

Evaluating phase level for critical success factors of BPM-system implementation: a case study in a Saudi government organization

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ABSTRACT: Nowadays, many organizations rely on a business process management system (BPMS) since it provides a systematic approach to aligning organization's processes with the customers' needs. There has been much research to study the critical success factors (CSFs) of implementing a BPMS in an organization. To our knowledge, this is the first published study that attempts to study the CSFs for BPMS implementation for each project phase independently. This research will present and study a case of BPMS implementation, located in a Saudi government organization. There was a survey conducted to analyze the CSFs of BPMS for each implementation project phase. Also, this research aims to present the importance of studying CSFs for BPMS implementation not in the whole project but rather for each project phase and to suggest success factors for each phase.

Keywords: BPM implementation, BPMS, case study, success factors

I. INTRODUCTION

In the last decade, many organizations around the world have attempted to implement a system that can tackle business process management (BPM) concerns. Gartner's study in 2009 identified BPM as the number one priority of (chief information officer) s(CIOs) globally [1]. From this study and other studies, BPM is considered one of the biggest information technology (IT) trends today. BPM has been known as a systematic approach to managing the basic activities in an organization. A business process is a set of activities that must be accomplished in order to achieve a collection of predefined objectives, such as the production of a product or delivery of a service. The activities within BPM may be performed manually by people or automatically by an IT system [2].

There have been many researches to identify the CSFs for BPMS. As far as we know, this is the first published research to study the CSFs of a BPMS implementation project at the phase level. One of our aims of this study is to present the CSFs for each project phase independently ordered by importance and impact. We aim also to provide the relationship between the project progress and status with the success factor. We will be using the Markus model [3] to identify the BPMS implementation project phases. The Markus model spouses that each enterprise system (ES) (e.g., ERP, CRM, and BPMS) implementation project consists of four phases: project chartering phase, project (configuration and rollout) phase, shakedown phase, and the onward and upward phase. The Markus model and its phases will be discussed further in literature review section.

In this research, we will study the CSFs of implementing BPMS by studying and analyzing a BPMS implementation case. Our case study was a BPM system implementation project which was located in a Saudi government organization. There has been a survey conducted of different stakeholders in the studied project. The survey's result will be used to study the CSFs of the BPMS project for each project phase.

Do the CSFs for implementing BPMS have the same importance to the BPMS implementation project during all the project's phases? Are the CSFs playing the same role regardless of project progress or status? Did the project phases all have the same success factors in order to end the phase with success? What are the critical success factors that the BPM systems implementers and researchers need to focus on more during each project's phase? We will answer these questions by doing a phase level evaluation for critical success factors of BPM-system implementation.

This research will consist of four sections. The first section is a literature review on the history of BPM and process modeling and the development of BPM systems. The second section will provide the case study description and analysis. The third section will discuss the conducted survey results and the experimental results. The last section in this research will be the conclusion of the work and the future works.

II. LITERATURE REVIEW

Michael Hammer defined process management as a systematic approach to performance improvement that focuses on organization's business processes. All the business processes should be organized and work together in order to satisfy the customer needs [4]. Each business process must have structure, input, output, and owner. Business processes are built from an organization's functions and operation flow (internally or externally) [5].

What is business process management (BPM)? There is no one agreed definition of BPM. Zairi answered this question: BPM is a systematic approach to managing and improving basic activities of an organization, such as manufacturing, marketing, etc. He also suggests that BPM should be governed by list of rules. For example, BPM should focus on customer needs, it should be a continued approach, and it's about changing culture not only building a good structure [6]. According to Werth et al., [7] BPM is a requirement engineering approach which used IT services to take care of business needs. Therefore, according to Werth et al., IT plays the most important role in BPM by facilitating process automation.

Currently off-the-shelf software, such as ERP systems and CRM systems, already provides automated processes following the best practices in the industry.

Business process management system is considered as a new era in enterprise applications (EA) and has attracted a lot of academic researches. Most of the researchers consider the BPM systems to be the next step after ERP and workflow systems. As per Fanbo et al., [8] BPMS can be defined as an information system supporting business processes by using techniques and tools to control and improve the process. A BPMS can be defined also as enterprise software that provides the ability to model, improve, and manage sets of processes based on a complete and an automated mechanism. An enterprise's defined processes can be modified and improved using BPMS at any time. BPMS can be seen as the evolution of the ERP systems and the WFM systems. Processes in an organization managed by BPMS can be divided into three main categories: core processes, support processes, and management processes [9].

Business processes are the main core of today's and tomorrow's enterprises. Enterprises must be ready to focus on their business processes in order to improve the quality of their services. Due to the importance of modeling the processes, many business process modeling techniques and tools have been introduced in the research society and the market. Figure [1] presents the benefits of using BPM system for an enterprise.



Figure [1] Benefits of using Business Process Management System

Identifying the critical success factors (CSFs) is a well-studied subject in information systems research. After each IS's system or solution matures in research and practice, there is a need to identify CSFs to implement that system or solution. In BPM studies there are many researchers who tried to identify the CSFs of implementing a BPMS in an organization. It is important to discuss what success in BPMS implementation means before we could discuss the CSFs to implement a BPM system. Based on Bandara et al.[10], a BPMS implementation project is considered a success project if it is effective and efficient. The implementation project can be considered effective if it accomplishes its objectives. The implementation project can be considered efficient if it is completed within an assigned time and budget.

The literature always offers similar CSFs for BPM. The critical success factors for BPM are similar to the critical success factors for any other enterprise system such as ERP and CRM. According to Yanhong [11], the IBM China Research Institute of Commercial value conducted a survey of around 200 companies to analyze the key factors of implementing an enterprise system business in China. The survey showed that the key success factors are top-management support, organizational strategy, organizational culture regarding the new system, technology (the new system), and project management. However, top management support was considered to be the most important CSF for BPM [12]. There are many CSFs for BPM listed in the literature. Table1 contains the CSFs for BPM that we will consider in our study.

Critical Success Factor	Literature Citation
Top Management Support	[13];[14];[12];[15];[16];[17]
Project Management Skills/ Methodology	[16];[13];[18];[19];[17]
Communication	[17];[13];[18];[19];[12]
User Participation/Involvement	[13];[17];[19];[12]
Organizational Culture	[12];[15];[11]
Training	[17];[16];[15]
Effective Change Management	[13];[17];[12]

Table[1]: CSFs for BPMS Implementation

Most of the researches on CSFs for BPMS or any Enterprise System studied the factors in the whole project life cycles. To our knowledge, this is the first published study that attempts to study the CSFs for BPMS implementation in each project's phase. Markus in [3] has introduced a project life cycle model for an enterprise system implementation. We will use this project model to study our case study and the CSFs in each phase.

The Markus model is a very well-known model with many citations in the relevant literature. The proposed model was built to provide a framework for an enterprise system implementation project. Based on the Markus model, any

enterprise system implementation project consists of the following phases: project chartering phase, project (configuration and rollout) phase, the shakedown phase, and the onward and upward phase.

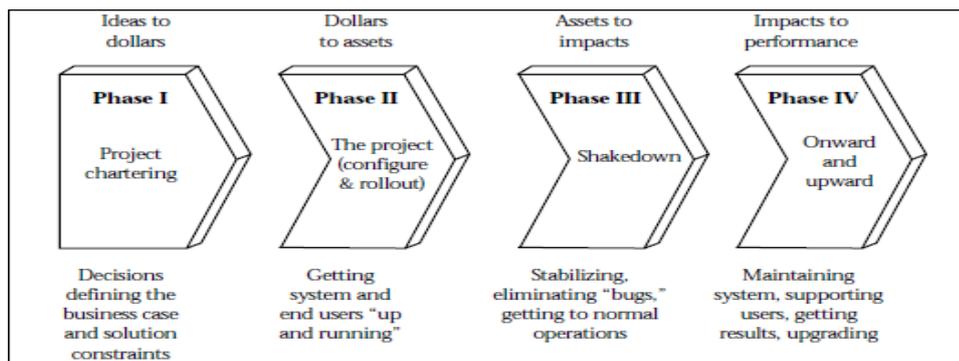


Figure [2] Markus model: Enterprise System Life Cycle [3]

III. CASE STUDY

Research Methodology

The research methodology is based on implementing the Marcus model for a BPMS implementation project. Semi-structured interviews and surveys have been used for data collection. Several individual interviews and meetings have been conducted with end users and top management to understand and present the case. There has been a survey built in order to study the CSFs for each project phase. The results from the survey will be used to find the relationships among those CSFs and to present the importance of identifying the CSFs for each project phase, using the Marcus and Tanis model.

Case Description

Our case study, which we will discuss in this research, was located in a Saudi government agency. This agency or authority was established by a royal order in 2004 to be fully operational officially in 2010. The agency plays an important role in the Saudi healthcare industry with more than 2,000 staff members. The business process management implementation project, which we will study in our research, was started in 2010. The agency decided to implement BPMS using an external implementer (vendor). Also, they have decided to use ORACLE SOA as a BPMS tool. However, they have different possibilities for BPMS tools. We will discuss the process of selecting the BPMS tool and the vendor in detail. Project duration was 16 months, and the project ended within the time and budget as per the input from the executives with whom I met. Project team members included approximately 11 people.

There were many causes and business needs that led the organization to implement a BPMS. One of the goals was to unify the process across the organization. For example, they found that the same process might be completed within a different time frame and a varied workload. Also, there was a pressure from top management to define realistic measurements for the organization's processes. There was a need to improve the productivity and reduce the time for each process, and implementing a new business process management system was intended to help in that. Also, the organization aims to be able to make better predictions of time, budget, and teams in case a new process will be implemented in the organization's future.

There was a strategic decision to implement BPMS using a commercial off-the-shelf (COTS) software package and using offshore implementer support. This decision was made for many reasons: lack of resources and the cost of in-house development, as well as the core business of the organization is not IT and in-house implementation of a BPM system would require a huge IT budget and team.

The phase of selection of the BPMS tool and vendor is an important phase for any BPMS implementation project. However, in our case, the organization didn't spend enough time and effort on this phase. For the BPMS tool, they decided to use Oracle Solution for BPM because they had a long contract with Oracle. Also, their IT platforms (databases, ERP system, and CRM system) were with Oracle. One of the IT executives I met said, "We didn't have many possibilities, so we decided to go with Oracle due to the successful history in implementing our ERP and CRM systems." It is clear to me that they didn't take the selection of the BPMS tool seriously. Also, the name-recognition of the brand may have distracted them from considering what they really needed from implementing a BPM system.

Study Marcus Model Phases on the Case:

- **Project chartering phase:**

In our case, this phase starts with the agreement on the business case document. A business case document is a document where all the business needs and requirements are written at a very high level. In this project, the business case document clearly mentioned that the agency needs to have a system that will help to improve and automate the current business processes. After that, the project team starts to prepare for brainstorming workshops, and it will invite all of the project's stakeholders to participate. These workshops aim to involve all the stakeholders in the process of preparing the Request-For-Proposal (RFP) document and the agreement on the new system's specification (hardware and software specifications). As per the project manager, the participation in the workshops was perfect and above what they expected as a project team.

After that, there were several meetings between the executives and the project team. By the end of those meetings, the project budget and the project timeline were adopted. Since the agency does not have any previous, similar projects on BPMS, they were forced to compare the project with other BPMS projects' budgets and time plans. The selection of the BPMS tool was a top management decision, where the project team participated as well. By the end of this, they agreed to go with Oracle's solution for the BPMS. Oracle's tool was selected due to many reasons: the successful history of support the agency received in previous IT projects with Oracle, the familiarity (platforms and staff knowledge) with Oracle that the agency has, and the budget and time comparisons with other BPMS tools. After the agreement on budget and time, RFPs were sent to five interested vendors.

By the end of chartering phase, the project team defines the performance indicators and the success measurements of the project. The performance indicators were to increase the productivity of the processes after using the system, and to increase the agency's ability to predict the time and cost, as well as the resources required for each new process. In addition, one of the performance indicators was to reduce the human inputs and resource the costs by fully automating the process. One more indicator was reducing the steps and time required to finish the process by using the benefits of automation.

The success measurements of the project were, first, the ability to finish the project within the reserved budget and time. The second success measurement was to achieve the suggested to-be improvements to the business processes after using the implemented BPM system. Third, success required increased availability and the friendly-of-use to the agency's processes, for its customers and staff. Fourth, increase the agency staff's ability to automate any business process within the agency, after the end of this project and the vendor's consultants are gone. Finally, improve the agency's culture and attitude to be more process-oriented than function-oriented.

- **Project configuration and rollout phase:**

By the end of the project configuration and rollout phase, the implemented system should be up and running. In our case, there were many activities during this phase. Since the decision has been made to go with a commercial off-the-shelf (COTS) BPM tool, there have been no development activities other than some system configuration tasks. The system configuration consists of several activities: system installation on the server Oracle BPM tool is working on either UNIX servers or WINDOWS servers; fortunately, both are available without requiring a new platform. Database platform creation required Oracle as a database and, fortunately, the agency's database platform was Oracle, which reduces the amount of work in this activity. The tool customization to fit the agency's business processes and rules, and other technical details required for any software configuration were important system configuration activities as well. At this phase, business process modeling and business process reengineering activities (where required) have been started. The project team started modeling the matured and the agreed processes. Some of the business processes required reengineering, which is done with the help of the vendor's consultants.

- **Shakedown phase:**

The shakedown phase starts when the system goes live and runs until the system has achieved normal operations. In our case, it started from the pilot go-live on the selected department's processes until the new system covered all organization's processes. Upon reaching this time, the vendor leaves the agency as per the implementation contract. At this stage, the project team has agreed on an action plan to cover all the remaining processes in the new implemented BPMS. There was agreement from the top executives to not pressure the agency departments to use the new BPM system. By that time, they figured out how the new system helped the pilot department. Thus, after that each department start looking forward to automate and model its business processes using the new system. The agreed-on action plan mentions that they have to send a request to the IT department to start using the new BPMS.

By the time our BPMS take the confidence from all the agency's different departments that the system will help them. For example, for one of the processes, which was in the project pilot phase, after the use of the new BPMS the number of weekly procedures jumped from 120 procedures to 700 procedures. After the heavy use of the system, there were some performance and delay complaints from users. After looking into those complaints, the root causes for the delay were identified by the project team. As per the project manager's input, the performance issues were coming from the integration tasks, which were implemented during the project phase. The project team reviewed the integration and those issues were resolved. One of the business users I had met mentioned that the performance of the system clearly improved after this enhancement.

With the increased system usage across the agency's business processes, more licenses from the tool vendor were required to overcome the usage expansion. This cost for more licenses was within the project budget, since the increased system usage was considered during the project chartering phase. By the end of the shakedown phase, the system had reached normal operations and the number of raised issues and requests was reduced.

- **Onward and upward phase:**

The onward and upward phase is the time when the organization decides that its investment has successfully met its goals or business needs. This is also the time to evaluate the system under normal operations, which was reached at the shakedown phase. In our case, a high-level committee has been established to review the project. This committee produced many recommendations. We will list the three main recommendations, which are the following: the project of implementing the BPM system at the agency successfully ended within budget and schedule, achievements were reached in process automation that satisfied the agency's needs, and the agency's business needs from the project were successfully addressed.

This system went smoothly and the majority of the agency's business processes are implemented using the new BPM system. Until the time of writing this research, there was no decision to upgrade the system or implement any new support system, since the current BPMS successfully meets the agency's requirements. However, there was an agreement to improve business processes continuously using the improved capabilities in the newly implemented BPMS. Moreover, there was a decision to provide additional user skills building, if required. The required skills include process improvement, process modeling, and process reengineering. Based on the Marcus model, the onward and upward phase might be a continuous phase, even if the project has ended.

IV. DISCUSSION AND EXPLORATION RESULTS

A questionnaire survey has been conducted to evaluate the critical success factors of implementing BPMS. The survey was built to do a phase-level evaluation for the CSFs in implementing the BPM system. The success factors for BPMS will be evaluated for each of the following project phases: the project chartering phase, project (configuration and rollout) phase, shakedown phase, and onward and upward Phase. The survey was administered to all of the project's stakeholders, accounting for their different perspectives and backgrounds. Thus, the survey studies the CSF for each phase and the survey results will determine the relations between the project phases, the success factors, and the importance of studying the CSF at a phase level.

The survey results show differences in the importance of success factors across the various phases. Based on the survey results, we will present the importance (range from 0 to 1) for each of the critical success factors in each project phase. In the following, we will propose the importance of each success factor in each project phase. This will help to prioritize the success factors for each phase, based on the importance and the impact of each success factor in that phase:

Project Chartering Phase:

Survey results have shown that the critical success factors during the chartering phase are ordered by the importance of the following:

Chartering Phase	Important Factor
1. User Involvement	0.938
2. Top Management support	0.933
3. Project Management	0.905
4. Communication	0.888
5. Culture	0.766
6. Change Management	0.622
7. Training	0.538

Table [2] CSFs for project chartering phase

The survey results show how that user involvement and top management support are the most important critical success factors among the different CSFs during the chartering phase. Project management factor and communication factor come in third and fourth, with importance factors of 0.90 and 0.88, respectively. After that, factors like culture, change management, and training exhibit lower importance factors. From this result, we conclude that user involvement is essential to achieving success during the chartering phase. It is also clear from these results that having top management support and project management skills are required to ensure this phase's success, after the end users are involved. Results also showed that the communication factor plays almost the same role during all the BPMS project phases.

Project Configuration and Rollout Phase:

Survey result has shown that the critical success factors during project configuration and rollout phase are ordered by the importance as the following:

Project Configuration phase	Important Factor
1. Project Management	0.9
2. Communication	0.872
3. Culture	0.872
4. User Involvement	0.861
5. Top Management Support	0.727
6. Change Management	0.705
7. Training	0.583

Table [3] CSFs for project configuration and rollout phase

The project configuration phase is the phase where the technical issues are tackled. Activities, such as the system setup, integration with other systems, and package customization, are the main activities during this phase. As shown from the survey, those activities do not required high levels of top management support or training. However, it is clear from this result that the most important success factors for configuration phase are, in order, project management, communication, and culture. The results show that user involvement still affects this phase, but much less than the effects user involvement had on the chartering phase. In addition, the importance of top management support clearly decreased from the chartering phase to the configuration phase. Change management and training factors are less important than other CSFs during the configuration phase.

Shakedown Phase:

The survey results show that the critical success factors during the shakedown phase are ordered by the importance of the following:

Shakedown Phase	Important Factor
1. Change Management	0.938
2. Culture	0.905
3. Training	0.888
4. Communication	0.838
5. Project Management	0.788
6. User Involvement	0.716
7. Top Management support	0.666

Table [4] CSFs for shakedown phase

The shakedown phase begins after the BPM system goes live. Thus, the survey results highlight the greater importance of soft factors, such as change management, culture, and training, in comparison to the other factors, such as project management and top management support. These results show that change management, culture, and training are the most important success factors during the shakedown phase. After the start of the new BPMS, which is during the shakedown phase, the project team should be ready for many change management tasks and organizational culture changes, as well as redefined activities. There is a decrease in the importance of success factors like user involvement and top management support. This is reasonable because the implemented system in the shakedown phase is in use, thus there will be no big demand to have the user involved or to have top management support. It is clear from this result that the project management success factor during the shakedown phase has less impact than it does during the chartering or configuration phases.

Onward and Upward Phase:

The critical success factors during the onward and upward phase are ordered by the importance and impact of the following:

Onward & upward Phase	Important Factor
Change Management	0.95
Training	0.938
Culture	0.916
Communication	0.894
Top Management support	0.8
Project Management	0.688
User Involvement	0.666

Table [5] CSFs for onward and upward phase

The results show that, during the onward and upward phase, the most important critical success factor is change management. In addition to change management, training has greater importance and impact during the onward and upward phase. This result could help academics and practitioners to focus more on change management, training, and culture during this phase. With regard to the communication factor, it continues to have almost the same impact during all phases of the BPMS implementation project.

The result shows that there is a clear increase in the importance of top management support in this phase, with value of 0.8. The importance of top management support during the onward and upward phase comes from the need to improve the system or to update the current system package, requires top management support and commitment. Factors like project management and user involvement continue to have almost the same impact during the shakedown phase. Since the onward and upward phase is almost like a monitoring and improving phase, it is reasonable to expect less importance and impact on factors like project management and user involvement.

V. CONCLUSION AND FUTURE WORKS:

During the last decade, business process management (BPM) was considered a global IT trend. BPMS is defined as an information system supporting business processes in an organization, through methodologies, techniques, and tools, which are used to model, automate, control, and improve the business processes. While there has been much research on process management techniques and tools, there has been little research on the critical success factors (CSFs) of implementing business process management systems. To our knowledge, this is the first published study that attempts to evaluate the phase level of CSFs for a BPMS implementation project, with each project phase considered independently. The project phases are followed the Marcus Model, which assumes that each BPMS implementation project consists of four phases: the project chartering phase, project configuration phase, shakedown phase, and onward and upward phase.

This research presented and studied a case study, which is the BPMS implementation project located in a Saudi governmental organization. The selected project studied in this research using the Marcus model. A survey was conducted to study CSFs for BPMS implementation project for each project phase. The survey's participants included the project stakeholders, IT specialists, BPM specialists, executives, consultants, and vendors. The survey results are used to analyze and study each critical success factor in the four project phases. In addition, the survey results are used to presents the critical success factors, ordered by the importance and the impact for each project phase.

Survey results showed that the different levels of importance and impact for each success factor depend on the BPMS implementation project status and progress. The top management support factor played a more important role during the chartering phase and the onward and upward phase than in other phases. Project management skills and methodology factors, and the user involvement factor, have the greatest importance and impact during the early stages of the BPMS project. The communication factor has almost the same impact and importance during the entire BPMS implementation project life cycle. The more the BPMS project progresses, the greater the importance and impact will be for the following factors: change management, training, and organizational culture.

This research suggests and presents the critical success factors for each project phase ordered by their importance. For the project chartering phase, the critical success factors are ordered as follows: user involvement / participation, top management support, project management, communication, culture, change management and, lastly, training. The critical success factors during the project configuration phase are ordered as follows: Project Management, Communication, Culture, User Involvement, Top Management support, Change Management and lastly Training. For the shakedown phase, the critical success factors are ordered as follows: Change Management, Culture, Training, Communication, Project Management, User Involvement and lastly Top Management support. Finally, the critical success factors during the onward and upward phase are ordered: Change Management, Training, Culture, Communication, Top Management support, Project Management and lastly User Involvement.

Further studies may focus on building a framework for using the Marcus model to present the BPMS implementation project's life cycle. The reasons for differences in critical success factors' importance between projects phases might be studied in future research as well. Future research may study the relations between the success factors for a BPMS implementation project.

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