenstermann and Weitzel, 2008). For the purpose of our paper we adopt this differentiation and thereon base our definition of business process standardization as shown in Table 1:

	Business process standardization *(BPS)*	
	Homogenization *(HOM)*	Optimization *(OPT)*
Goal	Unify multiple variants of a given business process to **reduce process variance.**	Additionally to pure homogenization, homogenize a business process or multiple variants of a business process towards a **time-, cost-, and quality-optimal** way of achieving the business process goal.
Method	Align a business process or variants of a business process against an **archetype process.**	
Type of archetype process	Archetype process selected or created within the focal firm. **Not necessarily time-, cost-, and quality-optimal.**	Archetype process represents a **time-, cost-, and quality-optimal way** of achieving the business process goal.[2]

Table 1: Definition of business process standardization as a two-staged approach based on (Muenstermann and Weitzel, 2008)

Some authors elaborate on the potential impact of business process standardization on business process performance: For example, Muenstermann et al. empirically show that there is a positive combined impact of process and data standards on business process performance (measured by time, cost and resulting quality of process execution) (Muenstermann et al., 2009). Similarly, Sánchez-Rodríguez et al. show that standardizing the purchasing process has a significant positive impact on the purchasing process performance (measured by materials cost, materials quality, on-time delivery and inventory performance) and later on business performance (in terms of ROA, ROS, production cost, and market share) (Sánchez-Rodríguez et al., 2006). Finally, Ramakumar and Cooper title "Process standardization proves profitable" (Ramakumar and Cooper, 2004).

Thus, drawing on these findings, we argue that standardizing business processes, i.e. homogenizing and optimizing them, will help to identify and reduce process inefficiencies, generate economies of scale, and integrate superior process knowledge and best practices into a firm's process design, which will ultimately result in increased business process performance. Therefore, we hypothesize that business process standardization (homogenization and optimization) has a positive impact on business process performance.

Hypothesis H1: Business process standardization (homogenization and optimization) has a positive impact on business process performance.

[2] Here the time-, cost- and quality-optimal archetype process can either be created or selected within the focal firm or be based on/adopted from an existing external reference/best in class process, such as e.g., the MIT process handbook. See Kindler and Nuettgens for an extensive overview of existing reference processes (Kindler and Nuettgens, 2005).

Business process flexibility

Flexibility represents a polymorphous concept in the literature, which has different meanings with respect to the context (Evans, 1991; Rahrami, 1992). As theoretical foundation for handling flexibility, contingency theory and real options theory have successfully been applied by previous literature. Contingency theory views flexibility as vehicle to achieve a fit between an organization and its environment in order to increase firm performance (Milliman et al., 1991; Snow et al., 2006; Zajac et al., 2000). From the viewpoint of real options theory, flexibility is seen as an option on future courses of action (Upton, 1995). Thus, the higher the expected uncertainty is, the more valuable are these options to a particular organization in order to have the opportunity to implement the best suitable strategy out of a greater set of possible strategies (Rese and Roemer, 2004; Trigeorgis, 1996). Accordingly, the management literature defines flexibility as "the degree to which an organization possesses a variety of actual and potential procedures, and the rapidity by which it can implement these procedures, in order to increase the control capability of the management and improve the controllability of the organization and the environment" (De Leeuw and Volberda, 1996, p. 131).

As the definition shows, changing environmental circumstances point out the need to be flexible in terms of speed and scope to change existing business behavior (Parthasarthy and Sethi, 1992). Therefore, we are looking at the ability of an organization to change its business processes in order to change its business behavior. In this paper, this ability is termed *business process flexibility* and comprises the tasks necessary to implement new procedures in order to "change organizational capabilities repeatably, economically and in a timely way" (Shaw et al., 2007, p. 92). As business processes are increasingly supported with underlying information systems, an important factor influencing the flexibility of the business process is the adaptability of its supporting IT infrastructure (Byrd and Turner, 2000; Nidumolu and Knotts, 1998).

According to previous research, business process standardization reduces the complexity of the business processes making them easier to modify in order to adapt to changing conditions (Bandow et al., 2008; Hesser et al., 2006). In addition, business process standardization consists of tasks, such as concisely documenting the business processes, which increase the understanding of the own business processes, which also furthers the ability to easier modify them when needed (Ungan, 2006a; Ungan, 2006b). Moreover, standardizing business processes makes it easier to alter them due to the fact that only 'one process variant' (the archetype process) has to be changed – leading to increased business process flexibility allowing for further changes (Gosain et al., 2005). Consequently, we hypothesize that business process standardization will positively influence business process flexibility.

Hypothesis H2: Business process standardization (homogenization and optimization) has a positive impact on business process flexibility.

The resulting research model is depicted by Figure 2.

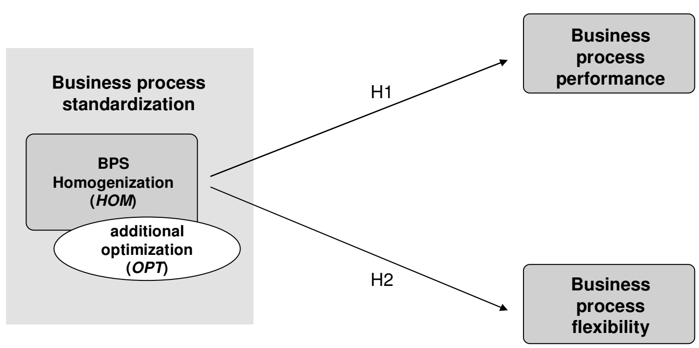

Figure 2: Research model

APPROACH

The theoretical research model (Figure 2) has been operationalized and transferred into a structural equation model. Subsequently, it was evaluated by quantitative analysis building on data from the 1,000 largest companies in Germany.

Research object

As application domain, we chose the corporate HR recruiting process to investigate the influence of business process standardization (homogenization and optimization) on both business process performance and business process flexibility for these reasons:

First, Luftman et al. stress the general importance of recruiting being a top issue for IT executives (Luftman et al., 2006). Then, in comparison to other HR processes the recruiting process is known to be the most time and cost consuming one (Kim and Won, 2007), consequently disposing of significant saving potentials that can be leveraged by business process standardization. Additionally, the rising importance of the corporate recruiting process is also recognized in practice, since more and more globally operating firms started to standardize their global recruiting processes (Stetten et al., 2008). Finally, driven by the fast changing recruiting environment (e.g., increasing share of online applications, increasing importance of job portals, shorter average employee retention times) the corporate recruiting process has to be highly adaptive/flexible to guarantee high potential candidates and hires. The following figure shows an exemplary HR recruiting process as proposed by Faerber et al (2003).

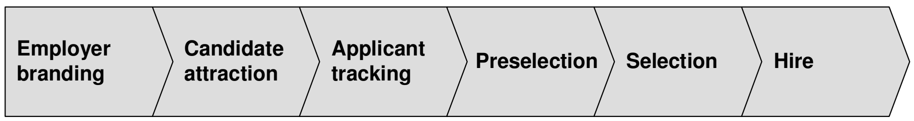

Figure 3: Generic corporate recruiting process (Faerber et al., 2003)

Construct operationalization

All latent variables in our research model are represented by a reflective measurement model consisting of three indicators. We measured all constructs on a 7-point Likert scale from 'strongly agree' to 'strongly disagree'. Table 3 in the appendix lists the indicators used. Most of the scales have been successfully validated and used in previous studies but needed to be translated to German and to be adapted to the particular context of the HR recruiting process. Further, to ensure content validity (Zhu and Kraemer, 2002), we discussed all of them in detail in case studies and survey pre-tests with both dedicated experts in the human resource and recruiting departments of German firms and senior executives and consultants of one of the world's largest job boards.

The measurement of process standardization shows some particularities. When comparing the definitions of homogenization and optimization as the two stages of process standardization, it becomes obvious that these concepts cannot be sufficiently separated from each other from a measurement perspective. If a firm optimizes its processes by e.g., adopting an external process standard, it will automatically have to homogenize its processes as well to broadly profit. Consequently, optimization will always have to cover the concept of homogenization. Therefore, we chose the following approach: We defined two measurement models, one for homogenization and one for optimization. Due to the discriminance difficulties, we tested our model with homogenization solely in the first step, and then extended the measurement model of process standardization by the three indicators describing optimization to recalculate the model again. Thus, the results will show the differential impact, caused by optimization, by the increase of the coefficients of outgoing paths and of the R^2 of the affected variables. In the following, we will refer to the different resulting empirical models by *HOM-model* (homogenization only) and *HOM+OPT-model* (homogenization and optimization).

Our first endogenous variable, business process performance, was measured as a second-order construct, consisting of three first-order constructs; process cost, time, quality, each measured by three reflective items. By contrast, business process flexibility was measured as a simple latent construct, again reflected by three indicators.

Data collection

This study uses a dataset obtained from a survey carried out in 2008 among the 1,000 largest companies in Germany (according to revenues in 2007). We sent out questionnaires to the individually identified and contacted executives responsible for the recruiting process in these companies; overall 147 questionnaires were returned (response rate 14.7%). 85 out of them were useable for our analysis since they showed no missing values in the indicators used. The sample is statistically representative regarding firm size.

Statistical analysis

For statistical analysis we used Partial Least Squares (PLS) employing SmartPLS 2.0 M3 (Ringle et al., 2005). PLS was chosen because first, PLS is preferable whenever theory is untested in a new application domain (Gopal et al., 1993), and second, our data set consists of not normally distributed variables which makes the use of covariance-based methods problematic.

RESULTS

In the following, both the measurement and structural model are evaluated. The appendix offers additional detailed data.

Measurement model

Following Hulland, the adequacy of a measurement model can be tested using following criteria (Hulland, 1999):

(1) Individual indicator reliability describes the statistical fit between an indicator and its corresponding latent variable. As shown in the Appendix (Table 4 for *HOM-model* and Table 6 for *HOM+OPT-model*), all indicator loadings are above the recommended threshold of 0.7 and all indicators have the highest loading with their respective latent variable (Fornell and Larcker, 1981). Moreover, significance tests using the bootstrap routine based on 1,000 bootstraps (Chin, 2000) showed that all indicators loadings are significant at the 0.001 level.

(2) Convergent validity refers to the internal consistency of a set of indicators and is analyzed by calculating the Average Variance Extracted (AVE) and the Composite Reliability (CR). As shown in Table 2 for both the *HOM-model* and the *HOM+OPT-model*, all AVEs are above the recommended threshold of 0.5 and all CRs are above the recommended threshold of 0.6 (Bagozzi and Yi, 1988).

	Research model for homogenization (*HOM-model*)		**Research model for homogenization and additional optimization (*HOM+OPT-model*)**	
	AVE	Composite Reliability	AVE	Composite Reliability
BPS	0.7007	0.8753	0.6466	0.9162
BPP_T	0.7764	0.9122	0.7729	0.9106
BPP_C	0.8219	0.9325	0.8153	0.9296
BPP_Q	0.6317	0.8368	0.6335	0.8378
BPF	0.6758	0.8614	0.6785	0.8631

Table 2: Quality criteria for the research model for the differential impact of a) homogenization and b) homogenization and optimization on business process performance and business process flexibility

(3) Discriminant validity is concerned with whether a construct shares more variance with its indicators than it shares with the other constructs (Hulland, 1999). To test discriminant validity we used the Fornell-Larcker-Criterion (Fornell and Larcker, 1981) that demands that for each construct the AVE should be greater than the variance shared between the respective construct and other constructs in the research model. As shown in Table 5 and Table 7 in the appendix this criterion holds for both our models.

Summarizing the results, each construct showed the required indicator reliabilities, convergent validity, and discriminant validity.

Structural model

Evaluating the structural model for the differential impact of homogenization on business process performance and business process flexibility first (*HOM-model*) (cf. Figure 5 in the appendix), we find that 16.9% (R^2=0.169) of the overall variance for business process performance and 24.1% (R^2=0.241) of the overall variance of business process flexibility could be explained by business process standardization. The path coefficient for the impact of business process standardization on business process performance amounts to 0.411 while the path coefficient for the impact of business process standardization on business process flexibility amounts to 0.490. A t-test conducted for the significance of the path coefficients by conducting a bootstrapping (Chin, 2000) based on 1,000 bootstraps yields significance at the 0.001 level in both cases.

Evaluating for the joint impact of homogenization *and* optimization on business process performance and business process flexibility (*HOM+OPT-model*) (cf. Figure 6 in the appendix), we find even stronger results. 26.5% (R^2=0.265) of the overall variance for business process performance and 26.8% (R^2=0.268) of the overall variance of business process flexibility could be explained by business process standardization. The path coefficient for the impact of business process standardization on business process performance amounts to 0.515 while the path coefficient for the impact of business process standardization on business process flexibility amounts to 0.518. Again, all path coefficients are significant at the 0.001 level.

Figure 4 below summarizes the findings by showing both the evaluated research model for the differential impact of only homogenization vs. additional optimization on business process performance and business process flexibility in one figure.

Please note that the results regarding the first-order constructs of business process performance are not shown here but in the appendix (Figure 5, Figure 6).

The evaluation of both structural models shows a significant impact of business process standardization on both business process performance and business process flexibility. Hence, in both our research models hypotheses H1 and H2 are supported. Comparing the path coefficients, we find a slightly (but significantly[3]) stronger impact of homogenization on process flexibility than on process performance (*HOM-model*: 0.490 vs. 0.411; *HOM+OPT-model*: 0.518 vs. 0.515). Moreover, extending the measurement model by optimization leads to a strong increase of the path coefficient regarding process performance (from 0.411 to 0.515), but only a minor (but still significant[2]) additional effect in path strength regarding process flexibility (from 0.490 to 0.518).

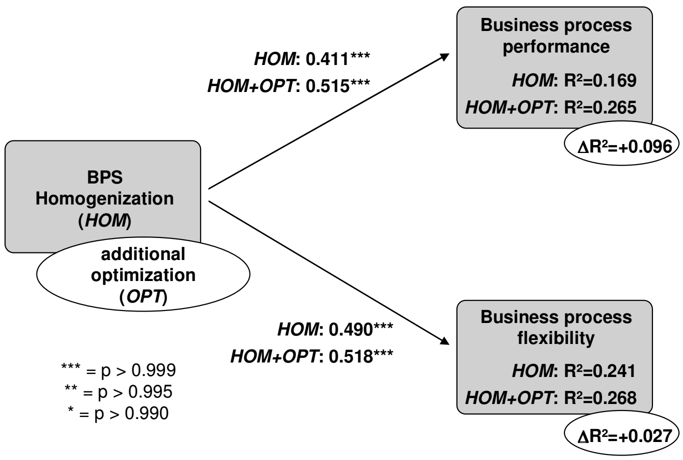

Figure 4: Evaluated research models: *HOM-model* (impact of homogenization) and *HOM+OPT-model* (impact of homogenization and optimization)

CONCLUSION

Discussion and Implications

Firstly, this paper suggests a theoretical model to analyze the impact of business process standardization on business process performance and flexibility. Secondly, the results are among the first to systematically and empirically show that there is not only a significant positive impact of business process standardization on performance but that besides that there is an at least equally significant impact of business process standardization on business process flexibility. With these two main contributions, the paper fills a gap in the existing literature and can serve as a starting point for promising future research.

Moreover, the results show that the exclusive impact of homogenization is comparably strong compared to homogenization combined with optimization. Homogenization explains two thirds of the explained variance explained by homogenization and optimization combined. Consequently, homogenization as the unifying of the two stages of process standardization (cf. Table 1) shows to be highly important. This differentiation sheds light on the heretofore non-transparent black box of the impact of business process standardization on performance, allowing for well-thought-out considerations of either executing homogenization alone or combining it with optimization in view of the standardization costs.

As a managerial implication, managers can use the results as justifying rationale before deciding to undergo a standardization project. The differentiation of business process standardization into homogenization and optimization allows managers to estimate the impact they can expect from homogenization and optimization with respect to the standardization costs expected, and in the following to conscientiously deliberate about whether it is better to only homogenize or worthwhile – adding on that – to also optimize by, e.g., buying in an externally available reference process.

Further, our research shows that besides the expected and monetarily measurable impact of business process standardization on business process performance there also is a not easily measurable but at least equally important impact of business process standardization: the impact on business process flexibility. In turbulent markets, the dynamic capabilities by which

[3] Significance of path coefficient differences was determined based on comparing the path coefficient samples generated by 1,000 bootstraps by a t-test.

firm managers "integrate, build and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al., 1997, p. 516) become an important source of sustained competitive advantage. Hence, on the long run achieving business process flexibility may even be more important than pursuing short term monetary process performance optimizations. Regarding the HR recruiting process, this means that being able to seamlessly change and adapt the recruiting process to e.g., a dramatically increasing rate of online applications, a profoundly fluctuating demand for applications (from the business units) and disposability of adequate candidates (on the recruiting market) is more important than ever before. In addition, only a highly flexible recruiting process allows for connecting to and integrating the quickly emerging and disappearing online career platforms and job portals at short term and arguable costs (Eckhardt et al., 2009).

Our results can be transferred to other application domains, as the following two cases, in which international organizations performed business process standardization activities and benefited from both increased business process performance and enhanced business process flexibility, show:

- In 2006, Exxon Mobil Corporation, which has a presence in 200 countries, launched a global business process and technology standardization program in which the introduction of business process and IT standards translated into both business performance improvements on the one hand and flexibility respectively agility for Exxon's global business units on the other hand. Patricia C. Hewlett, the Vice President of Global Information Technology with Exxon Mobil, said: "The efficiencies made possible by adopting consistent platforms and business processes add flexibility to the business" (Mitchell, 2006, p. 38).
- Between 2004 and 2008 a large multinational services firm – whose business model was severely under pressure due to a) severe price and margin pressure and b) a redefinition of the service production logic from a static towards a dynamic model – launched a company-wide business process standardization program. With this program the firm was not only able to significantly increase business process performance but to easily change its own production logic according to the market requirements from their static to a dynamic model (Muenstermann and Weitzel, 2008).

Limitations and Further Research

Beside the typical limitations of quantitative research (including limited transferability to other process domains, industries, and countries, the threat of common method bias) our work is particularly limited by the following issues: (1) Research on process standardization is a new field of research; thus, there is scarce literature, theoretical foundations, and operationalizations of measures we could draw from. (2) The combination of a measurement model for homogenization and optimization in order to develop a combined measure for standardization is debatable from a methodological perspective. Nevertheless, a formative combination based on two distinct constructs failed since optimization is inherently part of homogenization[4] and cannot be excluded – which leads to multicollinearity problems in case of formative measurement. (3) We used a very simple model to explain the impact of process standardization on performance and flexibility. We are aware that there are some important mediators and moderators, but in a first step wanted to test the basic effect to find evidence for our research direction. Finally, these results rely to some extent on opinions and interpretations of the involved individuals and therefore might be limited due to the problem that questionnaires do not allow in-depth questions. Hence, the results should only be seen as first indicative results, which we are going to further analyze in a case-study based approach to overcome these limitations.

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[4] Homogenization will usually lead to adopting the best available process variant. Thus, the other variants get optimized.

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APPENDIX

Evaluated research models

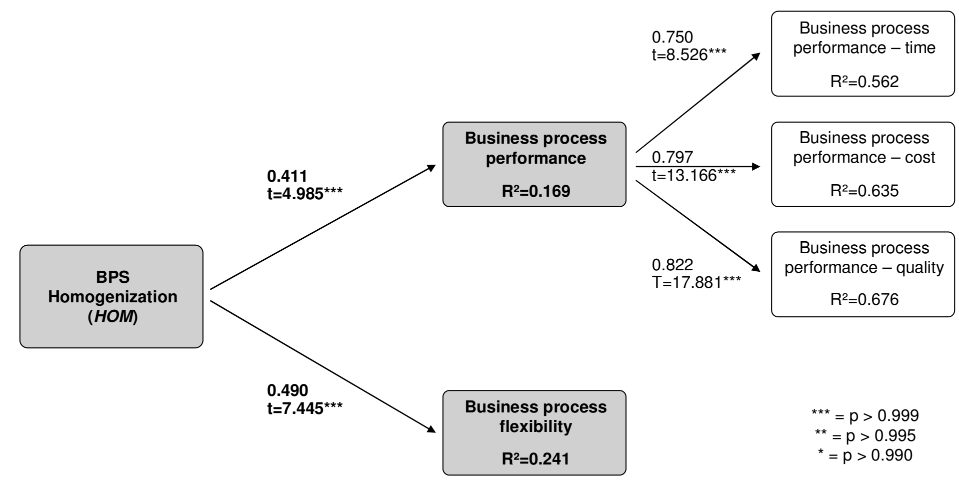

Figure 5: Evaluated *HOM-model* (impact of homogenization)

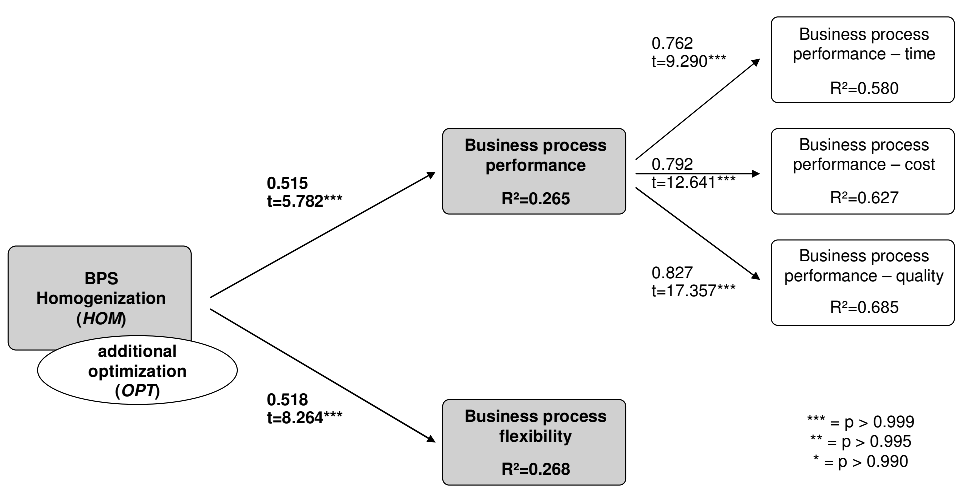

Figure 6: Evaluated *HOM+OPT-model* (impact of homogenization and optimization)

Overview of indicators

Construct			Indicator
Business process standarization	**Homogenization** (BPS_H)	BPS_H_1	We have established company-wide harmonized workflows in our recruiting.
		BPS_H_2	We have established uniform interactionpatterns between HR departments and business departments in our recruiting.
		BPS_H_3	The recruiting process is entirely supported by a single IT-system (e.g., SAP-HR).
	Optimization (BPS_O)	BPS_O_1	The recruiting process also underwent optimization actions as part of the standardization initiatives.
		BPS_O_1	Process inefficiencies have been identified and eliminated.
		BPS_O_1	Within our organization business process standardization is seen as a possibility to design the recruiting process in an efficient way.
Business process performance – time (BPP_T)		BPP_T_1	We have reduced the time between the identification of a vacancy and the posting of the job ad over the last years.
		BPP_T_2	We have reduced the time between the identification of a vacancy and its fill over the last years.
		BPP_T_3	We were able to reduce the time between the posting of a job ad and the fill of the vacancy over the last years.
Business process performance – cost (BPP_C)		BPP_C_1	In our company we have reduced the costs for interacting with the candidates (response management) over the last years.
		BPP_C_2	In our company we have reduced the costs for the internal applicant tracking over the last years.
		BPP_C_3	In our company we were able to reduce the costs per tracked application over the last years.
Business process performance - quality (BPP_Q)		BPP_Q_1	We were able to enhance the quality of applicants' data.
		BPP_Q_2	We were able to enhance the proportion of hired top candidates.
		BPP_Q_3	Out applicants are very satisfied with our offer of information.
Business process flexibility (BPF)		BPF_1	The applicant management system can be personalized/adapted by the user.
		BPF_2	Change requests can quickly be realized.
		BPF_3	Changes of the data structures of the applicant management system can easily be realized (e.g., adding of data fields).

Table 3: Overview of indicators used in survey questionnaire

Quality criteria for the *HOM-model*

	BPS	BPP_T	BPP_C	BPP_Q	BPF
BPS_H_1	0.8434	0.0902	0.1595	0.2178	0.3291
BPS_H_2	0.8140	0.2667	0.1925	0.2768	0.2532
BPS_H_3	0.8534	0.2633	0.4052	0.3920	0.5454
BPP_T_1	0.1964	0.8129	0.2669	0.4244	0.0938
BPP_T_2	0.2597	0.9075	0.3860	0.5432	0.1240
BPP_T_3	0.2313	0.9192	0.3167	0.4857	0.1360
BPP_C_1	0.1872	0.3252	0.8406	0.3968	0.0320
BPP_C_2	0.3619	0.3308	0.9373	0.3161	0.2398
BPP_C_3	0.3702	0.3499	0.9384	0.3405	0.1820
BPP_Q_1	0.3657	0.4502	0.2857	0.8391	0.2228
BPP_Q_2	0.2114	0.4820	0.3485	0.8151	0.1813
BPP_Q_3	0.3306	0.3795	0.2857	0.7256	0.2719
BPF_1	0.5278	0.0901	0.1296	0.2683	0.8874
BPF_2	0.2126	0.0247	0.0776	0.1456	0.7379
BPF_3	0.3616	0.1996	0.1966	0.2400	0.8338

Table 4: Cross loadings for the *HOM-model*

	BPS	BPP_T	BPP_C	BPP_Q	BPF
BPS	0.8371				
BPP_T	0.2617	0.8811			
BPP_C	0.3399	0.3702	0.9066		
BPP_Q	0.3769	0.5528	0.3869	0.7948	
BPF	0.4904	0.1348	0.1683	0.2799	0.8221

Table 5: Correlations between respective constructs in the lower left off-diagonal and square roots of the AVEs along the diagonal to check discriminant validity for the *HOM-model*

Quality criteria for the *HOM+OPT-model*

	BPS	BPP_T	BPP_C	BPP_Q	BPF
BPS_H_1	0.7904	0.0533	0.2109	0.2139	0.3699
BPS_H_2	0.7679	0.2362	0.2472	0.2747	0.2926
BPS_H_3	0.7866	0.2400	0.4328	0.3817	0.5595
BPS_O_1	0.8280	0.3969	0.3526	0.4831	0.3217
BPS_O_1	0.8996	0.2874	0.4472	0.4188	0.4134
BPS_O_1	0.7428	0.3436	0.2533	0.4350	0.4628
BPP_T_1	0.2770	0.8104	0.2854	0.4219	0.1019
BPP_T_2	0.3259	0.9059	0.4170	0.5406	0.1391
BPP_T_3	0.2887	0.9173	0.3392	0.4803	0.1472
BPP_C_1	0.2747	0.3490	0.8338	0.3984	-0.0088
BPP_C_2	0.4199	0.3557	0.9349	0.3163	0.2125
BPP_C_3	0.4394	0.3744	0.9363	0.3414	0.1518
BPP_Q_1	0.4159	0.4409	0.2949	0.8366	0.2208
BPP_Q_2	0.3522	0.4983	0.3287	0.8204	0.1570
BPP_Q_3	0.3697	0.3660	0.3066	0.7263	0.2800
BPF_1	0.5310	0.0812	0.1169	0.2564	0.8713
BPF_2	0.2582	0.0480	0.0257	0.1429	0.7496
BPF_3	0.4161	0.2260	0.1569	0.2401	0.8453

Table 6: Cross loadings for the *HOM+OPT-model*

	BPS	BPP_T	BPP_C	BPP_Q	BPF
BPS	0.8041				
BPP_T	0.3389	0.8791			
BPP_C	0.4205	0.3988	0.9029		
BPP_Q	0.4755	0.5501	0.3894	0.7959	
BPF	0.5176	0.1484	0.1330	0.2708	0.8237

Table 7: Correlations between respective constructs in the lower left off-diagonal and square roots of the AVEs along the diagonal to check discriminant validity for the *HOM+OPT-model*