



## The Effects of Process-Oriented Organizational Design on Firm Performance

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# The Effects of Process-Oriented Organizational Design on Firm Performance

## Structured Abstract

### Purpose

Several organizations choose a process-oriented organizational design as a source for competitive advantage. In this paper, we explore empirically the relationship between process orientation (PO) and firm performance. We consider PO as a multidimensional construct and examine how its underlying dimensions impact different aspects of organizational performance.

### Design/methodology/approach

We use an exploratory research design and investigate the effects of the different PO dimensions on profitability, customer satisfaction, product quality, and time-based performance using a random sample of Austrian manufacturing firms.

### Findings

The empirical findings reveal that process performance measurement, a process-oriented organizational structure, the application of continuous process improvement methods, and – in particular – a culture in line with the process approach, are significantly and positively associated with organizational performance.

### Originality/value

While a few studies examined the effects of PO on financial performance, there is a clear lack of quantitative studies investigating the effects of PO on other, non-financial performance measures. In addition, since most of the existing studies treated PO as a single measure, there is a clear lack of studies that investigate the performance effects of individual PO dimensions. We incorporate the multidimensional nature of PO and examine the effects of individual PO dimensions on several firm performance aspects.

## 1. Introduction

Several organizations choose to be process-oriented. Process Orientation (PO) means that a focus is placed on the business processes, which range from customer to customer, instead of emphasizing an organization's functional and hierarchical structures (McCormack and Johnson, 2001). A process-

oriented organization is also often referred to as a “horizontal organization” (Ostroff, 1999), “process centered organization” (Hammer, 1996), “process enterprise” (Hammer and Stanton, 1999), “process focused organization” (Gardner, 2004) or simply “process organization” (Osterloh and Frost, 2006; Gaitanides, 2007). A firm that is process-oriented, regardless of whether it has already run through business process reengineering and/or process improvement projects or not, is duly concerned with the management of its cross-functional business processes (Armistead and Machin, 1998). Business process management incorporates on the one hand the discovery, design, deployment and execution of business processes, and the interaction, control, analysis and optimization of these processes on the other (Smith and Fingar, 2003). Much of the existing literature on the process-oriented organization has been in the popular press and lacks research or an empirical focus (Sussan and Johnson, 2003). Many case studies do refer to a positive relationship between PO and organizational performance, but a solid empirical back-up has not yet been provided (Vera and Kuntz, 2007). While a few studies examined the effects of PO on financial performance, there is a clear lack of quantitative studies investigating the effects of PO on other, non-financial performance measures. In addition, since most of the existing studies treated PO as a single measure, there is a clear lack of studies that investigate the links between *individual* PO dimensions and overall organizational performance (Kohlbacher, 2010). Therefore, we incorporate the multidimensional nature of PO and examine the effects of individual PO dimensions on financial performance, customer satisfaction, product quality, time-to-market speed, delivery speed, and delivery reliability. We use a sample of 132 Austrian firms operating in the metal and machinery industry. The paper will begin by providing a description of the primary dimensions of PO and a review of existing studies exploring PO and its benefits. Based on the literature review, the explicit research question is formulated. Next, the study’s methods are specified and the operationalization of the variables is described. This is followed by a presentation of the empirical findings. The paper concludes with a discussion of the results, implications, and issues for further research.

## 2. Dimensions of Process Orientation

PO is a construct which consists of several dimensions. Following the line of authors who did extensive research in the field of PO (Fischermanns, 2006; Hammer, 2007b; Kohlbacher and Gruenwald, 2011; McCormack and Johnson, 2001; Reijers, 2006; Vera and Kuntz; 2007) we identify the following dimensions which cover the domain of PO:

### 2.1. Process Design and Documentation

A prerequisite for managing an organization based on its processes is to know which business processes are performed within the organization and how they are related to each other. A precise definition of the company's business processes is the starting point for process management (Hinterhuber, 1995). Business processes, however, represent a difficult challenge for their identification and analysis since they are often unknown quantities, have no names, and are not visualized in organizational charts.

### 2.2. Management Commitment

In a process-oriented organization, management needs to support the process program. Without the support of senior executives, the process idea cannot unfold to its full potential. There is a high risk for process management to fail if the senior executives do not undertake necessary leadership roles and do not promote process-oriented thinking (Hinterhuber, 1995). Process-oriented initiatives are less likely to secure benefits unless managers come to a consensus and an understanding of such initiatives (Edwards *et al.*, 2000).

### 2.3. Process Ownership

The existence of process owners is the most visible difference between a process enterprise and a traditional organization (Hammer and Stanton, 1999). Every business process needs to have a process owner who has end to end responsibility of the process (Suter, 2009). Process owners must have the authority to take all measures necessary to coordinate and improve the business process (Hinterhuber, 1995).

#### 2.4. *Process Performance Measurement*

By focusing measurement on processes rather than functions, alignment and a shared focus across separate organizational units can be achieved (Hammer, 2007a). Implementing measures and taking corrective actions are operating precepts of process management, since a business process can only be mastered if it can be measured (Hinterhuber, 1995).

#### 2.5. *Corporate Culture in Line with the Process Approach*

PO also involves cultural aspects (Hinterhuber, 1995). The cultural fit is an important issue since people and processes must combine to produce output (Armistead and Machin, 1997). Only a culture based on teamwork, willingness to change, customer orientation, personal accountability, and a cooperative leadership style goes hand in hand with the process approach (Hammer, 2007b).

#### 2.6. *Application of Continuous Process Improvement Methodologies*

Continuous process improvement refers to sustained incremental improvements of existing processes. Continuous improvement creates small wins that collectively translate into superior performance (Cole, 2001; Bessant and Francis, 1999). In firms emphasizing continuous improvement, performance of the existing processes is seen as a moving target and constantly under scrutiny for improvement opportunities (Peng *et al.*, 2008).

#### 2.7. *Organizational Structure in Line with the Process Approach*

A process-oriented organization has adapted its structure to the process view, following the principle “structure follows process” (Gaitanides, 2007). Several authors stress that business processes should determine the structure of an organization (Schantin, 2004; Suter, 2004; Osterloh and Frost, 2006; Gaitanides, 2007).

In this section, we discussed seven distinct constructs which shape the firm’s capabilities of managing its business processes. The discussion clearly showed that PO consists of different dimensions and the question arises which of these dimensions makes a visible impact on organizational performance.

### 3. Link between Process Orientation and Organizational Performance

In this section we will discuss the theory on the link between PO and firm performance. Based on this discussion we formulate the explicit research question which drives our study.

#### 3.1. *Link between Process Orientation and Financial Performance*

PO introduces transparency in the organization (Kohlbacher, 2009). By discovering and analyzing an organization's business processes, non-value adding activities are easily detected. The elimination of non-value adding activities therefore should lead to cost reductions which in turn should lead to improved financial performance. Several authors (Hammer, 2007b; Schmelzer and Sesselmann, 2006) state that PO leads to better financial performance. Case study research carried out by Bulitta (2006), Wahlich (2004) and Muñoz et al. (2011) also report a positive contribution of PO on financial performance. The empirical study of Ittner and Larcker (1997) reveals that certain process management methods improve profitability. The results of the empirical study of McCormack and Johnson (2001) provides evidence that PO helps companies to improve business performance, reduce inter-functional conflict and improve "esprit de corps". Frei, Kalakota, Leone and Marx (1999) empirically explored the relation between process performance and financial performance of U.S. retail banks. One of the findings of this study is that banks which perform better across processes also tend to have superior financial performance. The literature therefore supports the view that PO leads to better financial performance.

#### 3.2. *Link between Process Orientation and Product Quality*

Considerably less attention has been paid to the effects of PO on non-financial firm performance. Several authors, like Hammer (2007b), Hinterhuber (1995), Hirzel (2008), and Schmelzer and Sesselmann (2006), argue the PO leads to higher product quality. Case study research, carried out by Bulitta (2006), Küng and Hagen (2007), and Setti and Stückl (2006), also refer to a positive relationship between PO and product quality. It is therefore expected that PO is positively related to product quality.

### 3.3. *Link between Process Orientation and Customer Satisfaction*

Silo-oriented organizations do not easily permit their employees to concentrate on the customers and their problems. Departments are trying to make their internal issues perfect (they are internally focused), but they do not think about possible improvements in terms of the customer which may result from collaborating with other departments (Gulati, 2007). As business processes are aligned with customer requirements, PO implements customer orientation (Osterloh and Frost, 2006) which in turn should lead to a higher customer satisfaction. Hinterhuber (1995), Hirzel (2008), and Schmelzer and Sesselmann (2006) argue the PO leads to higher customer satisfaction. Several case studies, carried out by Bocionek (2006), Bulitta (2006), Hertz, Johansson and de Jager (2001), Schima (2004), and Wahlich (2004) also report that a shift to a higher level of PO leads to higher customer satisfaction. The empirical study of Gustafsson, Nilsson and Johnson (2003) shows a direct significant effect of PO on customer satisfaction for large service organizations. It is therefore expected that PO is positively related to customer satisfaction.

### 3.4. *Link between Process Orientation and Delivery Speed*

By discovering and analyzing an organization's business processes, non-value adding activities are easily detected. The elimination of non-value adding activities therefore should lead to speed improvements. Hammer (2007b), Hirzel (2008), and Schmelzer and Sesselmann (2006) argue that PO leads to throughput speed improvements. Also, case study research carried out by Bocionek (2006), Classe and Mundle (1997), Hertz et al. (2001), Küng and Hagen (2007), Mittermaier and Braun (2004), Ongaro (2004), Setti and Stückl (2006), and Wahlich (2004) report that PO leads to throughput time reductions. The empirical study by Forsberg, Nilsson and Antoni (1999) shows that PO has been perceived to have a positive effect on cycle time speed. It is therefore expected that PO leads to delivery speed improvements.

### 3.5. *Link between Process Orientation and Time-to-Market Speed*

Process management enhances incremental innovation, but is detrimental to exploratory innovation (Benner and Tushman, 2002). Jansen, Van Den Bosch and Volberda (2006) found a positive

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2 relationship between the extent of rules and procedures within organizational units and exploitative  
3 innovation. Their study also bears similarities with recent insights that rules and procedures might  
4 not be as detrimental to explorative innovation as assumed by previous studies. The case study  
5 carried out by Setti and Stückl (2006) reports that by the application of process management, the  
6 amount of products which are not developed to market on time can be significantly reduced. Another  
7 case study, done by Wahlich (2004), states that process management leads to significantly shortened  
8 time-to-market. Therefore, it is expected that PO is positively related to time-to-marked speed.  
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### 18 *3.6. Link between Process Orientation and Delivery Reliability*

19 Hill (2000) writes that delivery reliability – defined as the extent to which an organization delivers  
20 its orders on time – is in many businesses an order-qualifier instead an order-winning criterion. If a  
21 company continues to not deliver on-time, customers will stop considering the company as a  
22 potential supplier. The views of Hill are consistent with the views of Kumar and Sharman (1992),  
23 commenting that customers have become so demanding that if their suppliers do not deliver on time,  
24 they take their business elsewhere. They further state that the trend for deliveries on time has reached  
25 practically all industries. Business processes which are not under control may cause insufficient  
26 delivery reliability (Schmelzer and Sesselmann, 2006). Case study research carried out by Bocionek  
27 (2006) and Hertz et al. (2001) report a positive effect of PO on delivery reliability. It is therefore  
28 expected that PO leads to delivery reliability improvements.  
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45 In sum, we have identified a range of benefits that may be expected from PO: improvement of  
46 financial performance, product quality, customer satisfaction and time-based performance. In the  
47 previous section, we identified seven dimensions which determine the capability of managing the  
48 firm's business processes. We therefore formulate our study's research question as follows:  
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56 *Research question: Which of the PO dimensions (i.e. process design and documentation,*  
57 *management commitment, process ownership, process performance measurement, corporate culture*  
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2 *in line with the process approach, application of continuous process improvement methodologies,*  
3 *and organizational structure in line with the process approach) positively impacts financial firm*  
4 *performance, product quality, customer satisfaction, delivery speed, time-to-market speed, and*  
5 *delivery reliability?*  
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## 10 11 **4. Methods**

### 12 *4.1. Setting and Data Collection*

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15 The population of this study is defined as Austrian corporations operating in the metal and  
16 machinery industry with at least 50 employees. We base the choice of the study's population on the  
17 following thoughts: As financial firm performance is associated with industry affiliation we choose  
18 to focus our analysis on similar industries. Since accounting methods differ across countries, we  
19 chose to focus on firms from one single country. In order to be able to perform statistical analyses  
20 the objective was to maximize the number of firms in our sample. Therefore we chose the metal and  
21 machinery industry, two of the largest industries in Austria.  
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31 Firms were selected randomly from the data of KSV1870, Austria's largest association for the  
32 protection of creditors, which accesses data directly from Austria's commercial register. Therefore,  
33 using this data source does not impose any sort of bias. Telephone interviews were used for data  
34 collection. All telephone interviews were personally conducted by the researchers. For every firm,  
35 one executive (CEO, CIO or quality manager) was interviewed. Although personally conducting  
36 telephone interviews was a resource intensive option, we chose it over the standard methods of  
37 administering paper or online surveys for various reasons: (1) to be able to clarify respondents'  
38 queries; (2) to avoid the situation whereby a busy executive or senior manager delegated the task of  
39 filling up the survey to an subordinate; and (3) to ensure that the responses collected were complete  
40 and usable for data analysis. A total of 152 organizations were interviewed. Firms whose respondent  
41 did not have the knowledge to meaningfully answer the questions were removed, resulting in a final  
42 sample size of 132.  
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#### 4.2. Operationalization of Process Orientation

In order to measure the PO dimensions, we use existing scales developed by Kohlbacher and Gruenwald (2011). Each item was measured on a six-point Likert scale.

**Process Design and Documentation.** This dimension measures to which degree the firm's processes are explicitly designed and documented and includes the following six items: Existence of a complete and uniform enterprise process model; documentation of processes; use and update of process documentation; definition of inputs and outputs for each process; definition of suppliers and customers for each process and segmentation of business processes.

**Management Commitment.** This dimension captures to which extent management supports the process program. Its four items are as follows: senior executive team's percipience of process management; existence of a senior executive who has taken leadership of and responsibility for the process program; active engagement of the senior executive team in the process program; and existence of an instance coordinating and integrating projects dealing with process management.

**Process Ownership.** This dimension measures the extent to which the role of the process owner is implemented in the firm. Its six items are as follows: Existence of process owners; experience of process owners; power of the process owner in order to be able to act for the process interests; process owners responsibility for, and proactive execution of, continuous improvement of their processes; process owner's responsibility for budget; and process owner's influence over personnel assignments.

**Process Performance Measurement.** This dimension measures to which degree measurement of process performance is carried out in the organization. The following eight items are used: Existence of process performance indicators for business processes; derivation of process performance indicators from enterprise goals; continuous collection of process performance data; use of performance indicators to initiate improvement actions; presentation of metrics to process workers; use of metrics for process benchmarking; use of activity based costing; and existence of incentive systems which emphasize the process' needs.

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*Culture in Line with the Process Approach.* This dimension measures whether the firm exhibits a culture that is in line with the process approach or not. The dimension is captured by the following five items: Existence of inter-departmental teamwork; customer-focused attitude of employees; employees' accountability for enterprise results; use of process language which measures whether employees on all levels of the organization speak about business processes, customers and process performance indicators; and process workers' knowledge about process design.

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*Continuous Process Improvement Methodologies.* This dimension measures whether the organization applies continuous process improvement methodologies. Two items are used: Existence of a process redesign, project management and change management experts cadre; and use of process improvement methodologies like Six Sigma and KAIZEN.

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*Process-Oriented Organizational Structure.* This dimension measures the extent to which organizational structure fits process design. With the first item we measure whether the organizational structure is derived from processes. A second item captures the employees' attitude towards change.

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### 4.3. Performance Measures and Control Variables

Clearly, numerous variables influence a firm's performance. However, the objective of our work is to find out which PO dimension could make an observable impact on the performance of a business. Four aspects of organizational performance are assessed in this study. They are: (1) financial performance, (2) product quality, (3) customer satisfaction and (4) time-based operational performance. We will discuss these aspects in more detail now.

Financial performance was measured by return on sales (ROS) and return on assets (ROA). Financial data was gathered by inspecting the official financial statements of the firms, which are publicly available via Austria's commercial register. Product quality, customer satisfaction, delivery speed, time-to-market speed, and delivery reliability was measured by perceptual ratings. Perceptual ratings rely on the interviewee's judgment and allow him/her to give an answer without giving

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2 specific numerical information. Interviewees are more willing to answer a subjective question than  
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4 queries about numerical data (Ahire *et al.*, 1996). Respondents were asked to evaluate product  
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6 quality, delivery speed, and time-to-market speed (each as compared to their major competitors)  
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8 using six point Likert scales. Respondents were further asked to rate delivery reliability and  
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10 customer satisfaction. Customer satisfaction was measured by five items: customer complaints  
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12 (Yeung, 2008), ratio of price to value of products/services, company reputation, customer loyalty  
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14 (Zhang *et al.*, 2005), and overall perceived customer satisfaction (Bolton and Lemon, 1999; Guenzi  
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16 and Pelloni, 2004). The end-points of the Likert scales were selected such that high rating reflects  
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18 high performance.  
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24 We control for several variables that may affect firm performance to rule out alternative explanations  
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26 and enhance the fidelity with which the relationship between PO and firm performance is examined.  
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28 We include market share, firm size, and capital structure as control variables. Market share is  
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30 positively associated with financial performance (Capon *et al.*, 1990) and is therefore included as a  
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32 control variable. Respondents were asked to rate the market share of their company in comparison to  
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34 their major competitors using a six point Likert scale (if the company was operating in various  
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36 industries, respondents were asked to estimate a weighted mean of the different market shares  
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38 resulting in a single rating representing the firm's average market share). Firm size, measured by the  
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40 natural logarithm of the number of employees, is associated with economies of scale and, hence, is  
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42 expected to have a positive association with firm performance (Hitt *et al.*, 1997). Capital structure  
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44 has been argued to affect firm performance. In particular, debt can produce tradeoffs such as  
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46 reductions in long-term expenditures (e.g. R&D). Such reductions can be harmful to the firm over  
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48 time (Hitt and Smart, 1994). Capital structure is therefore also used as a control variable. Following  
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50 Hitt *et al.* (1997), to avoid artificial correlations (ratio error correlation), capital structure is measured  
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52 by (1) the ratio of liabilities to total assets for the regression equations with return on sales as the  
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2 dependent variable, and by (2) the ratio of liabilities to the number of employees for the regression  
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4 equations with return on assets as the dependent variable.  
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#### 7 8 *4.4. Thread of Common Method Bias*

9 To deal with common method bias, several post hoc and statistical remedies are available. We  
10 followed Parkhe (1993) and conducted a single factor test to identify whether common method  
11 variance is present. The assumption underlying the test is that if a substantial amount of common  
12 method variance exists in data, a single factor will emerge from factor analysis when all variables are  
13 entered together, or a general factor that accounts for most of the variance will result. The results of  
14 our unrotated factor analyses revealed neither a single nor a general factor, suggesting that any  
15 systematic variance common to the measures was lacking, and as such it could be argued that  
16 common method bias did not appear to be a problem.  
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### 28 **5. Results and Discussion**

29 The aim of this work is to provide exploratory evidence on the effects of individual dimensions of  
30 PO on organizational performance, as formulated in the study's research question. Since the concept  
31 of PO is a multidimensional construct, one has to ensure that the construct's underlying dimensions  
32 are unidimensional, reliable, and valid. Unidimensionality is assessed by exploratory factor analysis  
33 with varimax rotation. The factor analysis yielded the expected seven dimensions. Construct validity  
34 is supported by the fact that none of the items loaded greater than .50 on more than one factor.  
35 Adequate construct reliability of the dimensions was assessed by using Cronbach's alpha (see Table  
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2 The coefficients were all above the minimum acceptance level of 0.6 (Hair *et al.*, 2006), except the  
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4 coefficient for the process-oriented organizational structure dimension, indicating that this  
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6 dimension has less than desirable internal consistency. However, in early stages of research,  
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8 according to Nunnally (1978), one can work with instruments that have only modest reliability (and  
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10 the construct of process-oriented organizational structure certainly is based on early stage research).  
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12 Therefore, the dimension is retained in the study and interpretation regarding this variable needs to  
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14 be made with extra caution.  
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19 Dimension measures were calculated by computing the equally-weighted average of the item scores  
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21 associated with each dimension, as this is the most common approach of calculating summated  
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23 scales (Hair *et al.*, 2006). As customer satisfaction was operationalized by several indicators, its  
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25 reliability has to be assessed as well. Cronbach's alpha for the construct is .552. Unfortunately, the  
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27 construct of customer satisfaction has less than desirable internal consistency, as the low coefficient  
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29 indicates. The low coefficient could not be improved by removing items from the construct.  
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31 However, the construct is retained in the study and interpretation regarding this variable needs to be  
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33 made with extreme caution.  
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40 Table 1 depicts the descriptive statistics and bivariate correlation matrix. Given the explorative  
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42 nature of this paper, the relatively small sample size, and the relatively large number of potential  
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44 explanatory variables, the effects of the individual PO dimensions on organizational performance are  
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46 examined using stepwise multiple regressions. Variables were entered into the regression models if the  
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48 significance level of their F value was less than .10, and were removed if the significance level was greater  
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50 than .15. In the final regression models, all entered variables have p-values below .05. The resulting models  
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52 consist of organizational performance (return on sales, return on assets, product quality, customer  
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54 satisfaction, delivery speed, time-to-market speed, and delivery reliability) as a function of the seven  
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2 PO dimensions and various control variables. The results of the stepwise regressions are presented in  
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18 Results of the stepwise regression of return on sales on the PO constructs are presented in the first  
19 data column of Table 2. Capital structure (debt) entered the model and is negatively related with  
20 profitability ( $p < .01$ ). Of particular interest are the results of the PO dimensions. The analysis  
21 indicates that the more a culture is in line with the process approach (i.e. a culture based on customer  
22 orientation, where the employees feel accountable for firm results, where cross-functional teamwork  
23 is as a matter of course, where the workers well know how their process is executed, and where  
24 employees use a process-oriented language), the higher is the profitability ( $p < .05$ ). Results of the  
25 stepwise regression of return on assets on the PO constructs are presented in the second data column  
26 of Table 2. Firm size is positively associated with return on assets ( $p < .05$ ). The data analysis  
27 indicates that the more a company applies continuous process improvement methods, the higher is  
28 its financial performance in terms of return on assets ( $p < .05$ ). Results for the analysis of the effects  
29 of PO dimensions on product quality are presented in the third data column of the table. The analysis  
30 indicates that firm size ( $p < .05$ ) and process performance measurement ( $p < .01$ ) are positively  
31 related to product quality. The fourth data column of Table 2 pertains to the effects of PO  
32 dimensions on customer satisfaction. The data suggests that a corporate culture which is in line with  
33 the process approach leads to higher customer satisfaction ( $p < .001$ ). The importance of culture is  
34 corroborated by the fifth data column of the table, indicating that a culture which is in line with the  
35 process approach is also significantly related with delivery time ( $p < .01$ ). The effects of PO  
36 constructs on time-to-market are reported by the sixth data column of Table 2. The empirical data  
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2 indicates that when a company's organizational structure is more in line with the organization's  
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4 business processes, the faster is the firm able to launch new products to the market ( $p < .01$ ). Finally,  
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6 the seventh data column of the table emphasizes again the importance of culture. Organizations  
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8 reporting that their culture is in line with the process approach also report higher delivery reliability  
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10 ( $p < .001$ ).  
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## 13 14 **6. Conclusion**

15 This paper provides new empirical insights into the impact of PO on organizational performance. To  
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17 the best of the authors' knowledge, this is the first study on the impact of *individual* PO dimensions  
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19 on financial and non-financial firm performance. The empirical findings suggest that process  
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21 performance measurement, a process-oriented organizational structure, the application of continuous  
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23 process improvement methods, and a culture that is in line with a process management approach, are  
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25 significantly and positively associated with organizational performance. In particular, if the culture is  
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27 in line with the process approach, this seems to be the ultimate predictor for both financial and non-  
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29 financial firm performance. Organizations which actually *live* the process approach achieve higher  
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31 customer satisfaction, higher delivery speed, higher delivery reliability, and higher profitability.  
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33 Although the evidence indicates that some PO dimensions, such as design and documentation of  
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35 business processes and the process owner role, do not have an individual effect on organizational  
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37 performance, it may still be the case that these constructs are enablers which represent the basis for  
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39 other PO dimensions. For instance, measuring the performance of business processes requires a  
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41 sound definition and documentation of these processes; otherwise process performance measurement  
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43 would be useless. Another example would be the application of continuous process improvement  
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45 methods, requiring first a sound definition of the organization's business processes, and second the  
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47 implementation of process performance measurement, since the application of continuous  
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49 improvement methods without any process performance metrics in place would be aimless. Third,  
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51 applying continuous improvement methods for a business process might also require a process  
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53 owner who has the power and competence to initiate and implement organizational changes within  
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2 the business process to enhance its performance. Thus, as the empirical evidence suggests,  
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4 dimensions which are not directly associated with organizational performance might be *necessary*  
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6 but not *sufficient* to achieve higher organizational performance.  
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11 As with any empirical study, this work has obvious limitations that should be recognized and  
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13 discussed. First, the sample in this work only included Austrian firms operating in the metal and  
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15 machinery industry. Although one should expect similar findings in similar industries (particularly in  
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17 manufacturing industries), generalizability of the findings to other industries or other countries is  
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19 open to scrutiny. Second, non-financial data were self-reported assessments of executives.  
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21 Therefore, the results may be affected by the key informant bias and the common method bias.  
22  
23 However, common method bias would have produced consistent effects of the same PO dimensions  
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25 on non-financial performance measures, yet we found different effects of several PO dimensions on  
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27 non-financial performance measures. A third and important limitation of this work is the small  
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29 number of cases in certain regression models, for example in the models with return on sales ( $n =$   
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31 61) and time-to-market speed ( $n = 67$ ) as the dependent variables. Such a small number of cases is  
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33 not sufficient to clearly demonstrate a connection between PO and organizational performance.  
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35 Fourth, the construct of customer satisfaction has less than desirable internal consistency. All  
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37 findings with customer satisfaction as dependent variable must therefore be interpreted with extreme  
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39 caution. Although items used for measuring customer satisfaction were (1) derived from existing  
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41 studies and (2) are considered as meaningful indicators for customer satisfaction, other items for  
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43 measuring this construct may probably lead to a better internal consistency. As a result, other effects  
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45 of PO on customer satisfaction may become apparent.  
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53 There are a number of avenues for further research. First, the dynamics of PO could be investigated  
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55 through a longitudinal study of PO efforts and their outcomes. A longitudinal study would provide  
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57 stronger inferences about causal direction of the investigated effects (Straits and Singleton, 2001).  
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1  
2 Second, this study could be applied to other industries (particularly interesting would be service  
3 industries) and/or other countries. One could e.g. carry out a cross-industry study, which investigates  
4 the effects of PO in highly versus less competitive industries. Third, financial performance was  
5 assessed by the widely used financial performance ratios return on sales and return on assets,  
6 indicating short term performance. One may wonder whether the findings also hold in the long run,  
7 e.g., with organizational survival as the dependent variable. Fourth, other methodologies could be  
8 used to estimate the impact of PO. For instance, the effects could be investigated by a structural  
9 equation model. However, this would require more data in order to obtain reasonable results.  
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## 22 **Annex: Questionnaire items**

### 23 *Process Design and Documentation*

- 24 • Our firm has developed a complete and uniform enterprise process model illustrating the  
25 business processes of the organization by their names.
- 26 • Our firm's processes are documented in a sufficiently detailed way.
- 27 • Process documentation is always timely updated after process design has changed.
- 28 • Inputs and outputs of our firm's processes are clearly defined.
- 29 • The internal/external customers as well as the internal/external suppliers of our organization's  
30 processes are clearly defined.
- 31 • Our firm's process design uses the idea of process segmentation, i.e. our organization has built several  
32 process variants for business processes which face heterogeneous requirements.
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### 50 *Management Commitment*

- 51 • The management of our organization perceives process management not as a single project, but as a  
52 way of managing the business.
- 53 • There is at least one senior executive who has taken leadership of and responsibility for the process  
54 program.
- 55 • The senior executive team is actively engaged in the process program.
- 56
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- The organization has implemented an instance coordinating and integrating projects dealing with business process management.

### ***Process Ownership***

- The role of the process owner is established in our organization and a process owner has been assigned to each business process.
- Process owners are experienced leaders/managers.
- Process owners are members of the enterprise's seniormost decision-making body.
- Process owners are responsible for the continuous improvement of their processes and they perform this task proactively.
- Process owners take on budgeting responsibility.
- Process owners have strong influence over personnel assignments.

### ***Process Performance Measurement***

- Performance indicators are specified for our organization's business processes.
- Process performance indicators are derived from enterprise goals and/or from (internal) customer requirements.
- Process performance data is continuously collected.
- Improvement actions are actually initiated if poor process performance is encountered.
- Process metrics are periodically presented to process performers (for e.g. for awareness and motivation).
- Process benchmarking (for several processes) is carried out in the organization.
- Activity-based costing is comprehensively applied in the organization.
- The organization has implemented reward systems (incentive systems) that emphasize the needs of the organization's business processes.

### ***Culture in Line with the Process Approach***

- Teamwork (also between different departments) can be taken for granted in the organization.

- Our organization's employees understand that the purpose of their work is to fulfill the needs of the internal/external customers.
- Our organization's employees feel accountable for enterprise results.
- Employees on all levels of the organization are speaking about business processes, customers, teams, process performance indicators, etc.
- The employees know how their work affects subsequent work, customers and process performance.

### ***Continuous Process Improvement Methodologies***

- An expert cadre is available in the organization including change management, process redesign and project management experts.
- The organization makes use of methodologies for continuous process improvement, like KAIZEN and Six Sigma.

### ***Process-Oriented Organizational Structure***

- The organizational structure is derived from the organization's business processes.
- Changes in the way work is performed are accepted by the employees in a sluggish manner (reverse coded).

### ***Product Quality***

- Please evaluate the quality of your organization's products as compared to the quality of your major competitors' products. (1=poor product quality as compared to the major competitors, to 6=significantly better product quality as compared to the major competitors)

### ***Customer Satisfaction***

- We have received a lot of customer complaints in the last year (reverse coded).
- Customers perceive they receive their money's worth when they purchase our products.
- Our firm enjoys an outstanding reputation.
- Our customers are loyal; they almost never switch to competitors.

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- Please rate the overall satisfaction of your firm's customers. (1= low overall customer satisfaction, to 6=high overall customer satisfaction)

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### ***Order-to-delivery time***

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- Please rate your organization's order-to-delivery time performance relative to your major competitors. (1=We deliver very slowly in comparison to our competitors, to 6=We deliver very quickly in comparison to our competitors).

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### ***Time-to-Market Speed***

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- Please rate your organization's time-to-market performance relative to your major competitors. (1=We have a very long time-to-market in comparison to our competitors, to 6=We have a very short time-to-market in comparison to our competitors)

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### ***Delivery Reliability***

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- Please rate your organization's delivery reliability. (1=We have a very poor punctuality of delivery, to 6=We have a very high punctuality of delivery).

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### ***Market Share***

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- Please estimate the market share of your organization. If your company operates in various industries, please estimate a weighted mean of the different market shares in these industries. (1=poor market share in comparison to our major competitors, to 6=market leader)

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Table 1: Descriptive statistics and Pearson correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Process design and documentation	1																	
2. Management commitment	,581**	1																
3. Process ownership	,589**	,542**	1															
4. Process performance measurement	,613**	,510**	,685**	1														
5. Culture in line with the process approach	,546**	,503**	,418**	,444**	1													
6. Continuous process improvement methodologies	,395**	,483**	,459**	,456**	,394**	1												
7. Process-oriented organizational structure	,341**	,317**	,361**	,317**	,434**	,231**	1											
8. ROS	,036	-,042	,062	,038	,063	,165	,007	1										
9. ROA	,185	,099	,068	,084	,119	,217*	,109	,717**	1									
10. Product quality	,200*	,186*	,190*	,268**	,229**	,105	,143	,152	,083	1								
11. Customer satisfaction	,184	,138	,093	,170	,460**	,154	,287**	,130	-,009	,406**	1							
12. Delivery speed	,225*	,256**	,145	,170	,240*	,088	,176	-,265*	-,059	,422**	,267*	1						
13. Time-to-market speed	,247*	,117	,076	,165	,216	,054	,338**	-,090	,187	,188	,266*	,308*	1					
14. Delivery reliability	,119	,207*	,066	,157	,318**	,069	,170	,036	,055	,299**	,439**	,503**	,120	1				
15. Firm size	-,087	-,035	-,021	-,007	,062	,086	-,019	,135	,282**	,163	,134	-,090	,043	,107	1			
16. Market share	,046	,141	,145	,090	,124	,187*	,088	,319**	,099	,256**	,218*	,012	,030	,133	,192*	1		
17. Debt to total assets	-,040	,030	-,133	-,132	,107	-,056	,124	-,331**	-,258**	-,050	,078	,036	,169	-,150	-,118	-,013	1	
18. Debt per employee	-,187	-,051	-,017	-,144	-,030	,101	-,002	,316**	-,066	-,054	,029	-,133	-,182	-,112	,016	,058	,344**	1
N	132	132	132	132	132	132	132	74	105	126	112	108	67	121	132	115	104	104
Mean	3,09	2,85	2,56	1,88	2,93	2,33	2,62	6,99	8,28	3,50	2,92	3,05	2,88	3,45	398,17	4,22	45,34	68127,24
s.d.	1,26	1,49	1,70	1,47	0,90	1,36	1,11	6,56	7,60	0,93	0,42	0,99	1,04	1,23	478,28	1,18	18,22	65573,47
Cronbach alpha	0,89	0,88	0,94	0,94	0,81	0,63	0,52	-	-	-	0,55	-	-	-	-	-	-	-

Notes: Significant levels are denoted by \* p < 0.05, \*\* p < 0.01.

**Table 2: Stepwise Regressions of Organizational Performance on the Process Orientation Factors and Selected Control Variables<sup>a</sup>**

	Return on sales	Return on assets	Product quality	Customer satisfaction	Delivery speed	Time-to-market speed	Delivery reliability
Design and documentation of business processes							
Management commitment							
Process owner							
Process performance measurement			0.25** (2.88)				
Culture in line with the process approach	0.28* (2.23)			0.46*** (5.44)	0.26** (2.85)		0.32*** (3.66)
Continuous process improvement methodologies		0.21* (2.05)					
Process oriented organizational structure						0.34** (2.90)	
Firm size		0.24* (2.33)	0.22* (2.58)				
Market share							
Debt to total assets	-0.35** (-2.95)						
<b>R<sup>2</sup></b>	<b>0.27</b>	<b>0.12</b>	<b>0.12</b>	<b>0.21</b>	<b>0.12</b>	<b>0.11</b>	<b>0.10</b>
<b>F</b>	<b>5.12**</b>	<b>5.60**</b>	<b>8.32***</b>	<b>29.56***</b>	<b>7.25**</b>	<b>8.39**</b>	<b>13.41***</b>
<b>n</b>	<b>61</b>	<b>101</b>	<b>126</b>	<b>112</b>	<b>108</b>	<b>67</b>	<b>121</b>

<sup>a</sup>Standardized regression coefficients are reported. t-values are in parentheses. All tests are two tailed.

- \* p < .05
- \*\* p < .01
- \*\*\* p < .001