

The Additional Value of Business Process Management: Framework for comparing BPM systems on influencing business performance.

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ABSTRACT

In this paper we propose a framework that helps to compare the influence of different BPM systems on the business performance of an organization in the healthcare branch. BPM is a widely used term and there are many BPM systems that would support this form of management. Unfortunately there are hardly good methods to measure the influence of BPM systems on business performance. We have connected measuring points gathered from the real practice field to connect them to the academic framework introduced by Scheper (2002). We placed our findings in a new framework which can be used to compare which BPM systems supports and improves the different dimensions introduced by Scheper. Healthcare organisations can use these results to decide which BPM systems meet there requirements the best. After this we have validated the framework by letting an expert from TU/e validate it. This results have shown that influence of the BPM systems we have chosen diminishes compare to the influence of who and how they are implemented.

INTRODUCTION

Business Process Management (BPM) is nowadays drawing considerable attention. The function oriented approach, where individuals focus on one specific task, turned out to be not flexible enough to evolve with the business arena (Pantazi & Georgopoulos). A lack of overall process control was one of the main problems why organisations fail to act competitively. The concept of Business Process Re-engineering from Hammer and Champy (1993) was seen as the solution to this problem. This practise was based on the process-oriented vision instead of the function oriented vision. This request from the business site was met with a group of technologies, under which workflow systems, and more currently, BPM technologies. BPM is seen as the methods, techniques, and tools which are used to support the design, enactment management and analysis of business processes. BPM can be considered as an extension of classical Workflow Management (WFM) systems and approaches (van der Aalst et al., 2003). Although the term BPM is widely used a clear scientific underpinning is missing. Although there are many organisations that proved to have success with using BPM, the wide range of view points on BPM cause a lot of roadblocks for organisations which decides to move toward BPM solutions (Indulska et al., 2006).

The main difference between the definition of BPM and WFM is that BPM has an additional step in its lifecycle. Besides the traditional phases used in WFM, which are process design, system configuration and process enactment, BPM deals also with the concept of diagnosis. In this phase, the operational

processes are analyzed to identify problems and find issues that can be improved (van der Aalst et al., 2003). Although there are already many BPM suites it is expected that the BPM market will grow (Gonsalves, 2007). The main purpose of this research is to describe the additional value of specific BPM suites that are on the market. There are a lot of different BPM suites that sell their BPM software to organizations. Although they all claim to cover a broad range of organization types and branches, it is not valid to take possession of this right away. Branches differ too much when you compare them on the way they handle their information throughout the organization. For example an insurance company has a totally different approach than a healthcare organisation or a retailer. With this in mind, the suite vendors must have a (more or less) slightly different focus which makes one suite more suitable for a particular branch than another suite. We want to investigate on which issues different vendors differ to their competitors focused on one particular branch. Another argument that supports the investigation for one branch interesting is given by Galimi (2005). Here he states that it is hard to implement BPM systems into an organization. One of the reasons he gives for this statement is because all the vendors of BPM systems have different backgrounds, market focuses and scope. These factors make it harder to choose the right system for the right organization. The branch we want to investigate is the healthcare branch. We have chosen for this branch because healthcare can benefit from BPM by dealing better with the limited resources they have and the growing demands for improved customer services (Galimi, 2005). As this type of organizations have a very open environment it is easy to gather information about the way they organize and handle their information. Besides this, it is a branch with a complex organization structure and architecture. Healthcare organizations are characterized by an increasing number of medical disciplines and specialized departments which means a diversity of isolated information architectures. Also, the different types of customers that use the information system (e.g. Patients, employees and external medical practitioners) makes the information organisation for this branch difficult. For these reasons it is important to find a business process management system that meets the enterprises' needs. All the characteristics about healthcare organizations mentioned above make it clear that this branch is very interesting to investigate (Becker et al., 2007). We use Gartner's Magic Quadrant for BPM suites (Feb. 2009) to choose four different vendors. Gartner makes a distinction between leaders, challengers, visionaries and niche players. We select four vendors from the Magic Quadrant. We take three 'leader' vendors and one 'challenger'. We did not choose a 'niche' or a 'visionary' vendor as these are vendors who are specialized in one particular niche or did not support any healthcare organization. After we have chosen the vendors, we construct a framework which can be used to investigate which vendor fits the best for the branch we focus on. The main question in this research will be:

'How can BPM suites support the improvement of organisational performance the best for the healthcare branch?'

In this research we focus on four different BPM suites, which are: AG Software (leader), Lombardy (leader), Global360 (challenger) and Oracle (challenger). The main reason for investigating this topic is that there is little scientific information available about this topic. Furthermore we want to look at how BMPS are used in day to day practice compared to how it is described in the academic literature. This research paper can be used for organisations considering applying BPM to outweigh the best suite for their business.

The model we are going to apply to investigate the strength and weaknesses of the different suits is the model of Scheper (2002). Scheper introduced five business dimensions which he says, are a crucial part of every organization that need to be integrated. These five dimensions will be explained later in the paper. Basically, Scheper's hypothesis is that organizations that synchronize or level these five dimensions will significantly contribute their performance. This hypothesis is confirmed by a study over 265 Dutch housing corporations (Scheper, 2002) and confirmed by data collected among 30 CRM- (Batenburg & Versendaal, 2006). Even though this empirical test is done in another branch we state that these dimensions are important for every branch that deals with BPM. In this section we explained the basis of our framework. In the second section we explain the way we compose our framework. We outline the base of our framework and the roots of BPM. In the third section we explain in more detail the way our framework can be used. Here we link Scheper's dimensions with more concrete measurements. In the fourth section the entire framework will be validated. This will be done by asking experts to take a critical look at the framework. Furthermore we will analyze their

comments on the framework and draw some conclusions about the reliability of the framework. In the last section we will revisit the research question and outline the interesting areas for further research to make this research even more valuable.

CONSTRUCTION OF THE FRAMEWORK FOR THE EVALUATION MODEL

In this section we provide more detail about the way the model we are going to use is constructed. The fact that since the 1980's, the domain of information systems start to grow significantly the importance of information systems started to increase, which mend more and more problems on the business side. Information systems were implemented on the fly and even though this resulted in many technical issues, little people ever paid attention to the business elements of the organisation. Therefore the need to develop models and frameworks that involved the business aspects of an organisation became bigger and bigger. Nolan (1979) modelled the first framework in the field of information systems. This model is frequently referred as the origin of the maturity perspective. Nolan's model represents the specific pattern of IT-adoption or IT-management by organization. This pattern is better known as the 'S-curve' and it shows the cumulative frequency distribution of adoption within groups. Earl (1989) came up with a new model which, unlike Nolan's, concentrates rather on the task and objectives of planning at each stage, instead of on the interplay between expenditure and control (Curtis & Cobham, 1989). Earl's model can be considered as one of the first extensions of Nolan's model. In the 1990's, both models have been revised, extended, specified and modified in line with the software engineering and information systems progress (Beukers et al. 2006).

The Capability Maturity Model (CMM) is a famous example of a model which is grown out of the roots of the Nolan and Earl models. The model was designed to measure, monitor and evaluate the development and engineering of software and many related domains. Turban, McLean and Wetherbe (1999) made an extension of this model as well. Their model describes five components which are: 'Organization structure and the corporate culture', 'Information Technology', 'people and roles', 'the organization's strategy' and 'management and business processes'. Scheper (2002) made some small changes in these five components and the relations between them. For example, Scheper thinks that it is unnatural to separate individuals and roles from culture, as Turban did. For this reason, Scheper changed these components, to one component called individuals and culture. This change, and a shift in thinking about how organizations handle information systems nowadays, made it necessary to change some other components as well. The final five dimensions of Schepers model are:

- Strategy and policy
- Monitoring and control
- Organization and processes
- People and culture
- Information technology

Another reason to extend the model of Turban, McLean and Wetherbe (1999) is because it fails to describe the interaction between the components. So even though it is a good framework to think about the relations between organisation and ICT, it does not say anything about how the five components are related to each other. This lack means that the model has a insignificant operational validity. For this reason, Scheper developed levels of development for every component. On the basis of the levels of development for each component and the degree of difference between the levels of development, he made it possible to define the performance of a business.

We chose for Schepers model because we agree on the changes he made in the components. Other models which describe BPM systems, like the model made by Duncan et al. (2007) give a good theory-based architecture of how a business processes management system has to look like but gives no insight on which points a good BPMS should support an organization. For this reason we did not use this model. We want to look at which points a BPM system supports an organization instead of

checking if the BPM systems have every component in their system that makes it possible to support the organization.

In this paper we extend the five earlier mentioned dimensions with the more measurable variables declared by Silver (2008). Silver used many different variables to analyze particular BPM suites. By comparing these variables over the different BPM vendors we are going to analyze the four different systems.

The application of the model is explained in the next section. Now that the construction and determination of the model is explained, a remark based on the used literature is needed. To construct our framework we used both scientific literature and practical literature. This makes the research more reliable because practical literature has more empirical evidence to base your findings on. It is also necessary to use a scientific framework to put the information in an academic perspective, so research on the topic can easily be extended. This combination of types of literature makes the research more reliable and decrease the gap between the practical use of BPM and the theoretical analysis of it.

MODEL OPERATIONALIZATION

In section two we have described the framework we want to use as a fundament for our own framework. Schepers model provides the five dimensions that can be used to monitor the business performance and we will elaborate these variables by using more concrete measurements made by Silver (2008). In figure 1. Schepers model is elaborated with the points of Silver. The IT component is rated by Silver because this is the BPM system. Four measuring points from Silver are connected to the four remaining dimensions because the fifth dimension is the BPM system. Now we will elaborate why the four dimensions can be linked to the points used by Silver.

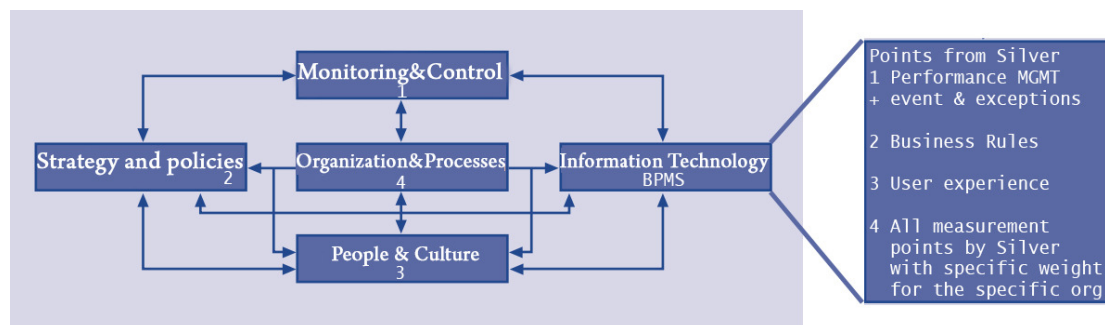


Fig. 1. Model of measuring points influencing the variables of the Schepers model (2002).

The first dimension in Schepers model is 'Strategy and Policy' which we monitor by looking at how well a BPMS deals with aspects regarding to business rules. Strategy and policies have very much to do with business rules. Leite and Leonardi (1998) say about business rules:

"Business rules are statements about the enterprise's way of doing business. They reflect business policies. Organizations have policies in order to: satisfy business objectives, satisfy customers, make good use of resources and conform to laws of general business conventions."

The last sentence makes it obvious that policies and business rules are linked to the strategy of an organization because the strategy is the plan to achieve the business objectives. So looking at how well a BPM system can deal with business rules gives us an indicator on how well a BPM system can support the strategy and policy variable. The second dimension we elaborate is Monitoring and Control. This variable will be measured best by looking at the performance of the Business Analysis Methods that the BPM system supports. Silver calls this 'performance management' and this measuring point will be combined with the measuring point Silver names 'Events & exceptions'. Without good event and exception handling within the BPM system, monitoring the process will be very hard. If the BPM system performs well on this point, then there will be a positive influence on the

whole 'Monitoring and control' variable in our model. The third dimension from Scheper is 'Organization and processes'. Every organization has a different structure and different processes. Silver (2008) acknowledges this and states that before choosing a BPM system you need to have an understanding of what kind of processes are occurring in a organization. Silver divides them into three different processes, two are very human-centric; these are the production workflow and case management processes and the other process type is an integration-centric process. Production workflow processes in healthcare organisations are for example processes that have to deal with customer service or the process that handle paper written health claims. A case management process for example is the handling of disability claims or processes that deal with a new product launches. Integration-centric processes are more straight-forward like online sales processes. How well a BPM system supports one of these processes is not measured by a single value. Silver measures this support by looking at eleven measuring points and gives different weights to those points when looking at one of the three processes. For example when looking at a BPM system that needs to support case management processes, the weight of the aspect 'Content, team collaboration, and case management' is bigger than when you look for systems that supports integration-centric processes. The product of the values given to the eleven points and the weights of those points will be summed up. This gives an indication on how well the BPM system supports the organization and its processes.

In our model we call this variable the 'overall measurement' of the BPM system. The eleven points measured by Silver (2008) are:

1. Environment and architecture
2. Process structure and data
3. Process modeling and design
4. Human workflow
5. User experience and task management
6. Integration framework
7. Business rules
8. Content, collaboration, and case management
9. Events and exceptions
10. Performance management
11. Solutions and services

The fourth dimension from Scheper is to measure business performance. This is done by looking at the people and culture within the organization. The new system needs to suite the people that are going to use the system and the culture in which it is going to function. To determine how well the BPM system fits the people and culture that are going to use it, we are looking at experiences that users have with the system. The language and experience with BPM system that the users have need to align with how the people work in the organization. Silver gives information about this by addressing the subject 'User experience and task management'. So by looking at this variable we have an indicator on how a particular BPM can align with the people and culture and therefore contribute to the business performance. The last dimension of Scheper's model, Information Technology, is not measured. The business processes management systems are the information technology systems that influence the four other dimensions and therefore we want to know how this variable influences the other variables and thus the whole business performance.

Now we have defined the four measuring points that give information about how they are going to influence the variables that determine the business performance of an organization. To make the comparison of the more suitable for the healthcare branch we are going identify more specific scenarios from the healthcare domain that align with above mentioned measuring points.

The first measuring point we will apply in our framework can be used to check whether a BPM system supports the 'strategies and policies' within a healthcare organization. The most common strategies and policies used in healthcare organizations are the clinical practice guidelines that personnel use to structure their way of working. Lyng, Hildebrandt and Mukkamala (2008) state the best improvement of clinical work will be done by more support of the clinical practice guidelines through ICT. So if the

BPM system can support and cope with these ‘business rules’ of a healthcare organization then it will support the ‘strategies and policies’ of that healthcare organization. The second measuring point which monitors the influence of the BPM systems on the business performance is ‘Monitoring and Control’. Business process analysis tools help to give an overview of how well a process is executed. A lot of research has been done on processes in healthcare organizations and we have already outlined that these processes are much more diverse and require much more flexibility than regular businesses (Mans, Aalst, Russel & Bakker, 2008). The processes that are executed can differ every time and this makes it harder for the system to monitor the processes that are different for every case. The BPM system needs to give a solution how it can support the monitoring and analyses of these processes that differ in many situations. The problem of flexible processes is also seen when we look at the measuring point that needs to measure the support of the ‘Organization and processes’. In order to measure the support of this aspect of business performance we need to look at how well a BPM system supports those case management processes as Silver (2008) names them. The support of content, team collaboration, case management, human task design and user experience are the most important measuring points in the findings of Silver research, therefore we are going to use these points to decide whether a system support the ‘Organization and processes’. To measure the last point, support of ‘People & Culture’ by a BPM system, is very difficult. Nytro, Sorby and Alsos (2008) state that today’s information systems are still hardly able and not willing to cope with the multitasking clinician that are using them. Context-aware systems will be the future and the BPM systems can only support the ‘People & Culture’ if they are flexible enough. When the system can support the use of context aware information while it executes a process, it will be rated higher on this measuring point compared to a system that cannot fulfill this requirement.

We now have defined on which aspects we will compare the observation Silver (2008) made in his BPM Watch papers about the BPM systems and applied these observations with observations made in the healthcare branch. By using the description and ratings of Silver we can give points to the four variables for every BPM system. The BPM system that has the most points on average and the less difference in points between the four variables will be the BPM system that supports the business performance the best. The system needs to support all the points rather equally because then the alignment of the four variables is the most and only by alignment of those four variables the business performance will be enhanced.

Table 1: Global framework for comparing BPM systems.

Which BPMS has the most positive effect on one of these variables:	Lombardi	Software AG	Oracle	Global 360
Strategy and policy <i>Measured by:</i> Performance MGMT + event & exceptions				
Monitoring and control <i>measured by:</i> Business Rules				
Organization and processes <i>measured by:</i> all the points from Silver calculated with a specific weight on each point.				
People and culture <i>measured by:</i> User experience				

VALIDATION

Now that the model is explained we can go on with validating this method. Validation need to be done by an expert. Many forums are available on the web where you can state the conclusion of your research and experts on the specific top can criticise it. This kind of comment can be very useful because a lot of people who are concerned with the topic and have real life experience with the topic add their suggestions. For the model we explained in this paper, it is a bit different. The reason for this is that we did not do a research with final results, but we made a model which can be applied. Besides this, the branch we used (healthcare) is not a competitive branch like other general businesses. This made the validation harder too. For these reasons we decide not to use a forum but we choose to show our model to two experts in this domain. We sent an e-mail to dr. ir_Reijers and assistant professor Jansen-Vullers. Dr. ir. Reijers is an associate professor in the information systems group of Eindhoven University of Technology and leader of the Business Process Management research cluster within this group. Together they wrote an article about business process redesign in the healthcare branch (Reijers, & Jansen-Vullers, 2005). After reading this paper we decided to ask them to validate our model because they know a lot about BPM in combination with the healthcare sector.

Dr. ir Reijers responded with the following remarks (in Dutch) on 13 april 2010:

“Ik ben van mening dat de manier waarop de genoemde BPM-systemen worden geïmplementeerd van een veel grotere invloed is op de manier waarop de variabelen uit jullie framework worden beïnvloed, dan de precieze ‘smaak’ van het systeem. Je kunt het een beetje vergelijken met de vraag of je met Lego dan wel met Knex een mooiere hijskraan kan maken. Beide ‘systemen’ zijn in zekere zin zo flexibel en veelzijdig dat het veel meer afhangt van de bouwer dan het materiaal hoe goed het resultaat is.

Daarmee zeg ik niet dat er überhaupt geen onderscheid gemaakt kan worden tussen verschillende BPM-systemen. Maar ik denk wel dat de systemen die jullie bekijken alleen niet voldoende onderscheidend zijn ten opzichte van elkaar. Mijn advies aan jullie is om nog eens goed na te denken over de reden waarom jullie deze 4 systemen bekijken. Verschillende Gartner-classificaties lijken me daar niet echt de beste grond voor.”

So he addresses to following points. The implementation of BPM systems would depend in his opinion much more on by who and how the system is build than which system is implemented. All the systems we wanted to research in this paper are very flexible and can be used for multiple purposes, according to Reijers. The influence of the builder is much bigger than the influence of the specific BPM systems on the implementation of a BPM system in organizations. The advice Reijers gave is to rethink why we want to compare the four systems we have chosen. The reasons we gave in our paper, the Gartner classifications, are not well grounded in his opinion.

CONCLUSIONS AND FURTHER RESEARCH

The validation gave us more information about what could be done better to answer the question; *'Which BPM suite supports the improvement of organisational performance the most for the healthcare branch?'*

The biggest critical point given by dr. Ir. Reijers is that the BPM systems we wanted to compare are too flexible to really differ from each other. Hereby the effect of which BPM system you choose on the business performance diminishes and will be much more depended on who and how the systems are implemented. In further research the BPM systems that are chosen need to differ more or the criteria's why you choose the systems need to be better specified. We had chosen for the specific BPM systems because else the difference would be too big to compare them, but this argument does not hold after the validation of our model.

A real answer on the research question is not given due to time constraints. Evaluating the four papers written by Silver would take too much time and this would make it impossible to give an example for a specific branch like it is done now for the healthcare. In further research this evaluation can be done by using the framework we presented here. Furthermore a possibility could be that we adjust the framework so that we are going to look at the specific methods people use when implementing a specific BPM system into an organization and how this effects the variables from the model. This will change the scope of the research radically because you do not look at the implementing materials like we have done now but at the people who implement the system. This would align more with the thoughts of dr. ir. Reijers.

The general framework that is made by combining the model of Scheper and the measuring points of Silver can easier be applied in other branches. The generalization of the framework makes it more applicable in other branches and this makes it easier to validate it in further research. There will be more research needed to check if the linking between the points of silver and the variables from the model of Scheper is correct. This can be done with the current model and you do not need multiple BPM systems for this. You can do research on whether a change of the points of silver leads to a change in the business performance. After the validation we know that the difference between the chosen BPM suites would not have very much effect on the business performance but that this is more influenced by the people and methods that implement the systems. Research needs to check whether the implementation methods used for implementing the systems are the same if they want to validate the linking between the points of Silver and Schepers variables. Further research can be done on the different BPM suites. As dr. ir. Reijers said, choosing BPM suites only based on Gartners findings is not enough to choose suites that are really different. To give more value to this framework totally different vendors need to be compared which, according to dr. ir. Reijers, is not the case.

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