THE ROLE OF PROCESS PERFORMANCE MEASUREMENT IN BPM ADOPTION OUTCOMES IN CROATIA

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ABSTRACT: *The state-of-the art literature finds that business process management projects very often fail to fulfil the measurement requirements. The reason lies in the fact that companies understand the need to identify and define process measures, but do not implement the measurement practices. The objective of this paper is to examine the role of process performance measurement in BPM adoption outcomes. To achieve that, the literature in this field is reviewed and the results of an empirical study conducted in Croatian companies are analyzed and discussed. The results of statistical analysis support the proposed theoretical background. In practical terms, this survey identifies process performance metrics and performance linkages as the key factors that need to be in place for a company to effectively adopt BPM.*

Keywords: *business process management, process measurement, business process management system, performance measurement system, croatian companies.*

JEL Classification: M15, M21

1. INTRODUCTION

Business process management (BPM) is a set of methods, techniques, and tools that can support the design, performance, management, and analysis of operational business processes (van der Aalst, ter Hofstede and Weske, 2003). According to Harmon (2007), BPM is "a management discipline focused on improving corporate performance by managing a company's business processes". Many companies have decided to initiate BPM projects to improve their business, though the adoption of BPM can be a daunting task. A major reason for the failure of BPM is the focus on implementation rather than the adoption of this concept. These terms may appear interchangeable; however, their outcomes are very different. BPM implementation is the introduction of BPM concepts (e.g. process owners, process modelling) or systems in the organization, while BPM adoption is the acceptance of those concepts in the organization. This adoption can lead (but does not necessarily in each case!) to business benefits. The adoption of BPM is not a single act, but a process

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that occurs over time. Once BPM is implemented in a company, additional efforts must be made to follow this concept and to reap the benefits of its implementation. Experience from business practice suggests that implementation happens as soon as a BPM project is successfully completed, though successful adoption happens when the organization accepts BPM concepts in its' everyday practice (e.g. strategic commitment to BPM is cascaded down through the organization; employees respect process owners and share process knowledge, BPM is institutionalized into the business practice via policies and standards). BPM adoption can enable an organization to achieve improved efficiency and quality and, ultimately, a positive return on investment in BPM. Reaching the ultimate goal "increased efficiency" has proven to be challenging in many ways. This challenge includes defining key performance indicators (KPIs), which align process performance with business objectives and strategy. An effective means of organizational performance evaluation is based on the systematic measurement of business process performance and is known as Process Performance Measurement (PPM).

To achieve this goal, companies are investing substantial resources (both human and financial) into deploying process performance measurement practices. Many companies have developed a wide variety of KPIs that they review periodically, while others have very complex and sophisticated business process management systems (BPMS) that allow them to track KPI achievements in real time. BPMSs are software platforms that support the definition, execution, and tracking of business processes. BPMS enables the design, analysis, optimization, automation and diagnosis of business processes by separating process logic from the applications that run them, managing relationships among process participants, integrating internal and external process resources, and monitoring process performance.

On the other hand, the deployment of PPM and BPMS is not a panacea. Ravesteyn and Batenburg (2010) surveyed the critical success factors of BPMS implementation in Dutch organizations. The findings underpinned the authors' perspective that BPMS implementation is not primarily an IT project. The information technology (IT) dimension must be supported by other BPM dimensions (e.g. management, organizational structure and culture). In order to overcome the risk of failure, a BPM project must be linked with an organizational strategy and achieving this lies in the development of reliable and effective PMS (Minonne and Turner, 2012). Wong, Tseng and Tan (2014) argued that managerial BPM capabilities based on the commitment of managers and employees have a positive impact on technical BPM capabilities, which in turn facilitates an organization's ability to increase its performance. In order to establish business process performance measurement, process management experts are needed and business process roles should be defined. Furthermore, business process monitoring and measurement bring the strengths of modern technologies and management disciplines together – both technical and business expertise is needed. Trkman (2010) pointed out that BPM should translate a company's strategy into specific requirements and enable the execution of the strategy.

The objective of this paper was to investigate the role of PPM in BPM adoption outcomes in Croatian companies. *A literature review was performed* to examine the definition of

performance measurement and its linkages to BPM, as well as the definition, benefits and obstacles of BPM adoption. In order to show trends in the BPM maturity level and PPM implementation, studies on BPM implementation in Croatian companies during the past decade were reviewed. *An empirical study in the form of a survey on BPM adoption was conducted* among Croatian companies to assess if PPM leads to better BPM adoption outcomes. The findings are presented, summarized and discussed. Finally, the requirements for further research are identified, together with the limitations of this survey.

2. PROCESS PERFORMANCE AND PROCESS MEASUREMENT: A BACKGROUND

Performance management comprises activities that ensure organizational goals are consistently met in an effective and efficient manner (Bosilj Vukšić, Pejić Bach and Popovič 2013). Different performance measurement models, methods and systems have been outlined in numerous studies, showing that the issue of performance measurement is a topical and complex one (Neely, 2005; Taticchi, Tonelli and Caganazzo, 2010).

2.1. About performance measurement

One of the most used models for performance measurement is a balanced scorecard - a comprehensive set of performance measures defined from four different measurement perspectives: financial, customer, internal processes and learning and growth (Kaplan and Norton, 1996). According to Neely, Adams and Kennerley (2002), a performance measurement and management system is a balanced and dynamic system that enables support of the decision-making process by gathering, elaborating and analyzing information. It uses different measures and perspectives in order to give a holistic view of the organization. As key authors of this area, Neely, Gregory and Platts (2005) define the performance measurement system (PMS) as a set of metrics used to quantify efficiency and effectiveness. Kueng (2000) defines a PMS as an information system that: (1) gathers relevant performance data through a set of indicators; (2) compares the current values against historical or planned values, and (3) disseminates the results to process actors and managers.

Many companies have developed a wide range of performance indicators that they review periodically, while some have very complex and sophisticated PMSs that allow them to track activity in real time. Bourne et al. (2000) emphasized that the uncertainties associated with identifying, defining (quantifying, valuing) and implementing measures, metrics and indicators were a major barrier in the implementation of PMS. Measures are designed, tested and agreed upon for use, but there is no consensus or standards as to their nature or design. It is impossible to define a generic set of measures that should be included in any PMS (Franco-Santos et al., 2007).

Choong (2013a) defined a conceptual framework relating to the use of accounting (financial) and non-accounting (non-financial) data, and suggested several non-accounting

methods of performance measurement that could be used generally in various organizations. A consideration for this holistic view is to provide a PMS that is balanced between financial and non-financial perspectives. Zeglat et al. (2012) found that although the literature shows significant changes and movements towards using balanced (integrated) systems, work is required in terms of developing more dynamic PMSs that consider significant stakeholders who contribute to achieving a better competitive advantage and success for an organization. Finally, according to Franco-Santos et al. (2007), the lack of an agreement on the definition of PMS creates confusion, and limits the potential for generalization and standardization of the key characteristics of PMS. These authors believe that greater clarity on what a PMS comprises could improve the understanding and comparability of the research conducted in this field, and could also accelerate the implementation of PMSs in business practice.

Kueng, Meier and Wettstein (2001) stated that PMSs are still not focused on business processes. Although only comprehensive management of business process performance can make a major contribution to business success, most companies still experiment with the specification of process-based performance measures (Harmon, 2007; Hammer and Champy 1993), and they rarely align their measures with their strategic goals. Furthermore, the literature in BPM implementation is short on rigorous empirical evidence as to the performance impacts of this concept. There is still not a clear understanding of whether BPM projects have a noticeable effect on the performance of organizations.

2.2. A process perspective of performance measurement

PPM entails capturing qualitative and quantitative information about the processes (vom Brocke and Rosemann, 2010). Therefore PPM can be considered a subset of performance measurement. PPM allows managers to measure the performance of business processes, individual activities and resources in the processes. The empirical findings of Kohlbacher and Reijers (2013) revealed that process performance management is significantly and positively associated with organizational performance. Dumas et al. (2013) identified four dimensions of process performance: time, cost, quality and flexibility. The introduction of process information that takes multiple dimensions into account helps to overcome shortcomings of traditional performance measures (Fürstenau, 2008). According to Dumas et al. (2013), each of these process performance dimensions can be refined into a number of process performance measures (or KPIs).

PPM makes it possible to perform comparisons (benchmarking) with competing companies. This is regarded by many authors as very important dimension of business excellence. Since the launch of the international ISO 9000:2000 family of standards in 2000, PPM has been a topic of interest (Nenadal, 2008). Moreover, PPM is an obligatory requirement of the ISO 9001 standard. PPM includes three stages: first, the measures and performance areas have to be aligned with the overall organization balanced scorecard framework; second, the specific process metrics and parameters must be identified and classified, and finally, a real time measurement must be performed using the selected parameters (Margherita, 2014).

However, there are still a number of issues relating to PPM adoption. Based on the literature review (Kueng, 2000; Kueng, Meier and Wettstein, 2001; Neely, 2005; Kohlbacher, 2010), Milanović Glavan (2012) introduced a conceptual model for the creation of a process performance measurement system (PPMS). According to these authors, PPMS should be conceptualized as a modular, separate information system (IS) which is loosely integrated to other ISs throughout the organization. It should be focused on processes, not on organizational units and it should evaluate performance by measuring both quantitative and qualitative aspects. Performance indicators must also be process specific and must be derived from the process goals.

In the paper "Understanding Process Performance Measurement Systems" (2011), Milanović Glavan answered the research question: "What is the current state of research on PPM?" She presented the results of a systematic analysis on: (1) BPM, business processes, business process orientation (BPO); (2) performance measures/indicators, business performance measurement, PMS and (3) PPMS in different journal databases and online libraries. The analysis showed that the search items (1) and (2) were well known and widely used in the literature, while there was the lack of PPMS research in the literature. The results of the literature review called for further survey on this topic in order to examine the state of PPM in Croatian companies.

2.3. THE LINK BETWEEN PERFORMANCE MEASUREMENT AND BPM

Many researchers have indicated the need for an integration of concepts and tools from process management, human resource management and workflow management in order to measure organizational performance (Glykas, 2011). Some authors argued the requirement for holistic performance measurement approaches and the need for linkages between performance measurement and BPM (Škerlavaj et al., 2007; Jeston and Nelis, 2009; Glykas, 2011). There is also a lack of metrics and measures that would link strategic performance indicators with employee performance indicators (Bititci, Carrie and McDevitt, 1997; Glykas, 2011). Thus Glykas (2011) proposed a holistic performance measurement methodology and a performance measurement tool that integrates three types of management tool categories: process management tools (business models, cycle time, time and cost analysis), human resource management tools (job descriptions, performance measures) and workflow management tools (events, transactions, business rules).

On the other side, Choong (2013b) identified several gaps of current PMS in meeting the measurement requirements of BPM, such as: PMS is focused on functional or workflow aspects rather than on business processes; performance measurement is still largely focused on financial measures; the goals of PMS are usually not clearly defined and explained,and measured information is not communicated properly. This author proposed an Integrated Business Process Management and Measurement System, which encompasses a management system combined with a measurement system and business processes to ensure that business processes performance within organizations can be measured using the best of IT and IS.

BPMSs should provide managers with an in-depth understanding of how a process is performing, while also identifying areas for improvement. Therefore PPM could be considered a very important functionality of every BPMS.

3. BPM ADOPTION

Over the past two decades, definitions of BPM have ranged from IT-focused views to BPM as a holistic concept (Rosemann and de Bruin, 2005; Willaert et al. 2007; Siriram, 2012). Siriram (2012) proposed an integrated "soft" and "hard" approach to BPM, where a "soft" approach is related to the human activity dimension, and a "hard" approach is concerned with the use of IT to improve business processes. Since most business problems have both the technical and human activity dimension, a hybrid (holistic) BPM approach gives the best solution (Crawford and Pollack, 2004; Shaw et al., 2007). This section aims to investigate BPMS as an IT perspective of BPM initiatives. Since recent research identified a series of obstacles associated with BPM adoption these aspects were also explored.

3.1. Definition of BPM adoption

Up until now, there have been different researches focusing on BPM adoption. For the purpose of this paper, several definitions and statements are used to explain the term "BPM adoption". Reijers et al. (2010) defined BPM adoption as the use and deployment of BPM concepts in organizations. Once BPMS is implemented and the BPM project is completed with the allocated resources (on time and on budget), there remains the need to adopt this concept in the organization. To have a truly successful adoption of BPM, organizations must define specific process roles and responsibilities and address ownership and control of process across organizational units (Bandara et al., 2007). Because of its scope BPM adoption is recognized as a complex process that requires effort, time, resources and discipline, and it is likely to trigger widespread organizational changes (Hribar and Mendling, 2014). According to vom Brocke and Rosemann (2010), BPM adoption passes multiple stages, such as: (1) awareness and understanding of BPM; (2) intention and desire to adopt BPM; (3) ensuring BPM project governance; (4) transition from BPM projects into a BPM programme and (5) a cost-effective setup of all BPM-related activities.

To date, some researchers have investigated the partial aspects of BPM adoption. Organizational culture can be considered one of the most important factors in BPM adoption (Hribar and Mendling, 2014). A survey conducted in organizations with more than 50 employees in Slovenia revealed that the highest level of BPM adoption success was achieved in organizations with a Clan culture type, while organizations with the lowest level of BPM adoption success appear to have a Hierarchy culture. Kohlbacher and Gruenwald (2011) conducted a survey on a sample of Austrian manufacturing companies to test the joint effect of PPM and process ownership on company performance. The empirical evidence indicated that organizations must implement both concepts: PPM and the process owner role to obtain the benefits of BPM. The authors stated that every metric must

have an individual who is personally responsible for achieving the planned target levels. Malinova and Mendling (2013) derived a conceptual framework showing the insights of BPM adoption by organizations. They classified the outcomes of BPM adoption into three categories: (1) understanding of processes; (2) performance of processes and (3) control of processes. The interviews showed that the most important outcomes of BPM adoption in the "performance of processes" category were: process standardization and optimization, elimination of process weaknesses, clear customer solution approach and efficient utilization of resources.

Furthermore, BPM practice should be aligned and integrated with corporate governance and management systems (Doebeli et al., 2011). Jesus et al. (2009) noted that multiple BPM initiatives with different purposes are often conducted in an isolated way within an organization, leading to a limited use of synergies and a diminished return on BPM investment. To avoid such situations, organizations need to create governance mechanisms that can drive BPM actions in a disciplined manner. BPM governance sets the principles for relevant and transparent accountability, decision making and a reward system, but with a focus on processes. De Bruin (2009) identified governance as one of the key factors for an organization to effectively adopt BPM. Process metrics and performance linkages were addressed as a very important part of BPM governance.

3.2. BPMS: the IT perspective of BPM adoption

According to Shaw et al. (2007), IT used to improve and manage organizations' internal and external processes is called BPMS. Ravesteyn and Versendaal (2007) defined BPMS as software applications that enable the modelling, execution, monitoring and user representation of business processes and rules. They stressed that BPMSs are based on the integration of existing and new information systems that are orchestrated via services. IT support is needed in process modelling and analysis, and in process execution (vom Brocke and Rosemann, 2010).

Nowadays, many software applications to support BPM are available on the market. The importance of integrated performance measurement indicators in BPMS has been identified by academics and practitioners (Glykas, 2011). Therefore, BPMS product vendors incorporate data warehouse and analytical capabilities to provide more sophisticated business activity monitoring and business intelligence capabilities. Properly implemented, BPMS can impact a company's performance through increased revenue, cost reduction, cycle-time improvement, increased customer satisfaction or improvements in any other metric considered important to creating value. Real-time process measurement systems motivate employees and management to improve their efforts, as it enables them to monitor, control and manage a process while performing it (Becker and Glascoff, 2014). From the perspective of IT, Janiesch, Matzner and Muller (2012) claimed that many BPMSs lack sophisticated capabilities to analyze log data, while process mining functionalities are limited to rather passive monitoring and reporting. The authors proposed the development of BPMS that facilitates a round trip from insight to action.

Ruopeng, Shazia and Governatori (2009) discussed two strong but often conflicting forces impacting BPMS adoption. One of fundamental aspects of BPMS is to provide control and coordination of business activities, though there is also a requirement for ensuring that the control does not negatively affect operational flexibility. Business practice shows that once deployed, business processes hardly ever remain unchanged over time. Thus, BPMS should be flexible in order to support a dynamic change of business processes and to ensure BPM governance and adoption within an organization. The problem of BPMS governance is similar to the maintenance problem in software development. Even the greatest experts in BPM face difficulties in redesigning processes and process measures without access to the knowledge that shaped previous BPMS design and development decisions (Ramesh et al., 2005). Thus, the requirements for BPMS to be capable of managing contextual knowledge are identified.

Some of the conclusions based on the literature review pertain to the adoption of BPMS and PPM that are beyond the scope of IT (Nenadal, 2008; Minonne and Turner, 2012; Kueng, 2000):

- BPMS and PPM goals, objectives and values must be shared as widely as possible among employees. Personal involvement is vital for BPMS and PPM adoption.
- Communication must be improved to ensure that process measures are clearly linked to strategies and easily understood by employees. Otherwise, a lack of understanding leads to poor BPM adoption.
- Measurement culture, social transformation and a changed attitude toward openness can be significant.
- The results of PPM must be accepted by users – all those being measured and all those using the measurement data should be able to explain any KPI.
- The KPIs must reflect all important aspect of process performance.
- Stakeholders (e.g. process owners, process managers) must have access to performance data when needed.
- A sufficient measurement frequency must be obtained in order to give a comprehensive and accurate overview of performance.

4. BPM, PMS AND PPMS IN CROATIA

Based on the above arguments that PPM is becoming highly important in companies, the objective of this paper was to determine the current status of utilization of BPM and BPMS for performance management in Croatian companies. Over the past decade, some research has been carried out in Croatian companies to investigate their BPM maturity level and to detect trends in PPM implementation.

In 2006, Škrinjar, Hernaus and Indihar Štemberger indicated that there was a lack of empirical research on BPM implementation outcomes. With that in mind, and based on the original study of McCormack and Johnson (2001), a group of researchers from the Faculty of Economics, University of Ljubljana, Slovenia and Faculty of Economics and Business, University of Zagreb, Croatia conducted a cooperative empirical study among Slovenian and Croatian companies with more than 50 employees. The survey showed that process

data quality was not very important in Croatia, that jobs were more often multidimensional rather than just plain tasks and that the process terminology was not been widely used in Croatia. Overall, the study indicated that Croatian companies achieved a somewhat lower maturity level at that time in comparison with Slovenian companies (Škrinjar, Hernaus and Indihar Štemberger, 2006). Also, Škrinjar, Hernaus and Indihar Štemberger (2006) emphasized that Croatian companies should put more effort into defining and measuring process performance, setting specific process performance objectives, and monitoring process data quality.

Škrinjar, Bosilj Vukšić and Indihar Štemberger (2008) presented an empirical study that confirmed the impact of BPO on organizational performance. They set three hypotheses in the study: (1) "the higher level of BPO a company achieves the better it performs financially", (2) "the higher the level of BPO a company achieves, the better it performs non-financially in terms of more satisfied employees, customers and suppliers" and (3) "better non-financial performance leads to better financial performance". Using extensive statistical analysis, Škrinjar, Bosilj Vukšić and Indihar Štemberger (2008) were unable to support the first but accepted the second and the third hypotheses. These authors presented a strong direct impact of BPO on the non-financial performance of the company. Although no direct impact was found between BPO and financial performance, the authors showed that BPO still strongly impacts the financial performance of the company through its impact on non-financial performance.

One year later, in 2009, a Croatian empirical study on BPM maturity was included in a global investigation of key turning points in business process maturity where, with the use of a decision tree, it was shown that the key factor of the turning point for Croatia was in process management and measurement dimension, and in the fact that employees had to undergo continual training in order to adapt to the process changes. The decision tree method also showed that employee roles had to be multidimensional and that process culture needed to be developed if companies wanted to move forward to business process maturity level 3. However, the authors stressed a limitation of the decision tree method in the case of Croatia, saying that more records should be used to determine rules for classification at the highest and lowest levels of BPO (McCormack et al., 2009).

An extension of the 2008 study (Škrinjar, Bosilj Vukšić and Indihar Štemberger, 2008) was conducted in 2012 by Hernaus, Pejić Bach and Bosilj Vukšić in order to examine how a strategic approach to BPM impacts organizational performance and PPM, using empirical data collected from Croatian companies. The authors set four hypotheses: (1) a strategic approach to BPM positively influences PPM implementation, (2) PPM practice positively influences non-financial performance, (3) PPM practice positively influences financial performance, and (4) PPM practice has an indirect positive influence on financial performance through non-financial performance. The collected data was analyzed using statistical methods such as validity analysis, reliability analysis, descriptive data analysis and non-parametric correlation analysis, as well as the structural equations model fit. The results confirmed three of the four hypotheses, and rejected the hypothesis that process performance measurement practice positively influences financial performance. The authors emphasized that PPM is a requirement for a modern, process-oriented organization and that managers should not focus solely on financial data (Hernaus, Pejić Bach and Bosilj Vukšić, 2012).

Two years later, a study aimed at assessing the current state of BPM maturity was conducted on large, small and medium sized Croatian companies (Milanović Glavan, 2014). The study showed that: (1) Croatian companies are between the defined and linked levels of business process maturity, i.e. in a comparison with a previous study from 2008, it was found that there were no statistically significant differences between the state of BPO in Croatian companies now and then; (2) IT has a positive impact on BPO; and (3) BPO has a positive impact on organizational performance, especially the nonfinancial performance. This study also detected the key turning points for Croatian companies.

The literature review on PPM and BPM in Croatia in the last decade also included a case study on a business process oriented project carried out in 2007 by a Croatian governmental organization. The Croatian project dealt with certain issues, including limited human resources, the readiness to settle for minor outcomes resulting in outdated solutions, the fact that BPO project dynamics were not adjusted to the launch of four other government projects, and that the process management office, process positions and roles failed to be established once a project was completed. Although employees of the Croatian governmental organization were highly motivated to participate in the project, their top management decided to implement only slight proposed changes, resulting in minor positive results of the project (Bosilj Vukšić, Hauc and Kovačič, 2010).

Bosilj Vukšić, Pejić Bach and Tomičić-Pupek (2014) presented a case study on a simulation modelling approach for reengineering collaboration in higher education. This study outlined the significance of pondering KPIs and confirmed that process performance management is a valuable method in higher education institutions.

5. EMPIRICAL STUDY

In order to facilitate organizations in obtaining the benefits of BPM, one essential approach is to identify the drivers and enablers for BPM adoption. While some of the previous studies pointed out the relevance of process performance measures for BPM adoption success, there have been no studies to date that have investigated the relationship of PPM on BPM adoption success. Consequently, this paper aims to address *the following research question*: Does process performance measurement lead to better BPM adoption outcomes? Providing an answer to this research question should represent the contribution of this study. An empirical study was carried out from October 2013 to May 2014, and its main goal was to assess the current state of BPM adoption in Croatian companies.

5.1. About the survey

The research instrument was developed in cooperation with researchers from the Faculty of Economics – University of Ljubljana and the Vienna University of Economics and Business. The survey (see Appendix) was structured to cover a holistic nature of the BPM concept (exploring four different perspectives on BPM): "Process Orientation" (15 questions),

"Organizational Culture" (24 questions), "Process Performance Index" (10 questions) and "BPM Initiative", e.g. BPM project or program (31 questions). For each of these perspectives, several dimensions were defined, and each consisted of several items (statements to be evaluated by respondents).

The survey was adopted from the BPO framework used during previous studies (McCormack et al., 2009; Škrinjar, Bosilj Vukšić and Indihar Štemberger, 2008; Škrinjar, Bosilj Vukšić and Indihar Štemberger, 2011; Hernaus, Pejić Bach and Bosilj Vukšić, 2012) and the Process Performance index (PPI) developed by the Rummler-Brache Group (2004). Usually, a BPO construct is treated as a multidimensional measure. Kohlbacher and Gruenwald (2011) found that documentation of business processes, management commitment, the process owner role, and process performance measurement are the most often mentioned dimensions of the BPO constructs. The focus of this paper is on PPM as one of the key dimensions of the BPO construct according to Hammer (2007). The BPM initiative is considered an organizational project/programme that aims to enhance the efficiency and effectiveness of business processes. The survey also comprised basic questions about the individual respondents' knowledge of BPM (7 questions) and about the characteristics of the company (3 questions) (see Appendix). In addition to numerous factors that play an important role in BPM adoption, this study only measured the role of PPM, while the remaining factors were not considered.

The survey was distributed to top managers in order to ensure a strategic perspective of the company in question. The assumption was that top managers have adequate knowledge of BPM and performance measurement within their companies. If top managers were not familiar with the progress of BPM in their company, they were instructed to pass the survey to a competent person within the organization. The practices identified were used in the survey in the form of statements to which respondents stated the extent of their agreement with the statement (on a 5-point Likert scale). With every question, respondents were given the ability to respond with "cannot judge" in order to prevent a random response due to a lack of knowledge on that topic. For some questions, it was possible to answer with "yes" or "no", or to give an explanation. The "Organizational Culture" part of the survey was structured differently, though these questions are beyond the scope of this paper. Participation in this survey was both voluntary and confidential for all respondents.

5.2. Data analysis

The data gathered from the national sample was analyzed using descriptive statistics and inferential statistics. For the purpose of the statistical analysis in this paper, only the dimensions "Process management and measurement" and "Outcomes of BPM adoption" were processed, as this paper focuses on the role of PPM in BPM adoption outcomes and this statistical analysis is sufficient to answer the stated research question. Within the "Process management and measurement" dimension of BPO perspective, respondents were asked to evaluate the level of PPM practice in a company. This dimension consisted of five statements: (1) Process performance is measured in the organization; (2) Process

measurements are defined; (3) Resources are allocated based on process; (4) Specific process performance goals are in place, and (5) Process outcomes are measured. The BPM initiative perspective consisted of six dimensions: (1) Interest in BPM, (2) Organizational structure, (3) Experience with BPM, (4) Reasons for BPM adoption, (5) BPM adoption and (6) Outcomes of BPM adoption. Aligned with the research question, the views of respondents were measured with respect to a variety of BPM adoption outcomes, such as: process efficiency, agility and quality improvement, increasing external quality (client satisfaction), throughput, decreasing waiting time, and reducing costs (see Appendix).

Surveys were sent to top managers in 417 Croatian companies, by post and web. A total of 110 Croatian top managers responded, giving a final response rate of 26.4%. The frequencies of companies in regard to their industry are given in Table 1.

Table 1: *The examined companies regarding their industry type*

	Industry type:	**Frequency**
A	Agriculture, hunting, forestry	3
B	Mining and quarrying	6
C	Manufacturing	3
D	Electricity, gas, steam and air conditioning supply	6
E	Water supply, sewerage, waste management and remediation activities	3
F	Construction	7
G	Wholesale and retail trade	14
H	Transportation and storage	7
I	Accommodation and food service activities	6
J	Information and communication	15
K	Financial and insurance activities	14
L	Real estate activities	6
M	Professional, scientific and technical activities	5
N	Administrative and support service activities	1
O	Public administration and defence; compulsory social security	1
P	Education	1
Q	Human health and social activities	1
R	Arts, entertainment and recreation	1
S	Other service activities	0
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0
U	Activities of extraterritorial organizations and bodies	0
Not given		10

Company size was determined by the number of employees and its annual revenues. The distribution of companies in the sample is shown in Figures 1 and 2.

Figure 1. Frequency of companies by number of employees

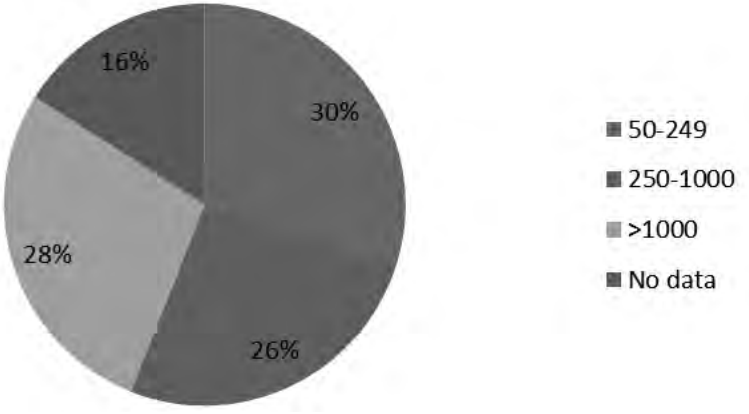
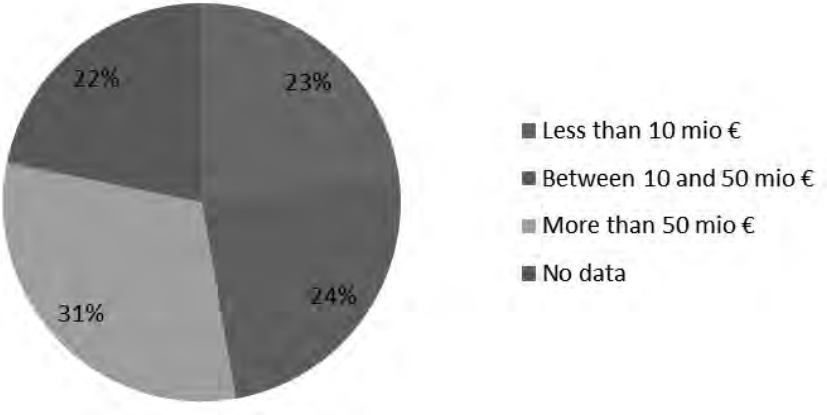


Figure 2. Frequency of companies by annual revenues



The data gathered from the Croatian national sample was analyzed using descriptive and inferential statistic, e.g. correlation analysis and the independent t-test. The goal was to determine if there is a relationship between the dimensions "Process management and measurement" and "Outcomes of BPM adoption". The analysis results are shown below.

Correlation analysis between these two dimensions was first conducted (Table 2). The correlation coefficient for the examined dimensions was 0.65, with the 1% statistical significance of the correlation. The coefficient indicates that there is a moderate positive relationship between the dimensions "Process management and measurement" and "Outcomes of BPM adoption". In other words, these two dimensions (variables) tend to increase or decrease together.

Table 2: *Correlation matrix between "Process management and measurement" and "Outcomes of BPM adoption"*

	PMM	***O_BMP_A***
PMM	1.000	
O_BMP_A	0.649	1.000

Secondly, the independent t-test was carried out. The t-test compares the means between two unrelated groups for the same continuous, dependent variable. The goal was to determine whether the dimension "Outcomes of BPM adoption" differs based on "Process management and measurement". The dimension "Process management and measurement" was represented with two statements (questions): Process performance is measured in the organization, and Process measurements are defined.

The independent t-test between "Outcomes of BPM adoption" and the statement Process performance is measured (as a representative of Process management and measurement domain) showed that the dimension "Outcomes of BPM adoption" differed based on the measurement of process performance (Table 3). In other words, it can be concluded with a significance value of 1% that companies that do not measure their process performance have an inferior outcome of BPM adoption than those companies that do. Companies that do not measure their process performance are those that graded the statement Process performance is measured with grades of 1 or 2 on the 5-point Likert scale, while companies that measure process performance include those that graded the statement Process performance is measured with a grade of 3, 4 or 5 on the 5-point Likert scale.

Table 3: *Independent t-test between "Outcomes of BPM" and statement Process performance is measured*

Not measured	**Measured**	
2.7804	3.8196	**mean**
0.9677	0.5879	**std. dev.**
15	59	**n**

The independent t-test between "Outcomes of BPM adoption" and the statement Process measurements are defined (as a representative of Process management and measurement dimension) showed that the domain "Outcomes of BPM adoption" differed based on the definition of process measurements (Table 4). It can be concluded, with a significance value 1%, that companies that do not define their process measures have an inferior outcome of BPM adoption than those companies that do.

Table 4: *Independent t-test between "Outcomes of BPM" and statement Process measurements are defined*

Not defined	Defined	
2.9474	3.8063	**mean**
1.0417	0.5833	**std. dev.**
17	57	**n**

According to the above results, an answer can be provided to the main research question of this study: process performance measurement leads to better BPM adoption outcomes. This means that the results of this study supported the suggested theoretical background.

5.3. Implications and limitations of the empirical study

The findings presented in this paper have two major implications for research. While previous studies indicated the relevance of process performance measures for BPM adoption success, few studies conducted a quantitative examination of the relationship of process performance measurement on BPM adoption success. For the purpose of this paper, preliminary statistical analysis was conducted. First, we investigated if process performance measurement leads to better BPM adoption outcomes. The results of the correlation matrix showed that the dimension "Outcomes of BPM adoption" differed based on Process management and measurement. Therefore, these findings indicate an important research gap, as they showed that process management and measurement was positively associated with the success of BPM initiatives and the resulting outcomes of BPM adoption. Second, the t-test showed that BPM adoption outcomes within companies that did not define process performance measures and did not measure process performance were significantly lower than within the group of companies that practiced process performance measurement. Therefore, this study found that companies that define their process measurements and measure their process performance had better outcomes of BPM adoption than companies that did not. This is a contribution to this important topic in BPM, namely the importance of measuring the performance of business processes.

Also, these findings have major implications for practice by providing a better understanding of the relationship between process management and measurement and BPM adoption outcomes. In practical terms, this survey identified process performance metrics and performance linkages as the key factors that need to be in place for a company to effectively adopt BPM. That fact can help organizations prepare their BPM initiative by including a definition of process measures in the preparatory phase of their BPM adoption. Since process performance measures have a significant role in the success of BPM adoption, organizations should be aware of their PPMS and its characteristics. This could serve as a guideline for a company when choosing an approach towards BPM adoption.

However, this study on the role of PPM had several limitations. As previously mentioned, certain other factors might also play a role in BPM adoption outcomes. These factors

were not addressed in this study and this is one of the limitations. Additionally, further empirical research is needed to investigate which specific measures are likely to support BPM adoption success. Since this survey was limited to respondents from Croatian companies, a future study could be carried out in other countries to explore if process performance measurement and BPMS adoption differ across regions and cultures. A further way to improve the reliability of the results would be to increase the sample size of the survey or to specifically validate a relationship of process performance measurement and BPM adoption results through comparative case studies. Also, the research question was approached with a survey design. This means that the conclusions of the study are subject to the general weaknesses of correlation studies. Still, correlations were found to be in line with the hypotheses. The interpretation of the potential direction of this connection builds on the theoretical arguments and on anecdotal evidence from the BPM literature, where positive effects of using process performance measures on BPM adoption outcomes have been reported.

Despite the boundaries set by these limitations, the findings of this survey offer a contribution to the discussion on the role of PPM in BPM adoption outcomes in research and practice. Moreover, we believe that the empirical results presented in this paper could provide a solid basis for further research in the fields it addresses.

6. CONCLUSIONS

This paper presents a review of the current literature on BPM adoption and the role of PPM therein. Outcomes of BPM projects frequently fail to accomplish the BPM measurement requirements. This is because companies do not implement measurement practices, although they do understand the need to identify and define process measures. Defining measurement criteria without implementing practical measurement techniques contributes to the misgiving of BPM.

The literature review also showed the increase of the company understanding of the process performance measures and their relevance for the successful BPM adoption. Although certain studies have investigated and showed BPM trends and PPM usage in Croatian companies, no studies have studied the relationship between PPM and BPM adoption.

The main objective of this paper was to investigate if process performance measurement leads to better BPM adoption outcomes based on the empirical study conducted among Croatian companies. Using extensive statistical analysis, the collected data was analyzed and it was concluded that BPM adoption was more successful within those companies that define their process measures and apply process performance measurement. Given that process performance measures have an important role in successful BPM adoption; companies should understand the value of PPMS and be aware of its characteristics.

Nevertheless, one should not ignore the fact that process performance measurement is only one of the factors that influence BPM adoption and that there might also be other important factors that are yet to be examined.

Finally, we can conclude that this study extends the body of knowledge regarding the definition and the use of process measures in BPM and thereby paves the path to more successful BPM adoption – which will significantly increase the benefits of BPM within organizations.

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APPENDIX

Business Process Management - BPM is a management discipline focused on improving corporate performance by managing a company's business processes. BPM is a modern business approach, which emphasizes the effectiveness and efficiency of operations based on customer orientation, innovation, flexibility, and eliminating unnecessary activities and congestions within the business processes of the organization.

INDIVIDUAL CHARACTERISTICS	
** A business process management initiative is an organizational project/program that aims to enhance the efficiency and effectiveness of business processes, e.g. business process reengineering, lean management, total quality management, operational excellence programs, six sigma, etc.*	
Knowledge of business process management (BPM)	
Which statement best describes your knowledge of business process management (BPM)?	☐ No notion of BPM. ☐ Only theoretical knowledge, e.g. by following training or reading a BPM book. ☐ Only practical knowledge, e.g. hands-on experience by participating in a BPM initiative*. ☐ Both theoretical and practical knowledge.
How do you assess your knowledge of BPM?	☐ Excellent ☐ Good ☐ Bad ☐ No knowledge of BPM
Experience with BPM	
Have you ever actively participated in a BPM initiative?	☐ Yes, I participated in _____ _____ [e.g. process modeling, process renovation]. ☐ No.
Your experience with BPM is mainly shaped through a role as:	☐ Process analyst ☐ Systems engineer ☐ Process participant ☐ Process owner ☐ Process manager ☐ Senior management ☐ I have no experience with BPM
Role and expertise	
How would you rate the following statements regarding your role and expertise in your organization?	1 = IT-oriented 5 = business-oriented
My current role is organizationally positioned mostly as…	1 2 3 4 5
With regards to BPM, I consider myself as having expertise that is mostly...	1 2 3 4 5

PROCESS ORIENTATION	
Indicate to what extent you agree / disagree with the following statements regarding process orientation in your organization.	1 = completely disagree 5 = completely agree X = cannot judge
Process view	
The average employee views the business as a series of linked processes.	1 2 3 4 5 X
Process terms such as *input*, *output*, *process*, and *process owners* are used in conversation in the organization.	1 2 3 4 5 X
Processes within the organization are defined and documented using inputs and outputs to and from our customers.	1 2 3 4 5 X
The business processes are sufficiently defined so that most people in the organization know how they work.	1 2 3 4 5 X
Indicate to what extent you agree / disagree with the following statements regarding process orientation in your organization.	1 = completely disagree 5 = completely agree X = cannot judge
Process jobs	
Jobs are usually multidimensional and not just simple tasks.	1 2 3 4 5 X
Jobs include frequent problem solving.	1 2 3 4 5 X
People are constantly learning new things on the job.	1 2 3 4 5 X
Our organization appoints process owners for all business processes.	1 2 3 4 5 X
Process owners of our organization have the authority to make decisions on business processes.	1 2 3 4 5 X
Process owners of our organization are accountable for the performance of business processes.	1 2 3 4 5 X
Process management and measurement systems	
Process performance is measured in the organization.	1 2 3 4 5 X
Process measurements are defined.	1 2 3 4 5 X
Resources are allocated based on process.	1 2 3 4 5 X
Specific process performance goals are in place.	1 2 3 4 5 X
Process outcomes are measured.	1 2 3 4 5 X

	ORGANIZATIONAL CULTURE	
This part consists of six questions (I-VI).Each question has four alternatives. Divide 100 points among these four alternatives depending on the extent to which each alternative is similar to your own organization. Give a higher number of points to the alternative that is most similar to your organization. Be sure your total equals 100 points for each question.		
I	**Dominant Characteristics**	
The organization is a very personal place. It is like an extended family. People seem to share a lot of themselves.		
The organization is a very dynamic entrepreneurial place. People are willing to stick their necks out and take risks.		
The organization is very results oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.		
The organization is a very controlled and structured place. Formal procedures generally govern what people do.		

II	**Organizational Leadership**	
The leadership in the organization is generally considered to exemplify mentoring, facilitating, or nurturing.		
The leadership in the organization is generally considered to exemplify entrepreneurship, innovating, or risk taking.		
The leadership in the organization is generally considered to exemplify a no-nonsense, aggressive, results-oriented focus.		
The leadership in the organization is generally considered to exemplify coordinating, organizing, or smooth-running efficiency.		
III	**Management of Employees**	
The management style in the organization is characterized by teamwork, consensus, and participation.		
The management style in the organization is characterized by individual risk-taking, innovation, freedom, and uniqueness.		
The management style in the organization is characterized by hard-driving competitiveness, high demands, and achievement.		
The management style in the organization is characterized by security of employment, conformity, predictability, and stability in relationships.		
This part consists of six questions (I-VI).Each question has four alternatives. Divide 100 points among these four alternatives depending on the extent to which each alternative is similar to your own organization.Give a higher number of points to the alternative that is most similar to your organization. Be sure your total equals 100 points for each question.		
IV	**Organization Glue**	
The glue that holds the organization together is loyalty and mutual trust. Commitment to this organization runs high.		
The glue that holds the organization together is commitment to innovation and development. There is an emphasis on being on the cutting edge.		
The glue that holds the organization together is the emphasis on achievement and goal accomplishment. Aggressiveness and winning are common themes.		
The glue that holds the organization together is formal rules and policies. Maintaining a smooth-running organization is important.		
V	**Strategic Emphases**	
The organization emphasizes human development. High trust, openness, and participation persist.		
The organization emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued.		
The organization emphasizes competitive actions and achievement. Hitting stretch targets and winning in the marketplace are dominant.		
The organization emphasizes permanence and stability. Efficiency, control and smooth operations are important.		
VI	**Criteria of Success**	
The organization defines success on the basis of the development of human resources, teamwork, employee commitment, and concern for people.		
The organization defines success on the basis of having the most unique or newest products. It is a product leader and innovator.		
The organization defines success on the basis of winning in the marketplace and outpacing the competition. Competitive market leadership is key.		
The organization defines success on the basis of efficiency. Dependable delivery, smooth scheduling and low-cost production are critical.		

PROCESS PERFORMANCE INDEX	
Indicate to what extent you agree / disagree with the following statements.	1 = completely disagree 5 = completely agree
Alignment with strategy	
Business processes are directly linked to the organization's strategy and critical success factors.	1 2 3 4 5
Holistic approach	
Enterprise business processes are defined before launching improvement initiatives (e.g., Six Sigma).	1 2 3 4 5
Process awareness by management and employees	
Key players understand the role of process management in improving performance.	1 2 3 4 5
Portfolio of process management initiatives	
Improvement efforts are prioritized according to process "health" and linkage to current issues.	1 2 3 4 5
Process improvement methodology	
Process management teams use a standard approach to navigate process analysis and design.	1 2 3 4 5
Indicate to what extent you agree / disagree with the following statements.	1 = completely disagree 5 = completely agree
Process metrics	
Process performance is measured at the individual, process, and enterprise levels.	1 2 3 4 5
Customer focus	
Process analysis and design efforts focus on delivering value to the customer.	1 2 3 4 5
Process management	
Process owners monitor process metrics and continuous improvement efforts on a regular basis.	1 2 3 4 5
Information systems	
Process is the "master" and the information systems are the "servants".	1 2 3 4 5
Change management	
People and cultural issues are effectively addressed when process changes are introduced.	1 2 3 4 5

BPM INITIATIVE	
A business process management initiative is an organizational project/program that aims to enhance the efficiency and effectiveness of business processes, e.g. business process reengineering, lean management, total quality management, operational excellence programs, six sigma, etc.	
Interest in BPM	
Which statement best describes the current interest in BPM within the organization?	☐ Key strategic commitment by top management ☐ An important initiative at the level of several business processes ☐ Initial initiative limited to certain small processes ☐ We are exploring the options ☐ We are not interested
Organizational structure	
Do you have a special group (department/unit) or individual within the organization that is responsible for management of business processes? If yes, how is it organized?	☐ There is no formal group / individual responsible for BPM ☐ BPM Group is organized at the level of top management ☐ We have a special department / division for BPM ☐ BPM Group is organized within the IS department ☐ BPM Group is organized within the HR department ☐ BPM Group is organized within the quality control department ☐ Elsewhere, please specify: _____

Experience with BPM	
Has your organization ever conducted a BPM initiative?	☐ Yes. ☐ No.
If YES, please specify (multiple answers possible).	☐ BPM initiative was conducted in some parts of the organization. ☐ BPM initiative was conducted in the entire organization. ☐ BPM initiative has covered all processes. ☐ BPM initiative has covered some processes. ☐ BPM initiative was conducted once. ☐ BPM initiative was conducted repeatedly. ☐ BPM initiative is being carried out continuously. ☐ Our longest BPM initiative lasted over a period of several weeks. ☐ Our longest BPM initiative lasted over a period of several months. ☐ Our longest BPM initiative lasted over a period of several years.
Reasons for BPM adoption	
What were the reasons for conducting the BPM initiative in your organization?	
Which specific objective(s) you wanted to accomplish with BPM in your organization?	
BPM adoption	
Who initiated the BPM initiative in your organization?	☐ Members of the Board /owners ☐ Top management ☐ Informatics ☐ Other (please specify): _____
How did you approach BPM initiative in your organization?	☐ Top-down ☐ Bottom-up
Did your organization have the help of external consultants for conducting the BPM initiative?	☐ No. ☐ Yes.
Did you anticipate any problems before you started with the BPM initiative in your organization?	☐ No. ☐ Yes, we anticipated the following problems (please specify): _____ _____ _____
If the previous answer was YES, what did you do to avoid the anticipated problems?	
Which were the most important success factors for conducting the BPM initiative in your organization?	

	Outcomes of BPM adoption	
Indicate to what extent you agree / disagree with the following statements.		1 = completely disagree 5 = completely agree X = cannot judge
BPM adoption in our organization was successful.		1 2 3 4 5 X
Our objectives of BPM adoption were reached.		1 2 3 4 5 X
BPM contributes to the execution of the organization's strategy.		1 2 3 4 5 X
BPM plays a role in our daily work practices.		1 2 3 4 5 X
Since we adopted BPM in our organization the process efficiency improved		1 2 3 4 5 X
Since we adopted BPM in our organization the process quality improved.		1 2 3 4 5 X
Since we adopted BPM in our organization the process agility improved.		1 2 3 4 5 X
Since we adopted BPM in our organization client satisfaction increased.		1 2 3 4 5 X
Since we adopted BPM in our organization quality of the products / services increased.		1 2 3 4 5 X
Since we adopted BPM in our organization the time spent on service provision process decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the time spent on other main processes decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the time spent on planning, goal establishing decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the time spent on analysis, corrective actions decreased.		1 2 3 4 5 X
Indicate to what extent you agree / disagree with the following statements.		1 = completely disagree 5 = completely agree X = cannot judge
Since we adopted BPM in our organization the reactive time to the internal changes decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the reactive time to the external changes decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the costs spent on service provision process decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the costs spent on other main processes decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the costs spent on planning, goal establishing decreased.		1 2 3 4 5 X
Since we adopted BPM in our organization the costs spent on analysis, corrective actions decreased.		1 2 3 4 5 X

CHARACTERISTICS OF THE ORGANIZATION	
Organizational size	
How many employees are working for your organization?	☐ less than 50 ☐ 50-249 ☐ 250-1000 ☐ more than 1000
What was your organization's approx. sales revenue (turnover) in 2012?	☐ up to and including 10 million € ☐ more than 10 million and up to and including 50 million € ☐ more than 50 million €

	Business sector (Industry type)
What is the organization's statistical classification of economic activities (i.e. industry the organization operates in)?	☐ A: Agriculture, forestry and fishing ☐ B: Mining and quarrying ☐ C: Manufacturing ☐ D: Electricity, gas, steam and air conditioning supply ☐ E: Water supply, sewerage, waste management and remediation activities ☐ F: Construction ☐ G: Wholesale and retail trade; repair of motor vehicles and motorcycles ☐ H: Transportation and storage ☐ I: Accommodation and food service activities ☐ J: Information and communication ☐ K: Financial and insurance activities ☐ L: Real estate activities ☐ M: Professional, scientific and technical activities ☐ N: Administrative and support service activities ☐ O: Public administration and defense; compulsory social security ☐ P: Education ☐ Q: Human health and social work activities ☐ R: Arts, entertainment and recreation ☐ S: Other service activities ☐ T: Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use ☐ U: Activities of extraterritorial organizations and bodies

Thank you for your participation in the survey.