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Process Maturity Orientation Measurement

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Abstract. The results of the maturity process orientation measurement in the Slovenian electric-power supply industry shows that, despite this long-standing preoccupation with the processes, the introduction of the process approach, certified management system and computerization of business, process maturity is not high. Measurement was carried out using a questionnaire for an expanded concept of process orientation with nine elements. Given the statistically evaluated elements of process orientation, the power supply industry is located on the second level i.e. "Defined" of the McCormack's Maturity Model.

Keywords: business process orientation (BPO), process maturity, business process management (BPM), electric-power supply

1 Introduction

The definition of the business process orientation (BPO) construct has a somewhat intangible nature, which represents a barrier to its conceptualization. Many studies into process management use proxy variables (e.g. ISO 9001 certification) as an indicator for BPO (Kohlbacher and Gruenwald 2011; Xiaofen 2013). BPO is extremely important for the success of business process management (BPM) efforts within organizations, e.g. McCormack and Johnson (2001) research results indicate a surprisingly strong relationship between BPO and overall performance (Hammer and Champy 1993; Sikdar and Payyazhi 2014; Škrinjar, Bosilj-Vukšić and Indihar-Štemberger 2008). Since both concepts are closely intertwined, surveys focussing on BPM and BPO are considered in the literature review (Roeser and Kern 2015; Škrinjar and Trkman 2013).

Owing to constantly changing business requirements and challenges, such as decreasing product life cycles, international competition and increasing cost pressure, companies are forced to improve their processes in order to keep pace with fast-changing market requirements. As a consequence, BPM is among the most important managerial topics because it allows companies an agile adaptation to changing business requirements. The Neubauer's (2009) survey showed that only a small number of the participating companies can be determined as process-focused organizations (PFOs) according to the criteria taken from the literature. The vast majority of companies are still on their way towards a PFO that includes the design of end-to-end business processes and measuring and managing of process level results (Işik, Mertens and Van den Bergh 2013).

Among the reasons for struggling to evolve and expand BPM practices across the organization are the lack of positive organizational culture (Wilson 2015), lack of support among senior management, the absence of clear roles and responsibilities in implementing the methodology, and insufficient budget and available resources (Sikdar and Payyazhi 2014, 972; Young, Young and Zapata 2014).
The majority of academic work on BPM, but also its practical implementation across industries, is focussed on tools, systems and techniques, and less on the managerial, organizational, strategic or cultural challenges of BPM. Because the BPM community is doing this extremely well, to the extent

that the ability to eliminate problems within an operational process has become a commodity, as a consequence, massively streamlined processes, rather than highly innovative processes have been encountered (Kohlborn, Mueller, Poeppelbuss and Roeglinger 2014).
From the process maturity research perspective the Slovenian electric-power supply industry organizations (power supply industry) are interesting because of their engagement with processes and process approach over many years. Most involved organizations have a certified Quality Management System according to ISO 9001. One feature of their activity is that it demands that a lot of resources and efforts are directed to the automation and computerization of operations in the technical field, as clearly defined and documented processes are required in this business.

The power supply industry consists of all the installations and equipment for the generation, transmission and distribution of electricity, ensuring the maintenance of a balance between production and consumption, with appropriate regulation. The Slovenian electricity market is an integral part of the common energy market of the European Union. Production of electricity to the public network in Slovenia amounted to 16.281 gigawatt hours (GWh) in 2014. Therefore the consumption coverage with domestic production resources amounted to 98% (Ministry of Infrastructure 2015).

The remainder of the paper proceeds as follows. In the next section, the research background is represented. The methodology section presents construct operationalization, data collection procedures and instrument validation procedures. This is followed by the data analysis and results section, which discusses the testing of the proposed research methodology. The paper then concludes with the discussion of findings and implications for research and practices.

2 Background

2.1 Business process orientation maturity

Davenport and Short (1990) explicitly articulated ‘process orientation’ as a beneficial management practice. Furthermore, it became considered as an essential element for successful business process re-engineering (BPR). From Taylorism and scientific management through to BPR, an environment has been evolved where manufacturing processes are being scrutinized by a range of methods and techniques, such as Six Sigma and Lean, to become as efficient and effective as possible (Antonucci 2010; Işik et al. 2013; Kavčič and Gošnik 2016).

According to many authors, the maturity and capability of business processes is acknowledged as a key determinant of an organization’s ability to adapt and respond to emerging threats and opportunities, and thus its sustainability (Janeš 2014). Based on the literature, it is clear that business processes have an important role to play in defining how organizations perform. It is commonly accepted that operational processes together with support processes determine an organization’s current performance. Nowadays, many managers are looking for ways to make their organization more process-oriented. Findings of several authors indicate that BPM involves many different aspects, ranging from process agility and performance measurement (Benmoussa, Abdelkabir, Abd and Hassou 2015, 29) to process-oriented organizational structure. But it is the managerial processes that determine how this performance is sustained over time (Kohlbacher and Gruenwald 2011; Sikdar and Payyazhi 2014).

Although many authors stress the importance of BPO or the organization’s performance, extensive literature reviews on the subject indicate there remains a lack of comprehensive studies that would clearly demonstrate the positive impact of BPO on performance (Hammer and Champy 1993; Roeser and Kern 2015; Sikdar and Payyazhi 2014; Škrinjar et al. 2008; Škrinjar and Trkman 2013).

The concept of process maturity stems from the understanding that the processes have their life cycle or development stages, which can be clearly defined, measured and managed over time. The higher the degree of maturity of any process resulting in improved forecasting objectives, costs and operating efficiency, the greater are the presumed performance and achievement of objectives in an improved performance and in proposing new, higher target levels of business performance (Jin, Chai and Tan 2014, 88; McCormack et al. 2009, 793; Novak 2016). Maturity is therefore synonymous with standardization and business process improvement (Young et al. 2014). Process maturity is more reflective of how far an organization has progressed toward continuously improving its process capability in any specific area in order to deliver higher performance over time (Işik et al. 2013, 519). Different organizations mature at different rates, depending on the nature of the business and the emphasis placed on process improvement.

2.2 Maturity models

The notion of 'maturity' has been proposed for other management approaches as a way to evaluate 'the state of being complete, perfect, or ready' and the 'fullness or perfection of growth or development' (Oxford University Press 2004; Rosemann and de Bruin 2005). According to Paulk, Weber, Curtis, and Chrissis (1995), maturity is defined as the extent to which a specific process is explicitly defined, managed, measured, controlled and effective (Jin et al. 2014).

Thus, because BPM governance is essential to organizations, there is a need to evaluate its elements using a process management maturity model developed for this purpose (Gobbi de Boer, Müller and Schwengber ten Caten 2015). Maturity models are increasingly popular frameworks for supporting assessment and guiding organizational improvement. According to Albrecht and Spang (2014) and Mullaly (2014), a maturity assessment can be viewed as a cyclical process, a procedure that could also be viewed as a part of an improvement cycle structured around the phases Plan, Do, Check and Act (Backlund, Chronéer and Sundqvist 2015, 263).

Crosby (1979) initiated the first conceptual model (Jin et al. 2014; Xiaofen 2013), named Quality Management Maturity Grid, for evaluating the quality status of maturity models, suggesting a five-level framework by which to evaluate the quality of organizational processes. Therefore, the concept 'maturity model' has its origin in the field of quality management, with a focus on process maturity, including statistical process control and continuous process improvement. Pretorius, Steyn, and Jordaan (2012) concluded that there seems to be no consensus on whether a higher maturity level leads to improved project performance or not (Backlund et al. 2015, 258; Mullaly 2014, 170).
The purpose of a maturity model is concisely described as: 'to help organizations where they are today, where they should go in the future and the value of doing so, and how to get there'. The maturity model provides a 'big picture' overview, composed of small elements, and thus comprehensively explains how to implement the development of a product or a process (Masalskyte, Andelin, Sarasoja and Ventovuori 2014, 129).

Benmoussa et al. (2015) suggest that maturity measurement-driven models attempt to apply the two concepts, i.e. capability and maturity (Jin et al., 2014, 88), to the assessment of business processes of different areas, including the supply chain. Scholarly analysis of these two models shows that the capability or maturity concept includes the concept of performance. In practice, the capability or maturity of a system is evaluated by its performance relative to specific objectives at each level. Thus, in maturity models, performance is defined by a level (Jochem, Geers and Heinze 2011, 382–383). To improve performance and upgrade from one level to another, a hierarchical and incremental process should be deployed. Performance, as seen by performance measurement-driven models, is a global measure regarding a final or intermediate result of an organization. For these reasons, Benmoussa et al. (2015), claim that a maturity-driven approach is more relevant than a performance-driven approach.

According to the Capability Maturity Model Integration (CMMI) definition (CMMI Product Team 2010), the maturity of an organization is the degree to which it has made explicit and consistent processes that are documented, managed, measured, controlled and continuously improved. Maturity level corresponds to achieving a uniform level of capability for a process group (e.g. the five levels of maturity proposed by the CMMI model) (Benmoussa et al. 2015, 29; Macchi and Fumagalli 2013).
Cronemyr and Danielsson (2013) and Van Looy, De Backer, and Poels (2011) recognize that process maturity models are based on the Capability Maturity Model (CMM), which was developed and presented in 1993 by the Software Engineering Institute (SEI) of Carnegie Mellon University and has been adopted by businesses (Masalskyte et al. 2014; Rosemann and vom Brocke 2010). CMM guides organizations to define and qualitatively assess several organizational levels, in order to identify areas of gradual improvement. In essence, the goal of the CMM is to optimize processes and practices within an organization to generate a greater return on investments such as IT (Carroll and Helfert 2015).

Maturity models typically serve three purposes: descriptive, prescriptive and comparative. Descriptive purposes for maturity models include using them to conduct as-is assessments of organizational processes. Prescriptive purposes include using maturity models to identify desirable maturity levels and opportunities for process improvement. Comparative purposes include using maturity model assessment results for internal or external benchmarking (Novak 2016; Rendon 2015; Röglinger, Pöppelbuß and Becker 2012, 331). Among others, Rendon (2015) found that most published maturity models are based on practices and success factors from projects that showed good results in an organization or industry, but which lack a sound theoretical basis and methodology.
In the BPM field, two types of maturity models can be identified: the process and the BPM maturity models (Rosemann and vom Brocke 2010). The former refers to the condition of processes in general or distinct process types, the latter addresses a company's BPM capabilities (Hammer 2007; Rosemann and de Bruin, 2005; Röglinger et al. 2012, 329).
Since 1993 the idea of maturity (model) as a framework for guiding improvement has been adopted by a number of other disciplines and subject areas, including strategic management, innovation, contract management, business process and organizational quality culture management (Rohloff 2011; Wilson 2015), leadership (Hogan 2008), product and service development, knowledge management, project management, construction project (Jin et al. 2014; Motaleb and Kishk 2014) and corporate real estate management (Masalskyte et al. 2014; Mullaly 2014).

Given the scope of the assessment, maturity models can be divided into three groups: for assessing the maturity of business processes, the maturity of business processes management and for business process orientation maturity assessment. According to McCormack, the following definitions for the stages that an organization goes through when adopting BPO are provided (McCormack 2007; McCormack et al. 2009):

1. Ad hoc: The processes are unstructured and ill-defined. Process measures are not in place and the jobs and organizational structures are based on the traditional functions.
2. Defined: The basic processes are defined, documented and available in flow charts. Changes to these processes must now go through a formal procedure. Jobs and organizational structures include a process aspect, but remain basically functional. Representatives from functional areas (e.g. development, manufacturing, sales) meet regularly to coordinate with each other, but only as representatives of their traditional functions.
3. Linked: The breakthrough level. Managers employ process management with strategic intent and results. Broad process jobs and structures are put in place outside of traditional functions.
4. Integrated: Company and its partners take cooperation to the process level. Organizational structures and jobs are based on processes, and traditional functions begin to be equal or sometimes subordinate to process. Process measures and management systems are deeply imbedded in the organization.

Maturity models enable organizations to evaluate the achieved level on their way to business processes excellence. In the last two decades dozens of models for assessing the business processes maturity, BPM maturity and BPO maturity have been developed.

Although the practice confirms their usefulness for continuous improvement, there is no comprehensive comparative study of maturity models in terms of usefulness in increasing the processes performance and business performance of organizations (Röglinger et al. 2012, 340).
As a result, it is found that contemporary literature acknowledges the importance of BPM and BPO maturity of the organization. However, thus far, the phenomenon has been so under-researched and under-theorized that it merits a systematic research.

3 Methodology

The presented research relies on measuring BPO maturity with the selected survey instrument and therefore holds a quantitative paradigm (Hair, Babin, Anderson and Tatham 2006). Within the framework of an empirical study, the level of BPO maturity was measured in the 19 organizations from the production, transmission and distribution of electricity. In order to achieve the research purpose and goal, BPO measurements of the power supply industry were performed between February and March, 2016. One important reason for performing the maturity measurement in the power supply industry is the importance of its activities for the operation and development of the whole of Slovenian society.

As a measuring instrument, a questionnaire with nine elements and with 7 Likert-scale levels was used, allowing ample opportunity to express a level of agreement, ranging from a rating of 1 (the statement is not true) through to a rating of 7 (the statement is absolutely true) (Novak 2016; Škrinjar 2010). To determine the level of maturity, McCormack's (2007) four development stages maturity model was used (McCormack 2007; Novak 2016; Škrinjar 2010). In doing this, the degree of Ad Hoc (maturity level boundary including 4) Defined (4.01 to 5.5) Linked (5.51 to 6.5) and Integrated (6.51 to 7) was taken into account. The survey comprised the top, middle and lower managers, and project managers, thus representing the whole population of 450 managers.

Questionnaires were submitted to respondents in agreement and with the support of the presidents of boards and directors of organizations through established channels of internal communication, which is why a higher response rate was expected. Namely, 240 fully completed questionnaires were received, which represented a 53.33% response rate. The survey was conducted via an online portal EnKlikAnketa using the open source application 1KA (1KA is the name of the application for a free service online survey developed by the Centre for Social Informatics (CDI) Faculty of Social Sciences in Ljubljana). The questionnaire was pre-tested on a test sample of 34 respondents in one organization of the power supply industry. The research was supported by the Section for Quality and Excellence in the power supply industry with an invitation to organizations to complete the questionnaire.
Based on the replies to the questionnaires, descriptive statistics for every element of BPO were calculated (e.g. frequencies calculation, mean values and standard deviation). The questionnaire included a control question: Do you agree with the statement 'Our organization is very process-oriented'?

The research's basic thesis is linked to the introduction of BPM and BPO, in which organizations management devote too little attention to so-called 'soft or intangible factors' i.e. values, organizational culture (Wilson 2015) and behaviour that promotes process functioning. Successful implementation of BPM is significantly influenced by the strategic commitment of leadership and the established role of process holders (Hernaus, Vukšić and Štemberger 2016).

In practice, the BPM is often carried out only in certain parts of the organization, with no real connection to the organization's strategy (Jeston and Nelis 2007; Sikdar and Payyazhi 2014). In many organizations functional boundaries between organizational units are explicit and remain significant barriers to the effective implementation of cross-functional and inter-organizational processes and the performance of BPM (McCormack 2007).

From here originates the first hypothesis, which was subjected to statistical assessment:

Hypothesis 1: Poor development of 'soft' elements associated with leadership, such as process oriented organizational culture, structure and human resource (HR) management, reduces the level of an organization's process maturity.
The second hypothesis relates to the perception of the BPO by the top, middle and lower management. Practice often points out that top management assesses the BPO maturity and performance of BPM more positively.

Hypothesis 2: Middle and lower management assesses the performance of realized business process orientation and business process management more critically than the top management.

4 Empirical findings and discussion

Based on the replies to the questionnaire, descriptive statistics for every element of BPO were calculated (Cronbach's Alpha = 0.847). The KMO and Bartlett's test showed that the variables are relevant (Communalities > 0.5). For the purpose of verifying the hypotheses, the main components for each BPO element were identified using the principal component analysis, which explains the proportion of the total variance and variables weights. Based on these weights, the average values (Figure 1) and the standard deviation for each BPO element were recalculated.

4.1 Hypothesis verification

Hypothesis 1:

First hypothesis H1 was tested in two steps. Firstly, the correlation analysis was performed, which established the dependence between 'soft' elements related to leadership and the level of the BPO, and where, as a level of business process orientation, the responses of managers to the control question were taken into account (see Table 1).

Correlation analysis (Table 1) showed that between process oriented organizational culture, process oriented organizational structure, HR management and the organization's business process orientation, there is a positive medium-strong correlation (correlation range from 0.599 to 0.649). From the results it was noted that underdeveloped 'soft' BPO elements, which are associated with leadership, such as process oriented organizational culture, process oriented organizational structure and HR management, reduce the level of the organization's business process orientation and vice-versa. Consequently the first hypothesis was accepted.

Table 1: Correlation analysis for H1

'Soft' elements	Correlation coefficient	Control question: Our organization is very process-oriented
Process oriented organizational culture	Pearson's	0.639**
	Sig.(2–sided)	0.000
	N	210
Process oriented organizational structure	Pearson's	0.599**
	Sig.(2–sided)	0.000
	N	196
HR management	Pearson's	0.649**
	Sig.(2–sided)	0.000
	N	219

Note: ** Correlation is significant at 0.01. Statement: 'Our organization is very process-oriented' was a control question included in the questionnaire.

Secondly, the influence of 'soft' elements of BPO associated with leadership (independent variable), on the level of the organization's business process orientation (dependent variable) was analysed using regression analysis. As previously, the impact of individual 'soft' BPO elements on the level of the organization's business process orientation was of central interest. To this end, multiple regression analysis (method Enter) was conducted. A histogram and graph of standardized regression residues demonstrated that the residues were normally distributed.

Multiple regression analysis results (Table 2) showed that dependent variable BPO is positively affected by all three 'soft' elements associated with leadership, namely: process oriented organizational structure, process oriented organizational culture and HR. The regression model explained 52.5% of the variability of business process orientation.

Table 2: Evaluation of regression coefficients for H1

Model	Unstandardized coeff.		Standard. Coeff. Beta	R^2	t	sig
	ßi	Std. error				
Constant	-0.119	0.396		0.525	-0.300	0.765
Process oriented organizational structure	0.252	0.121	0.164		2.081	0.039
Process oriented organizational culture	0.493	0.112	0.391		4.419	0.000
HR management	0.298	0.114	0.236		2.616	0.010

Note: Business process orientation is dependent variable.

Partial regression coefficient ßi explains how much the dependent variable BPO has changed, if there is a change of the independent variable e.g. process oriented organizational culture for one unit, with constant values of all other independent variables (ceteris paribus).

Hypothesis 2:

For the verification of the second hypothesis the three surveyed groups were divided into two:

- First group: top management (CEO or general manager, director of the company, member of the management board, deputy CEO or deputy director of a company, director or executive director of the organizational unit);
- Second group: middle and lower-level management (head of department, head of unit, project manager).

Hypothesis H2 was tested with T-test for independent samples. Results represented in Table 3 indicate that evaluation of BPO elements' averages cannot be seen as statistically significant (sig > 0.05) between the two groups of respondents' i.e. top management and middle and lower-level management. On average, both groups equally assessed individual elements of business process orientation. For that reason the second hypothesis was rejected.

Table 3: BPO elements T-test results for H2

Elements	Group	N	Average	Sig
Strategic perspective	Executive management	33	4.91	0.931
	Middle and lower management	158	4.93	
Determination and documenting of processes	Executive management	32	5.23	0.943
	Middle and lower management	165	5.20	
Measurement and management of processes	Executive management	32	4.76	0.543
	Middle and lower management	183	4.95	
Process oriented organizational structure	Executive management	31	4.93	0.351
	Middle and lower management	171	4.73	
HR management	Executive management	33	4.53	0.139
	Middle and lower management	192	4.39	
Process oriented organizational culture	Executive management	31	4.75	0.165
	Middle and lower management	184	4.58	
Market orientation	Executive management	32	4.54	0.085
	Middle and lower management	140	4.63	
Suppliers' perspective (business partners)	Executive management	31	4.53	0.080
	Middle and lower management	141	4.45	
Process oriented information technology	Executive management	31	3.97	0.312
	Middle and lower management	115	4.29	

Note: Nine elements from a questionnaire (see chapter Methodology and Figure 1).

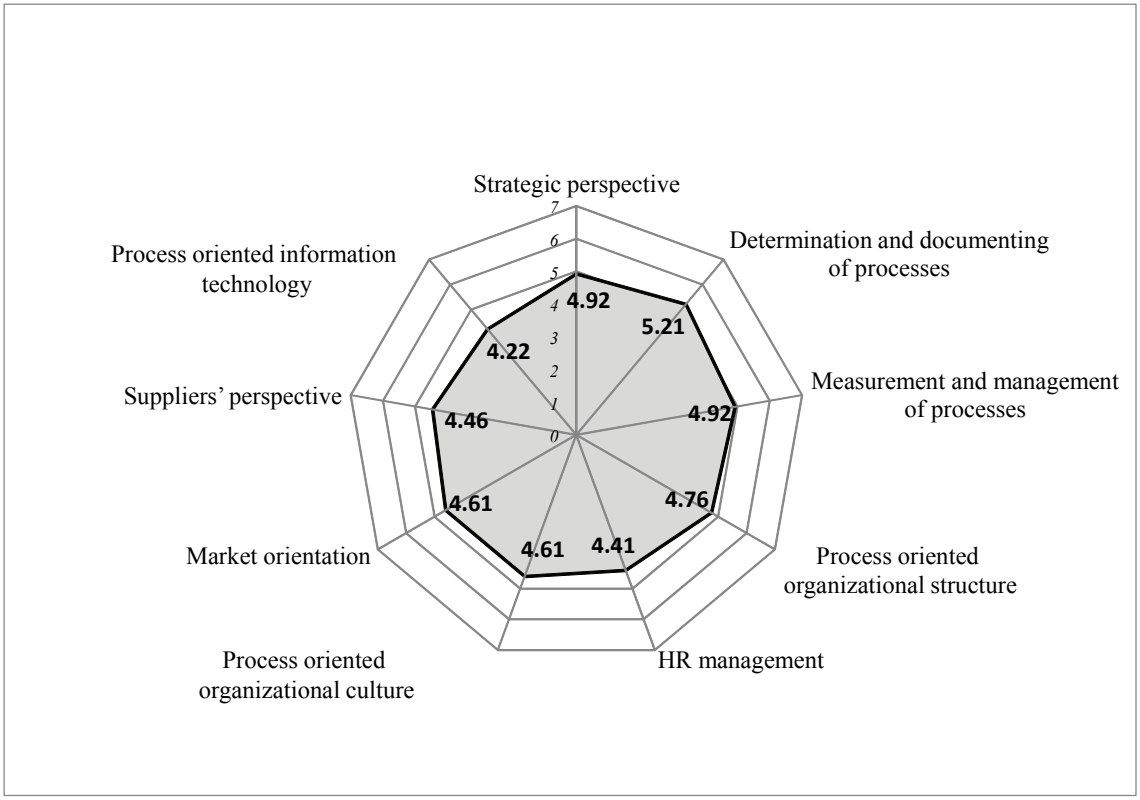
1.2 Analysis of results and discussion

Measurement results in the power supply industry showed that, despite this long-standing processes engagement, the implementation of the process approach, certified management systems and business ICT, business process orientation maturity is not high.

Regarding the questionnaire's control question: Do you agree with the statement 'Our organization is very process-oriented'?, managers on average agreed, with a score of only 4.73 out of 7 levels on the Likert scale. An almost identical assessment was obtained by statistical evaluation of measured values of the nine individual BPO elements (nine elements average = 4.68).

Top-rated BPO elements were the Determination and documenting of processes (5.21), Strategic perspective (4.92) and Measurement and management of processes (4.92). Determination and documenting of processes was, as expected, the highest rated element, with 70.8% of respondents recognizing the special organizational unit or part of an organizational unit, which provides professional support to the processes' owners. The lowest evaluated elements are Process oriented information technology (4.22), HR management (4.41) and Suppliers' perspective (4.46). The lowest score for information technology represents a surprise, which, within individual organizations deserves a more detailed analysis and appropriate action. Average values of BPO elements are represented in Figure 1.

Figure 1: Statistically evaluated BPO elements



Note: Averages of the nine process orientation elements from a questionnaire.

Based on the calculated average value of BPO, the power supply industry is located on the 2nd level as defined in McCormack's Maturity Model. This level is characterized by the defined and documented processes. Changes to processes are taking place on the basis of formal procedures. Jobs

and organizational structures already include a process perspective, but actually remain functional (McCormack 2007, 62).

Analysis of the results points to the need for better communication with employees. Lowest estimates of the individual elements are for statements concerning the acquaintance of employees with strategic objectives, indicator results and achievement of processes and the expected changes. The power supply industry is a highly technical activity, which is dominated by managers from technical sciences. Therefore it is not a surprising that the second lowest evaluated element is HR management (4.41). Employees are unfamiliar with methods for processes improvement and are not stimulated for process improvement proposals, which may represent a serious obstacle to the further improvement of the processes' effectiveness and efficiency, and consequently the performance of organizations. Process oriented organizational culture (4.61) and structure (4.76) are slightly better assessed.

Results of the correlation and regression analysis confirmed that underdeveloped 'soft' elements of BPO, associated with leadership, such as process oriented organizational culture, process oriented organizational structure and HR management, reduce the level of an organization's BPO. Thus Hypothesis 1 was accepted. Research findings represent valuable feedback on the necessity of investing in employees, about the importance of the development of process oriented organizational culture and process oriented organizational structure for the executive management of the power supply business.

T-test for independent samples indicated that between the estimates of individual BPO elements by the executive management on the one hand and the middle and lower management on the other, there were no statistically significant differences. The fact that the second hypothesis is rejected is encouraging, as managers at different management levels gave similar estimates of the situation in the field of BPO.

5 Conclusion

This research makes significant contributions to the literature and above all to practitioners who work professionally in this field and will find useful information and guidance for a better understanding of the business process orientation and maturity models. In particular, the executive management should recognize the practical benefits of these research findings.

Based on the lowest estimated statements and BPO elements and an understanding of the break-even points (Novak 2016; Škrinjar 2010), a definite improvement programme can be planned for the implementation of BPO and transition to the third stage of maturity i.e. Linked. Further impetus in this direction may also represent the discussed insight into the relationship between the development level of BPO and the business performance of power supply chain organizations. Given the observed deficiencies in the HR management perspective, especially with communication, checking the differences between the estimates of managers and employees could provide an opportunity for future research.

The survey has a number of limitations. The first limitation is the fact that the measurement of the business process orientation maturity was conducted on a limited sample of power supply industry organizations. The next limitation relates to the time at which the research was conducted. Part of the industry was at the time in serious financial difficulties, which raised issues of restructuring and further development of some of the companies in one group. The declared general warning strike of Slovenian energy sector union workers at the time of the research had already become fact. Additional limitations were the fact that the survey coincided with the change of executive managers in three of the organizations and the nature of the results, which are generally treated as a business secret.

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