Business Process Management System Implementations

Towards an extended unified critical success factor model for BPMS implementations

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ABSTRACT

The aim of this paper is to deliver a critical success factor model for BPMS implementations. In doing so, we used the unified critical success factor model for ERP implementation as a starting point. In this paper we show that it is possible to adapt the model for ERP implementations in order to map the critical success factors for BPMS implementations in a similar model. Organization can use this model to gain more insight in the critical success factors for BPMS implementations on the different business levels and with this, the chance of a successful BPMS implementation increases.

INTRODUCTION

Nowadays, organizations around the world need a flexible structure that supports them in responding quickly to the ever-changing market environments (Gerwin, 1993; Bayus and Putsis, 1999; Barnes-Schuster, Bassok, & Anupindi, 2002). This requires an IS-IT infrastructure that is capable of handling such changes, while maintaining to provide the management and employees with relevant information for their business. Depending on the frequency of processes changes and the complexity of process coordination (Krafzig, Banke, & Slama, 2005), an organization can use an application server, Enterprise Application Integration (EAI) or a business process management system (BPMS). Due to the cost of implementation, a BPMS should only be implemented when there is a frequent change of processes and the complexity of coordinating the processes is high.

BPMS implementation

A BPMS can be defined as (Ravesteyn and Versendaal, 2007): "A (suite of) software application(s) that enables the modeling, execution, technical and operational monitoring, and user representation of business Processes and Rules, based on integration of both existing and new information systems functionality that is orchestrated and integrated via services''. To implement a BPMS, or in general an information system, one can choose from several implementation methods. Some of these methods are based on scientific research while other methods originate from business practice. A common feature of these models is that they are designed to be used in various situations. This provides the opportunity to use these general implementation methods for the purpose of implementing a BPMS. One can for instance use an enterprise resource planning (ERP) implementation method to guide the BPMS implementation process. Of course, the implementation method cannot be reused one on one for a BPMS system, but has to be adapted for the specific situation at hand. A consultant that guides the implementation process is held responsible for this adaption.

Critical success factors

To assist in the success of the implementation, one can identify success factors for the implementation process. The most important success factors are the so-called critical success factors. Rockart and Bullen (1981) define these factors as: “the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department, or organization”. In the context of an implementation process, we can define critical success factors as: “the limited number of areas in which satisfactory results will ensure a successful implementation”.

Problem definition

For an ERP implementation, Esteves-Sousa and Pastor-Collado (2000) collected the most important critical success factors and determined the similarities between them. Based on these similarities they construct a unified critical success factor model that addresses implementation problems on different perspectives. Besides critical success factors for an ERP implementation, it is also possible to identify critical success factors for BPMS implementations. Ravesteyn and Versendaal (2007) come up with a list of 55 success factors in their paper. Some of these success factors are derived from ERP success factors, others originate from other implementation methods and are adapted to fit the BPM paradigm. Ravesteyn and Versendaal (2007) made an initial grouping based on business/IT-alignment principles (Henderson and Venkatraman, 1993). The grouping is different from the distinction in perspectives that is used by Esteves-Sousa and Pastor-Collado (2000) in their unified model. This raises the question whether it is possible to map the success factors of BPMS on the perspectives of the unified model or that we need to extent the current unified model to be able to cover all of the success factors for a BPMS implementation. In this paper we explore the possibilities to reuse the unified critical success factor model for BPMS success factors. Possibly, this can mean that we need to adapt the unified model in order to support all identified BPMS success factors. Our research question throughout this paper is therefore:

How can we modify the unified critical success factor model for ERP implementations to create a unified critical success factor model for BPMS implementations?

Scientific and practical contribution

Our research paper is an addition to the already existing literature that is available on the subject of business process management systems. Due to the fact that BPM paradigm only exists since the beginning of the 21st century, the amount of existing literature is limited. This paper provides a useful insight in how BPMS implementations can be supported by critical success factors on different levels within the organization. Furthermore, it displays the similarities and differences between ERP and BPMS implementations. On a practical side, organizations can use the unified critical success factor model to determine and select the right critical success factors for a successful implementation of a business process management system, on both the organizational and technological domain.

Research approach

To determine the possibility of modifying the unified CSF model to support BPMS implementations, we first need to conduct a literature study on critical success factors for ERP and BPMS implementations. Furthermore, we need to find out if there are problems regarding BPMS implementations that do not fit the perspectives from the unified model. After this research, we classify the CSF’s of BPMS into the different perspectives. Based on the identified perspective and the corresponding critical success factors, we can construct the unified critical success factor model for BPMS implementations. Finally, different experts in the field of BPMS implementations verify the model to ensure its correctness and relevance.

MODEL CONSTRUCTION

A business process management system implementation is similar to ERP system implementations due to the fact that the implementation project is hard to manage and can easily result in a fiasco (Reijers, 2006). In order to reduce the risk of project failure, companies and organizations often try to implement an ERP system using critical success factors (CSF's). These factors indicate possible bottlenecks in the implementation phase. Identifying the critical success factors for an implementation project is a subject studied by many different researchers. Examples of these studies are the researches of Hong & Kim (2002), Akkermans & van Helden (2002) and Nah, Lau and Kuang (2001).

In our research paper we use the unified critical success factor model for ERP implementation as shown in Table 1.

	Strategic	Tactical
Operational	• Sustained management support • Effective organizational change management • Good project scope management • Adequate project team composition • Comprehensive business process reengineering • Adequate project champion role • User involvement and participation • Trust between partners	• Dedicated staff and consultants • Strong communication inwards and outwards • Formalized project plan/schedule • Adequate training program • Preventive trouble shooting • Appropriate usage of consultants • Empowered decision-makers
Technological	• Adequate ERP implementation strategy • Avoid customization • Adequate ERP version	• Adequate software configuration • Legacy systems knowledge

Table 1: Unified critical success factor model (Esteves-Sousa & Pastor-Collado, 2000)

The model of Esteves-Sousa and Pastor-Collado (2000) consists of the most common critical success factors for implementing ERP systems. The model consists of two dimensions. The vertical dimension consists of an organizational part and a technological part. The organizational part deals with the internal structure and mindset within the organization while implementing an ERP system. The horizontal dimension makes a distinction between strategic and tactical critical success factors. The strategic success factors differ from the tactical success factors because the strategic factors influence the organization on higher level than the tactical ones. This means that strategic CSF's are less project-related than tactical CSF's.

Besides the unified CSF model for ERP implementation, we also need the critical success factors for BPM in our research. BPM is a field of research without the long history of experiences that ERP has, and has become more popular among researchers since the beginning of the 21st century. In one of the more recent papers on BPM, the critical success factors for BPMS implementations are identified

(Ravesteyn & Versendaal, 2007). The authors succeeded to determine 55 success factors by means of an empirical study (see Appendix I). These 55 success factors are the basis for our research approach.

Hypotheses definition and conceptual model

Although the CSF's from the unified model and the list with BPMS CSF's seem to be different at first sight, they also have a lot of similarities. One of the purposes of our research study is to find and explain the differences between the critical success factors of both (ERP and BPM) system implementations. In advance, we expect that each critical success factor of BPMS implementation can somehow be linked to a critical success factor of an ERP system implementation. Therefore, hypothesis 1 (H1) can be defined as:

H1: Every BPMS implementation CSF can be linked to ERP implementation CSF.

Esteves-Sousa and Pastor-Collado (2000) have visualized the critical success factors for ERP in a unified model. The 55 success factors identified by Ravesteyn and Versendaal (2007) for BPMS implementation have not yet been visualized in a model. Taking hypothesis 1 in account, we expect that the 55 success factors can also be visualized in the unified critical success factor model. Therefore, hypothesis 2 (H2) is defined as:

H2: The unified critical success factor model can also be used to categorize the critical success factors for BPMS implementations

Our hypotheses can be visualized in a conceptual model (see Figure 1). The upper half of the conceptual model shows the comparison between the critical success factors of BPMS and ERP implementations (H1). The ERP CSF's are then categorized in the unified critical success factor model for ERP implementations. According to hypothesis 2, it should be possible to categorize the critical success factors of BPMS implementations in a similar way into the extended unified model for BPMS implementations.

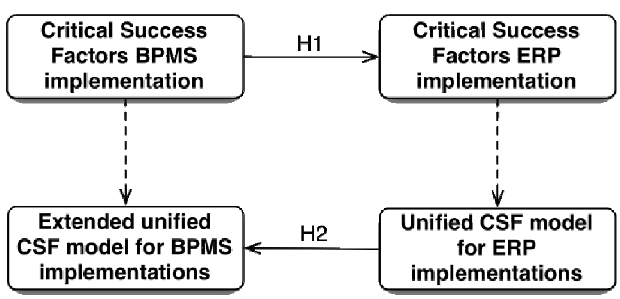

Figure 1: Conceptual model

MODEL OPERATIONALIZATION

In the following section we first describe the unified critical success factor model and explain the different dimensions and perspectives. After that, we discuss the changes that have to be made in the model. These modifications are necessary, so that the model can contain the success factors of BPMS implementations.

Characteristics of the unified model

The original model consists of four perspectives (Esteves-Sousa and Pastor-Collado, 2000).

On the vertical dimension it consists of

- An organizational perspective, and
- A technological perspective.

On the horizontal dimension it contains

- A strategic perspective, and
- A tactical perspective.

The organizational perspective deals with the organizational structure, culture and processes. The technological perspective deals with hard- and software. Both perspectives have critical success factors covering the accomplishment of strategic and tactical objectives. The strategic level deals with the bigger picture. In particular, this is where the long-term goals are specified that fit the company's future vision. The Tactical level comprises targets that are derived from goals at the strategic level. Decisions and plans at this level are transient, which means that they are fixed for some time, but change or get updated after that.

Extension of the unified model

While mapping the success factors into the quadrants of the unified model, several factors cannot be classified directly into the model. For example, some factors do not address long-term strategic or tactical objectives, but influence an organization on a daily basis. Other factors do not fit into a single field of the matrix. To still be able to map these success factors for BPMS implementations, we have extended the unified model with extra perspectives. For those success factors that deal with immediate (daily) objectives we created an operational perspective. Furthermore, some success factors cover both the organizational and technological perspective. These factors are placed in the general perspective. Finally, there are also success factors that could be situated in multiple horizontal dimensions (i.e. strategic, tactical and operational). The result is an extended unified critical success factor model for BPMS implementations (Table 2).

	Strategic	Tactical	Operational
Organizational	Change management and involving people Management commitment Strategic alignment (this includes taking into account the customers, industrial partners and the target environment) Culture Establishing a support organization because ongoing maintenance and management is very difficult Involving the right people An organization and culture of quality Strategic objectives and functional objectives should be identified and linked to process model Not underestimating the difficulty in integrating offshore supplier employees into the processes and work flows of their companies Pre-determined collaboration choreography of participating organizations (ad hoc changes are not possible) Vision that supports BPM Process orientation Business & IT divide Treat value as realizable by all stakeholders, irrespective of geography or organizational boundaries	Project management Governance & accountability Training Understanding the process Hiring of external consultants Organizing the modeling ‘design’ phase Both formal and informal monitoring and reporting activities should be taken into account Embedded business logic within communications networks Transformation of design models into implementation models Maintenance and control (including quality) Defining (web) services Create challenging roles and new job perspectives after the project When altering private processes, which modifications are allowed without jeopardizing the correct operation of the overall workflow? Pre-determined collaboration choreography of participating organizations (ad hoc changes are not possible)	Discovery of information Sometimes information-processing work is subsumed into the real work that produces the information

<table>
<tr><td rowspan="3">Organizational general</td><td colspan="2">Granularity and visibility control (information is not available or private information is made public)

Capture information once and at the source (tasks are performed wherever it provides the most value)</td><td></td></tr>
<tr><td></td><td colspan="2">Use of Business Rules</td></tr>
<tr><td colspan="3">Understanding the BPM concept

Understanding the BPMS paradigm</td></tr>
</table>

	Strategic	**Tactical**	**Operational**
Technological	Build a knowledge base around processes Implementation guide: follow an "outside-in" strategy. IT infrastructure that is aligned to the developed solution SOA (currently) works best when working with applications from large IT vendors Reducing the inflexibility of IT application systems Multi process adaptation alternatives should be present, and also a contextual adaptation process	(Use of) Web services The process manager might get direct access to the application server where connections are running Modeling interfaces related to software systems Interdependencies and integration of data sources Use multiple data gathering approaches	Delay the technology evaluation until process reverse engineering is finished Reliability of Internet (standards) Testing prototypes and the final solution The availability of data within the Supply Chain is critical Sufficient documentation of embedded processes in application systems

	Strategic	**Tactical**	**Operational**
General (organizational & technological)	For global inter-operability, transparency to the end user is needed which has consequences for the information availability Use of best practices Use the 'best' modeling standards & techniques	Performance measurement Continuous optimization	Integration of processes and data Use of best practices Use the 'best' modeling standards & techniques

Table 2: Extended unified model for BPMS implementations.

MODEL VALIDATION

Multiple experts in the field of business process management system implementations have validated our model. The following section describes the adjustments to our model based on the expert's feedback. The first person that is involved in the validation of the extended unified critical success factor model is Theo Priestley. He has been involved in BPM for more than 10 years. By developing adeep understanding of BPM strategy, Mr. Priestley is able to drive and maximize the benefits of BPMS implementations. Finally, he is also specialized in vendor independent analysis and advice.

Next to Theo Priestley, Mr. van der Biezen from PragmatiQ also evaluated the proposed unified critical success factor model. PragmatiQ is a Dutch consultancy firm. They have several years of experience in the field of business process management and business intelligence. By combining the two fields they have developed a unique expertise in business process intelligence.

Changes in the model

Based on the feedback provided by Priestley and van der Biezen, we changed some success factors in our model. The success factor "Take into account the customers, industrial partners and the target environment" is combined with "Strategic alignment" because the definition is broad enough to include all aspects of alignment. Furthermore, "Use of best practices" and "Use the 'best' modeling standards & techniques" are placed under strategic as well as operational because, using the best practices, standards and tools can been seen as both a strategic target and also as an operational goal. Next to this, we added "Vision that supports BPM" as a success factor. Based on this vision, an organization can derive strategic objectives and functional objectives and link them to the various processes. On the tactical level, the use of external consultants is often required in order to design, develop and implement the new system as well as giving training to future users. The last modification in our model is the change from having an "inside-out" strategy, into an "outside-in" strategy as a success factor. This is changed to accommodate the current vision in the field of BPMS. The inside out approach has an organizational-centric view. This means that an organization first prioritize their internal systems and applications, and define their business processes. In this way, the organization is better suited for integration with external systems. Nowadays, BPM experts are however convinced that the outside-in approach is a better starting point, because there is little value in having the cheapest or the most efficient internal processes, when none of your customers is actually buying your product. The outside-in approach has a customer/supply chain view and is aimed at delivering value to their customers. An organization using this approach first focuses on their interaction with their suppliers, customers and partners. This helps them to define the boundaries of their business, from which they finally can determine the business processes.

Suggestions and recommendations

The feedback from Priestley and van der Biezen also contained several suggestions for further research. The first suggestion is that instead of using the strategic, tactical and operational qualifications, it is also possible to look at the business process management lifecycle (zur Muehlen & Rosemann, 2004; van der Aalst, ter Hofstede, & Weske, 2003). This lifecycle (Figure 2) has five categories:

- Design

In this phase you identify the current processes and design new ones to close the gap between the current situation and the desired one.

- Modeling

The modeling consists of simulating the newly designed processes to determine how they operate under different circumstances.

- Executing

The development and implementation of applications that fulfill some or all steps of a new processes.

- Monitoring

Construction of key performance indicators and the continuous monitoring thereof.

- Optimization

This category involves the optimization of the current processes and identifies potential improvements

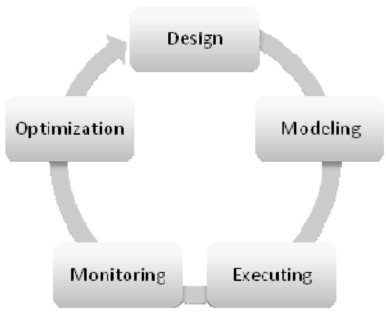

Figure 2: BPM lifecycle

For each category we can determine corresponding success factors to create a critical success factor model based on the BPM lifecycle. Furthermore, due to the fact that the unified critical success factor model is based on ERP implementations, the model strongly emphasizes an IT viewpoint towards BPMS. It is also possible to focus on the business aspects of BPMS. This means that usability is paramount and that the use of IT is reduced to an absolute minimum. Looking at BPMS from this business viewpoint involves different critical success factors and with that it changes the interpretation of the unified model.

Another recommendation is to take a closer look at case management within a BPMS context. Within BPM, a process is a structured path from start to finish. It has several steps that can be modeled in a diagram. In case management the process flows cannot be visualized in a diagram in advance. It is an unstructured and dynamic process that is influenced by several factors. These factors determine at runtime which activities need to be performed and whether additional steps are needed for the process. An example of case management is the opening of a new bank account. This process involves several steps from different processes (e.g. account creation, credit control) and depending on specific situations additional steps have to be added. The flexibility of case management influences the way we look at the critical success factors for BPMS implementations. Each specific situation can have different success factors and the meaning of success factors in each situation may differ. Finally, it is recommended to investigate the validity of the critical success factor: “SOA works best when working with applications from large IT vendors”. Currently there are several smaller parties in the market who are able to deliver a very good product that fits the needs of the business. An advantage of these smaller parties is that they have practically the same knowledge but that the customer is king. Investigating whether BPMS implementations are more successful when using smaller parties is therefore an interesting topic for further research.

CONCLUSION

Our research paper provides a structured categorization of the critical success factors for BPMS implementations. Critical success factors are important for the successful implementation of an ERP or BPM system. One of our findings is that most of the success factors of BPMS implementations can be linked to the critical success factors of ERP implementations (H1). However, there are some success factors for BPMS that have no relation to ERP implementations. For instance, continuous optimization is not part of ERP implementations. Furthermore, we have successfully extended the unified critical success factor model (Esteves-Sousa & Pastor-Collado, 2000) to incorporate 55 success factors for BPMS implementations that were identified by Ravesteyn and Versendaal (2007). Herewith, we proved that it is possible to reuse the unified CSF model for BPMS implementations (H2). By adding an operational level to the model, it is possible to guide organizations for all business levels (i.e. strategic, tactical and organizational) on both the organizational and the technological dimension. Organizations are, in this way, better prepared when starting a BPMS implementation project, resulting in a more successful implementation.

Further research should focus on 'lean BPM/ BPMS' strategies by developing a model based on the BPM lifecycle instead of using a more formal ERP implementation approach. This should lead to a BPM system implementation that is successful and more capable of supporting the organization. It is also possible to look at the business side of BPMS and develop a unified critical success factors model that is based on this business viewpoint. Furthermore, is possible to investigate whether BPMS implementations are more successful when using systems that are developed and delivered by small software parties instead of utilizing software from large software suppliers. Finally, more research can be done on the impact of case management within a BPMS context. Case management changes the way in which an organization should look at the critical success factors. Within case management, each situation can have different success factors and the interpretation of a success factor may be different for various situations.

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APPENDIX I

Management of organization and processes

1. Project management
2. Change management and involving people
3. Understanding the BPM concept
4. Management support and involvement
5. Strategic alignment
6. Governance & accountability
7. Training
8. Culture
9. Take into account the customers, industrial partners and the target environment
10. Create challenging roles and new job perspectives after the project
11.Establishing a support organization because ongoing maintenance and management is very difficult
12. Treat value as realizable by all stakeholders, irrespective of geography or organizational boundaries
13. Build a knowledge base around processes
14. Implementation guide: follow an "inside-out" strategy, this means first prioritize the integration of internal systems and applications, defining and institutionalizing your business processes then the company is better suited for integration with external systems
15. Use of best practices

Architecture design

16. Understanding the process
17. Use the 'best' modeling standards & techniques
18. Organizing the modeling 'design' phase
19. Maintenance and control – including quality - of the models is important
20. When altering private processes, which modifications are allowed without jeopardizing the correct operation of the overall workflow
21. Strategic objectives and functional objectives should be identified and linked to process model
22. Lack of documentation of embedded processes in application systems
23. Multi process adaptation alternatives should be present, and also a contextual adaptation process
24. Underestimating the difficulty in integrating offshore supplier employees into the processes and work flows of their companies
25. Modeling interfaces related to software systems
26. Pre-determined collaboration choreography of participating organizations (ad hoc changes are not possible)
27. Interdependencies and integration of data sources
28. Discovery of information
29. Process orientation
30. Defining (web) services
31. Understanding the BPMS paradigm
32. Business & IT divide
33. Use of business rules
34. Sometimes information-processing work is subsumed into the real work that produces the information
35. For global inter-operability, transparency to the end user is needed which has consequences for the information availability

Developing an IT solution based on SOA

36.IT infrastructure is not aligned to the developed solution
37. Embedded business logic within communications networks
38. Integration of processes and data
39. (Use of) Web services
40. Transformation of design models into implementation models
41. Delay the technology evaluation until process reverse engineering is finished
42. SOA (currently) works best when working with applications from large IT vendors
43. Reliability of Internet (standards)
44. The process manager might get direct access to the application server where connections are running
45. Testing prototypes and the final solution
46. The inflexibility of IT application systems

Management of implementation and change

1. Project management (repeated)
2. Change management (repeated)
47. Involving the right people

Measurement and control

48.Performance measurement
49. Continuous optimization
50. An organization and culture of quality
51. Use multiple data gathering approaches
52. The availability of data within the supply chain is critical
53. Both formal and informal monitoring and reporting activities should be taken into account
54. Capture information once and at the source (tasks are performed wherever it provides the most value)
55. Granularity and visibility control (information is not available or private information is made public)