



Case study

Supporting performance management with business process management and business intelligence: A case analysis of integration and orchestration



Vesna Bosilj Vukšić^a, Mirjana Pejić Bach^a, Aleš Popovič^{b,c,*}

^a Department of Informatics, University of Zagreb, Faculty of Economics and Business, Zagreb, Croatia

^b Department of Business Informatics and Logistics, University of Ljubljana, Faculty of Economics, Ljubljana, Slovenia

^c Universidade Nova de Lisboa, ISEGI, Lisboa, Portugal

ARTICLE INFO

Article history:

Available online xxx

Keywords:

Performance management
Business process management
Business intelligence
Service industries

ABSTRACT

The case(s) demonstrates the importance of business process management (BPM) and business intelligence systems (BIS) in achieving better firm performance. It has been well documented in the literature that research on the effectively usage and combination of knowledge from BPM and BIS in turbulent service environments is limited. In response, we conduct an exploratory comparative case study of four firms in banking and telecommunication industries that have implemented BPM initiative and BIS solution. Our results firstly highlight that actual results of applying BPM and BIS differ greatly from the results that were originally planned. Secondly, we find that BIS initiatives are usually driven by improving marketing and sales, while BPM initiatives are driven by improving business processes. Thirdly, we identify that there is a lack of strong commitment to using both systems for supporting performance management.

© 2013 Elsevier Ltd. All rights reserved.

1. Introduction

In order to stay competitive firms measure, monitor, and analyze their performance. Performance management systems are regularly implemented as balanced and dynamic solutions requiring considerable human and financial resources, and offering support to the decision-making process by gathering, elaborating and analyzing information. Although business process management (BPM) and business intelligence (BI) are frequently linked to performance management, existing research rarely explores their integration.

While investments in business concepts and IT have regularly contributed to economic growth in developed countries, investing in IT has not had clear outcomes in the context of transition economies (Samoilenko, 2008). However, recent investigations (see for example, Hernaus, Pejić Bach, & Bosilj Vukšić, 2012) confirmed the impact of business process orientation on organizational performance in transition economies. Since businesses in service industries operate in more dynamic situations, and service processes are more difficult to standardize than manufacturing processes, performance management in business services can often be more complex than in manufacturing (Mcivor, Humphreys, Mckittrick, & Wall, 2009).

In response, we shed some light on the area of BPM and BI usage for supporting performance management in service industry firms. Our data come from case studies of four Croatian firms in two service industries: telecommunications and banking, among which two are early adopters and two late adopters of BI and BPM. The specific research questions addressed in the paper are as follows:

RQ1. To what extent do service industry firms utilize the potential of BPM and BI in performance management?

RQ2. To what extent is the usage of BPM and BI orchestrated within the framework of performance management?

Since our sample consists of firms from two industries and in different stages of technology adoption, we set the last research goal as follows:

RQ3. Are there any differences between the implementation of BPM and BI in performance management within telecommunications and banking industry vs. early and late adopters of both technologies?

The paper proceeds as follows: the second section introduces BPM and BI and analyzes their relationship in the context of performance management. The third section introduces our research design and methodology. The fourth section reports on the findings and results of four case studies. The final section provides a

* Corresponding author. Tel.: +386 15892783.

E-mail address: ales.popovic@ef.uni-lj.si (A. Popovič).

discussion of limitations, lessons learnt, suggestions for future research and conclusions.

2. Theoretical background

2.1. Performance management supported by BPM

In scientific management, performance is associated with two key processes: performance management and performance measurement. BPM refers to aligning processes with the organization's strategic goals, designing and implementing process architectures, establishing process measurement systems that align with organizational goals, and educating and organizing managers to manage processes effectively (Brudan, 2010). The measurement and evaluation of the efficiency of business processes is a very important facet of Business Process Management Systems (BPMSs) as it provides real-time feedback on the status of processes and measures the time and cost of processes so that they can be optimized. Properly implemented, BPM can impact a service industry firm's performance through increased revenue, cost reduction, cycle-time improvement, increased customer satisfaction and improvements in any other metric considered as important for creating value.

2.2. Performance management supported by BI

A review of scientific and professional literature shows that many BI definitions focus on decision making, which determines BI as the ability of a firm to act effectively through the exploitation of its human and information resources. The common goal of BI is to provide knowledge workers within firms with useful information which can fulfill their information needs. Providing information is even more important in service industry firms where knowledge about customers and their perception of the quality of the service is harder to measure when compared to manufacturing companies. This information is provided through a Business Intelligence System (BIS) – quality information in well-designed data stores, coupled with business-friendly software tools that provide knowledge workers timely access, effective analysis and intuitive presentation of the right information, all of which enables them to take the right actions or make the right decision. These systems enable the service industry firms to become proactive by: (1) supporting internal users in the continuous assessment, improvement and optimization of firm performance and business processes; and (2) delivering to end-users critical business information about value chain constituencies, such as customers and supply-chain partners.

2.3. BPMS vs. BIS: similarities and differences

A major shortcoming of the “traditional” BI approach was that it did not allow users to associate data with processes. In response, “process-centric” BI emerged as capabilities that are dedicated to the analysis as well as to the systematic transformation of business-relevant data into analytic information which is simultaneously embedded into an operational process (Bucher, Gericke, & Sigg, 2009). On the other hand, BPM systems resemble logs as they enable us to track the execution of processes – each process instance is observed continuously by the monitoring system. The data contained in these logs should enable insights into executed and running processes. However, many BPM systems still lack sophisticated capabilities to analyze log data (Kang, Kim, & Kang, 2012). Therefore, BPM systems are improved by incorporating BI. According to Janiesch, Matzner, and Müller (2012), the application of various measurement techniques on process-related data has been proposed under umbrella terms such as process intelligence and process mining. Consequently, this paper evaluates the

extent of orchestration of BPM's and BI's usage in the framework of performance management.

3. Methodology

3.1. Purposeful selection

Firms from banking and telecommunications industries participated in the study. Some of them were considered as early and others as late adopters of examined technologies. Telecommunication industry was selected because performance management within industry has reached a standardized and mature form. Banking industry was selected since banks have reported ample improvement in cycle time, efficiency, and cost, due to BPM adoption. In addition to process improvement, BPM can also help financial institutions to streamline regulatory compliance, with account opening processes, compliance to regulations and standards, and the automation of paper-based processes being some of the more common scenarios for BPM adoption in banks.

3.2. Data collection

Both managers responsible for BI and BPM (e.g. BPO Division Executive Director; BI Expert; Chief Information Officer) and employees working with these systems on the day-to-day basis were interviewed. Interviews were conducted in three phases. First, in-depth interviews with the relevant group of managers and employees within each firm were conducted in order to collect the data. Second, each interview was analyzed in order to assess for possible inconsistencies in interviewees' estimates of the current situation. Additional explanations were obtained from firms whose managers and employees had provided inconsistent responses. Third, all of the interviews were examined together in order to establish in which areas additional information was needed to further increase the reliability of the study.

3.3. Data analysis

Since the literature lacks solid research on the implementation of BI and BPM within performance management framework, this paper employs descriptive case studies and to answer the research questions stated in the first part of the paper. The case studies were structured and conducted following a previously established and tested methodological approach for business process orientation and BPM maturity evaluation based on semi-structured interviews (Trkman, 2010; Škrinjar, Bosilj Vukšić, & Indihar Štemberger, 2010). Since the BPM aspect was originally incorporated into the methodology, our approach was modified to also include the BI approach.

4. Environment

Four firms participated in the study: two from banking industry and two telecommunications firms. One firm from each industry was considered as an early adopter of examined technologies whereas the other was considered as a late adopter.

4.1. Firm A – telecommunications and early adopter

Firm A is a telecommunication firm that pioneered the telecommunication market in Croatia and made its way through the position of the market leader. It is a branch of a multinational telecommunication firm and in the year 2010 its turnover was EUR 1131.7 million compared to 1150.9 in the year before. Despite the decrease in the turnover, however, the number of users has

increased by 1.5% in 2010. At the time of the study, Firm A had a market share above 50 percent.

4.2. Firm B – telecommunications and late adopter

Firm B is a telecommunication firm that was the last to enter the market six years before the study and presently has a market share around 20 percent. It is a branch of a multinational telecommunication firm and in the year 2010 it had a turnover of EUR 102.71 million. Although the firm is constantly increasing its market share it still does not generate high profits due to high costs of their aggressive marketing campaign.

4.3. Firm C – banking and early adopter

Firm C is a banking firm that has existed on the Croatian banking market for over 40 years and has retained its position as the second largest bank in Croatia due to its successful privatization in 1999, as well as to becoming a member of a large international group. In 2010 its equity capital was EUR 257.6 million. At the time of the study, the market share of the bank was above 20 percent.

4.4. Firm D – banking and late adopter

Firm D is a banking firm that operates under its present name since 2003 and a series of mergers and acquisitions involving banks that had existed in the Croatian banking market for over 50 years. The bank is nowadays a member of a large international group. In year 2010 its equity capital was EUR 229.5 million. At the time of the study the market share of the bank was above 15 percent.

Table 1 presents descriptions of BPM and BI initiatives of the participating firms. BPM initiatives were followed by BI initiatives (the one exception was Firm D where BI was initiated first). The implementation of BPM was more often initiated by the top and middle level management, while BI was more often initiated by the CIO. The main goals of the BPM initiatives were business process optimization and improvement, while BI initiatives were started to increase knowledge and enhance marketing effectiveness. Interestingly, as regards the usage of BPM and BI, the early adopters generally claim to be better than competitors, while the late adopters claim to be equal to their competitors or much inferior.

5. Findings

The analysis has been guided by the purpose and research questions of the paper, by earlier empirical results of the IT and service industries, and by the empirical material of the cases studied. The analysis has been performed on the firm level, not on the departmental/functional level.

6. BI and BPM utilization within performance management framework

The fact that measurement in business processes is a relatively new topic in BPM is clearly reflected in Table 2. The results show that different firms adopted different elements of process performance measurement. Business processes are measured “ad-hoc” (occasionally, not continuously) – when a BPM project is conducted, in all participating firms. This type of measurement is mostly associated with the design measures dealing with the static properties of business processes. Design measures are usually used to improve a business process in the early stages of its lifecycle. In Firms A and D business processes are measured, analyzed and managed continuously, based on real-time data. These execution measures quantify process execution over time and are used for comparison with

the expected results. In Firm D only high level business processes are measured in this way in order to track products and services efficiency, effectiveness and quality in real time. The performance results are used by top management for tactical and strategic decision making, while business process measurement results are used for business process improvement or reengineering, and for setting improvement targets in Firms A, C and D, but not in Firm B. In Firm A, business process measurement results are also used in determining employees' salaries.

The main focus of BI initiatives in the firms (Table 3) is closely related to the nature of the sector a firm operates in (e.g. telecommunications focus mainly on sales; financial sector expands the focus on risk and asset management). Yet, the same does not apply to the placement of BI within the organization of participating firms. Some firms (B and D) have it as a dedicated organizational unit (e.g. retention and controllership) while others (e.g. A and C) have it as part of a wider organizational unit, where the placement is likely to occur based on the business area BI is mostly used on. While most of the firms take advantage of ad hoc querying, embedding and integrating analytical processes in everyday business is not so common. We can further observe that the participating firms characteristically use BI for two purposes: (a) for measuring and monitoring, and (b) as an integrated performance management solution. In contrast, innovation, people's productivity, strategic agility and differentiation do not top the list of BI uses.

7. Relationship between BI and BPM

This research shows that the four firms are adopting BPM and BI to drive performance and profits, but all of them are only just beginning to formally align and orchestrate these efforts (Table 4). Having separate governance structure for BI and BPM, they are treated separately. BI and BPM managers discuss common topics occasionally (Firms A and C) or within a week or month period (Firm D). All the firms reported using BI technologies and tools for BPM purposes: to provide input for BPM systems and for generating BPM measures and KPIs. On the other hand, it is only in Firm A that the BPM system provides input data for the BI system.

8. Difference between industries (telecommunications vs. banking) and maturity (early vs. late adopters)

The following issues will be analyzed regarding the difference between industries and maturity: (1) BPM and BI initiatives in the firms, and (2) BI and BPM utilization within performance management framework.

8.1. BPM and BI initiatives in the firms

There is no significant difference regarding the reasons for starting BPM initiatives. Companies A, C and D had more ambitious goals regarding BPM (process management and eTOM framework implementation; optimization of business processes, their management and improvement), while only company B had quite moderate goals (business process identification and documentation). As regards the reasons for starting BI initiatives, the difference between industries is greater than the difference between early and late adopters. Telecommunication firms are more oriented towards the market (more effective marketing, knowledge about customers), while banking firms are more oriented towards providing better support for decision making (providing complete and fast information to management, decreasing information requests for the transactional system).

Table 1
BPM and BI initiatives in participating firms.

BPM and BI initiatives		Firm			
		Telecommunications		Banking	
		A (early adopter)	B (late adopter)	C (early adopter)	D (late adopter)
When did the initiative in the firm start?	BPM	2001 (10 years ago)	2007 (4 years ago)	2000 (11 years ago)	2008 (3 years ago)
	BI	2005 (6 years ago)	2008 (3 years ago)	2005 (6 years ago)	2007 (4 years ago)
Who started the initiative?	BPM	Board of directors	CEO	CIO	Functional manager
	BI	CIO	Retention manager	CIO	CIO
What was the main reason to start it?	BPM	Process management and eTOM framework implementation	Business process identification and documentation	Optimization of business processes, their management and improvement	Business process optimization
	BI	More effective marketing	Knowledge about customers	Providing complete and fast information to management	Decreasing information requests for the transactional system
Is your firm more BPM/BI oriented than your competitors?	BPM	More BPM oriented than competitors	Much less BPM oriented than competitors	More BPM oriented than competitors	Slightly less BPM oriented than competitors
	BI	More BI oriented than competitors	Much less BI oriented than competitors	The same as competitors	The same as competitors

8.2. BI and BPM utilization within performance management framework

The difference between industries regarding BPM utilization is greater than the difference between the early and late adopters. Telecommunications firms more often use performance targets in line with their process goals, and communicate performance indicators on a regular basis within the organization. On the other hand, banking firms continuously analyze and manage the business process using the historical data.

There are differences between the firms as regards the maturity of their BPM systems. In both early adopting firms performance measures are used by management, and business processes are measured, analyzed and managed continuously, based on real time data. When it comes to the influence of performance management on firm management, no distinctions were observed between

the two industries and between firms on different levels of BPM system maturity. With respect to the level of impact that performance management has on firm management, Firm A is in the lead (telecommunications, early adopter), and both banks are following it closely. Firm B (telecommunications, late adopter), however, is lagging behind. More precisely, Firm B did not formally implement the BPM concept, but their business processes are managed, monitored and measured in real time through the features, functionalities and reports embedded in their EPR and BI information systems. The enabling software architecture was developed by external consultants. During the implementation phase of this project, Firm B's business processes were modeled and documented. However, the process-related organizational structure was not developed and process owners were not established. According to [Kohlbacher and Gruenwald \(2011\)](#) the implementation of process performance measurement or the process owner

Table 2
Process management and measurement.

Process management and measurement		Firm			
		Telecommunications		Banking	
		A (early adopter)	B (late adopter)	C (early adopter)	D (late adopter)
Level of process performance measurement:	Process measures are defined and documented for each process.	✓			
	Performance targets are in line with process goal.	✓	✓		
	Performance indicators are communicated on a regular basis within the organization.	✓	✓		
	Performance measures are used by management.	✓		✓	
Dynamics of process performance measurement:	Business processes are continuously analyzed and managed using the historical data.	(a)		✓	✓
	Business processes are measured "ad-hoc" when a BPM project is conducted.		✓	✓	✓
	Business processes are measured, analyzed and managed continuously, based on real-time data.	(b)		✓(c)	
Influence of performance management on firm management:	Performance results are used for business process improvement or reengineering.	✓		✓	✓
	Performance results are used in setting of improvement targets.	✓		✓	✓
	Performance results are used in decision making on a daily basis (based on operational data).	✓	✓		
	Performance results are used by top management for tactical and strategic decision making.	✓	✓	✓	✓
	Performance results (of processes) influence employees' salaries.	✓			

Comments: (a) data is not integrated; (b) not all of the processes; (c) products and services are tracked in the real time.

Table 3
BI management and measurement.

BI management and measurement		Firm			
		Telecommunications		Banking	
		A (early adopter)	B (late adopter)	C (early adopter)	D (late adopter)
Focuses of BI in the firms:	Marketing	✓	✓		
	Customers	✓(a)	✓(b)	✓(c)	
	Sales	✓(d)			
	Risk management			✓	
	Profitability			✓	
	Asset and cost management			✓	✓
Organization of BI within firms:	Strategy and process management				
	Dedicated organizational unit		✓(e)		✓(f)
Dynamics of BI analytics:	Part of wider organizational unit	✓(g)		✓(h)	
	Ad hoc usage	✓	✓		✓
How would you characterize use of BI inside the firm?	Analytical processes are fully embedded and integrated	✓		✓	
	Running the business	✓	✓	✓	
	Measuring and monitoring	✓	✓	✓	
	Integrated performance management	✓	✓	✓(i)	
	Fostering business innovation and people productivity	✓(j)	✓		
	Creating strategic agility and differentiation	✓(k)			

Comments: (a) churn; (b) segmentation, customer behavior analysis; (c) CRM; (d) product development; (e) retention; (f) controllership; (g) marketing; (h) IT, but other departments participate in analysis with the domain knowledge; (i) financial processes, technical, CRM; (j) productivity; (k) often with external consultants.

role only is insufficient to achieve high performance. Companies must implement both concepts to reap the fruits of process measurement and management. Industry is a stronger source of differences in the focus of firms' BI systems than the level of system maturity. Telecommunications firms' BI systems focus on marketing, customers and sales. On the other hand, banking firms' BI systems focus predominantly on risk management, profitability and asset and cost management. Organization of BI within firms is the result of the time of BI adoption in the firms. At first sight it seems surprising that late adopters have BI organized as a dedicated organizational unit, while early adopters have BI organized as part of a wider organizational unit. Further discussions with CIOs revealed that early adopters were pioneers in utilizing BI technology, and were happy to organize BI in the firm as part of a wider

organizational unit. Early adopters have more levels of data integration within the firm, which includes spread marts, data marts and data warehouses. On the other hand, late adopters rely solely on the data warehouse. The use of analytical tools is similar in all of the firms examined. All of them use the wide range of possibilities provided by BI to the fullest extent.

9. Lessons learned

Our research sought to understand the ways in which BPM and BI are employed to improve the process performance management within service industries. Interestingly, the data describe a more complex picture than might have been anticipated. Drawing on the case studies of four Croatian firms in two service industries,

Table 4
BPM vs. BI.

BPM vs. BI		Firm			
		Telecommunications		Banking	
		A (early adopter)	B (late adopter)	C (early adopter)	D (late adopter)
Relationship between BPM and BI:	Does BPM give data as input for BI?	✓	(a)	✓(c)	✓(b)
	Are BI and BMP separately treated?	✓	✓	✓	✓(e)
	Separate governance structure for BPM resp. BI	✓		✓	✓
	Are BPM and BI managers or specialists discussing topics together (regularly)?	✓(d)	✓	✓(d)	✓(f)
Impact of BI to BPM aspects:	BI exposes the problematic aspects of current BP	✓	✓	✓(d)	✓(d)
	BI provides input for assessing BP against standards and for continuous process improvement	✓	✓		✓
	BI system provides input for BP redesign projects	✓	✓	✓	✓
BI is used to measure, analyze and manage business processes and the following functions are used:	Data Warehouse and OLAP	✓	✓	✓	✓
	Dashboards	✓	✓	✓	✓
	Analytical tools	✓(a)	✓	✓	✓
	Optimization tools	✓(b)	✓	✓	✓
	Data about process performance is extracted from transaction/operational IS (ERP).	✓	✓	✓	✓
	Data about business processes is collected manually (based on activity duration measurement and interviews with employees)	✓(c)		✓	✓

Comments: (a) opposite is true, BPM provides data on customer behavior for BI; (b) e.g. timestamps for BPM project; (c) partly, (d) occasionally; (e) separate teams in separate organizational units; (f) weekly and monthly.

namely telecommunications and banking, it seems that all organizations under investigation have found ways to utilize BPM and BI for performance management not just as isolated initiatives, but as important tools for improving business performance.

The BPM and BI initiatives were implemented for the purpose that is highly connected with the goal of improving performance. However, BPM is more business-process oriented, while BI is more focused on business performance, especially in terms of non-financial goals. These results agree with the findings published by González, Rubio, González, and Velthuis (2010) and Schläpke, Silvi, and Möller (2012). According to them, no important measurable concept for business process execution measures exists and very few initiatives concerning these measures exist either. Therefore, it would be very useful to provide support to all of different business process measurement perspectives using an integrated framework which would allow business experts to apply them in business practice.

There appears to be a conflict between the intended and the achieved results of BPM and BI technology usage within the performance management framework. On one hand, management starts both initiatives with the goal of improving the performance of the firm's services. BI initiatives are usually driven by sales, marketing, and the need to obtain information about customers in order to improve organization's effectiveness. Since processes generate most of the cost of any business, the main goal of the BPM project in any organization is to improve efficiency by improving the organization's processes. Both goals and both initiatives thus contribute to performance management. However, even though both BPM and BI were implemented, there was little commitment towards using both systems as tools for supporting performance management.

The analysis of BPM analytics shows that more support is needed for the collection and analysis of performance-related data. The data about business processes is collected manually (based on activity duration measurement and interviews with employees). A lack of information consistency, poor data quality and insufficiently detailed information can be considered as the most important shortcomings of manual BPM. According to the research results, these data problems are solved through the use of BI technology and information systems. This indicates that the alignment of BPM and BI, and the creation of integrated data architecture could solve these data problems.

10. Discussion and conclusion

Croatian service industry firms do not use the potential of BPM and BI in performance management to a satisfactory level (RQ1). More precisely, all the firms stated that they require more support for the collection and analysis of performance-related data. This would allow the firms to derive much better intelligence about the performance of their key business processes than what is currently the case. The results of the research conducted by Gersch, Hewing, and Schöler (2011) show that most BPM tools focus on efficiency (i.e. the costs and time) from the company's internal point of view. However, this approach needs to be enhanced, especially in service-dominant companies. Amongst others, customer integration is a basic element of services since the customer has an active role in the value creation process. The advanced analytics driven data analyses, functioning as a part of framework for BI, allow companies to have a complete view of their operations and customers (Bose, 2009). Accordingly, the results of Bose's research reveal that BI is widely used to drive firms' performance. It is reasonable to conclude that BI has become a mainstream managerial tool since it is predominantly used to improve the core processes that drive business performance. Our findings show that the usage of BPM and BI is not orchestrated within the framework of performance

management and that communication between BPM and BI managers is insufficient (RQ2). Very similar results were presented by Bucher et al. (2009) and González et al. (2010). They concluded that the overall levels of adoption and maturity of the BPM and BI integrated framework within real-world organizations appeared to be rather low at that moment. These findings suggest that business leaders and managers need to be educated about the need for BPM and BI orchestration (Schläpke et al., 2012). The BPM and BI experts should operate as a team and share the responsibility for linking BPM and BI information. Although interviews conducted during this research did not comprise questions about BPM and BI costs, it is obvious that all firms invested a lot of time and money into these initiatives. Consequently, BPM and BI use/implementation alignment could help to rationalize firm's budget. Some aspects of the BPM and BI used in the four firms stem from industry-specific characteristics, while others have to do with the time of starting the initiative (RQ3). Industry is the source of the following differences: who started the initiative, reasons for starting BI initiative, BPM utilization, and differences in the focus of BI in the firm. Maturity is the source of the following difference: usage of performance measurement by the management of the firm, organization of BI unit, and sources of information within the firm.

While our study adds to the existing body of knowledge, we also acknowledge its limitations and recognize them as possible future research directions. The cross-sectional nature of the data gathered limits the generality of the conclusions. In fact, the ability to draw conclusions would be strengthened with the availability of longitudinal data. Moreover, future research could also focus on testing on other industries and comparing results between them. Although the sample size could be considered a limitation of the study, its reliability was ensured through an elaborate survey design and questionnaire structure. A further way to improve the reliability of the results would be to increase the sample size, include more respondents from a single organization and weigh their responses. The measures used are also subject to further improvements and adjustments through continued research. Furthermore, future research could examine the same issues in firms of different sizes: small, medium, and large. Since we have investigated only multinational firms, it would be interesting to see the differences between performance measurement supported by the BI and BPM systems in the headquarters and chapters of multinationals. Finally, the question emerges on the connection between business results and the efficiency of the performance measurement systems. The last question is of the highest importance, especially since the transition countries are still looking for ways to achieve high productivity and efficiency.

References

- Bose, R. (2009). Advanced analytics: Opportunities and challenges. *Industrial Management and Data Systems*, 109, 155–172.
- Brudan, A. (2010). Rediscovering performance management: Systems, learning and integration. *Measuring Business Excellence*, 14, 109–123.
- Bucher, T., Gericke, A., & Sigg, S. (2009). Process-centric business intelligence. *Business Process Management Journal*, 15, 408–429.
- Gersch, M., Hewing, M., & Schöler, B. (2011). Business Process Blueprinting – An enhanced view on process performance. *Business Process Management Journal*, 17, 732–747.
- González, L. S., Rubio, F. G., González, F. R., & Velthuis, M. P. (2010). Measurement in business processes: A systematic review. *Business Process Management Journal*, 16, 114–134.
- Hernaus, T., Pejić Bach, M., & Bosilj Vuksić, V. (2012). Influence of strategic approach to BPM on financial and non-financial performance. *Baltic Journal of Management*, 7, 376–396.
- Janiesch, C., Matzner, M., & Müller, O. (2012). Beyond process monitoring: A proof-of-concept of event-driven business activity management. *Business Process Management Journal*, 18, 625–643.
- Kang, B., Kim, D., & Kang, S.-H. (2012). Periodic performance prediction for real-time business process monitoring. *Industrial Management and Data Systems*, 112, 4–23.

- Kohlbacher, M., & Gruenwald, S. (2011). Process ownership, process performance measurement and firm performance. *International Journal of Productivity and Performance Management*, 60, 709–720.
- Mcivor, R., Humphreys, P., Mckittrick, A., & Wall, T. (2009). Performance management and the outsourcing process: Lessons from a financial services organisation. *International Journal of Operations and Production Management*, 29, 1025–1048.
- Samoilenko, S. (2008). Contributing factors to information technology investment utilization in transition economies: An empirical investigation. *Information Technology for Development*, 14, 52–75.
- Schläfke, M., Silvi, R., & Möller, K. (2012). A framework for business analytics in performance management. *International Journal of Productivity and Performance Management*, 62, 110–122.
- Škrinjar, R., Bosilj Vukšić, V., & Indihar Štemberger, M. (2010). Adoption of business process orientation practices: Slovenian and Croatian survey. *Business Systems Research*, 1, 5–19.
- Trkman, P. (2010). The critical success factors of business process management. *International Journal of Information Management*, 30, 125–134.