ERP IMPLEMENTATION CRITCAL SUCCESS FACTORS - THE ROLE AND IMPACT OF BUSINESS PROCESS MANAGEMENT

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ABSTRACT

Variously called enterprises resource planning (ERP) systems, enterprise-wide systems, or enterprise business system, these comprehensive, package software solutions seek to integrate the complete range of a business's processes and functions in order to present a holistic view of the business from a single information and IT architecture [1]. The critical success factors for ERP implementation include top management support, a clear business vision, and issues specific to ERP such as ERP strategy and software configuration. However, some of the more important factors are the issues related to re-engineering business processes and the integration of various core processes to the ERP system.

Few business managers will dispute the value that ERP applications can bring to their companies. However, most organisations are not putting in place the procedures to manage the changes and customisations they need to make to ERP systems for establishing a competitive advantage [2]. Most companies are too busy building and running the technical aspects of their ERP systems to recognise the need, and long-term value, of change and business process management. This value extends well beyond application development, and, in fact, provides the backbone for successful installations and operation of an ERP system.

This paper investigates the role and impact of business process management in successful ERP implementation.

The paper starts by defining business process management, ERP, and the ERP critical success factors. The impact of business process management on successful ERP implementation is then assessed through looking at the experiences of several organisations. The paper concludes by highlighting best practices for capitalising on business process management for successful ERP implementation.

Keywords: Enterprise Resource Planning (ERP), Business Process Management (BPM), Critical Success Factors (CSF)

1. INTRODUCTION

In the past ten years, organisations have moved from stand-alone business information systems applications to integrated and flexible enterprise wide information systems. The rise of Enterprise Resource Planning (ERP) systems has been the major event in the software industry in the 1990s [3][4]. However, ERP systems are huge and complex systems and warrant careful planning and execution to ensure their successful implementation. They are not pure software systems; they affect how a business conducts itself [5]. The value that ERP applications can bring to companies is clear, and few will dispute its potential [5][6]. However, numerous organisations failed to put in place the procedures needed to manage the changes and customisations to be made to ERP systems for establishing a competitive advantage [2].

Consequently, it has been estimated [7] that at least 90% of ERP implementations end up late or over-budget, and almost half fail to achieve the desired results.

The success of an ERP system has often been attributed to two facts: the ERP system is configured and running, and the whole project is (more or less) on time and within budget [8]. However, this is a narrow view of ERP as it focuses on the hard aspects and reduces it to a software, or IT project. Organisations are becoming engrossed in building and running the technical aspects of their ERP systems to recognise the need, and long-term value, of change and business process management [9]. ERP is the umbrella for integrating sets of business applications that allow a company to manage almost all aspects of operations. This in turn implies that successful ERP implementation should be measured on a larger scale in terms of its effects on the organisational triple bottom line (product, people, and plant). The value of this holistic view extends well beyond application development, and, in fact, provides the backbone for successful installations and operation of an ERP system. Many ERP implementation failures have been due to the lack of focus on 'the soft issues' of business process and change management [10] [11]. The role and impact of business process management (BPM) in successful ERP implementation is crucial, and is thus the subject of this review.

2. WHAT IS ERP

Before attempting to discuss ERP's critical factors of success, it is prudent to establish a clear definition. ERP has been defined by many, and although definitions varied in their orientation from a technical (IT) view to holistic business focus, they did not contain any major differences. The definition adopted here views Enterprises Resource Planning (ERP) systems as comprehensive package software solutions that seek to integrate the complete range of business's processes and functions in order to present a holistic view of the business from a single information and IT architecture [1]. Thus, ERP is seen as "an integrated, multi-dimensional system for all functions, based on a business model for planning, control, and global (resource) optimisation of the entire supply chain, by using state if the art IS/IT technology that supplies value added services to all internal and external parties" [12].

3. ERP CRITICAL SUCCESS FACTORS

Due to the complex and integrated nature of ERP, the large investments involved (time and money), and the relatively high implementation failure rates [13] [14][7], it is imperative for organisations to study the

experiences of others, and learn from their practices and success factors.

A literature review was conducted to understand the critical success factors in successful ERP implementation. The review covered numerous published books and articles [5][6][9][11][13][14][15] and secondary case studies.

The review concluded that all the main ERP CSFs fall under one of four main categories, namely: commitment from top management [6], reengineering of the existing processes [5], the IT infrastructure [11], and deploying change management. These CSF categories, and their interaction, are presented in Figure 1.
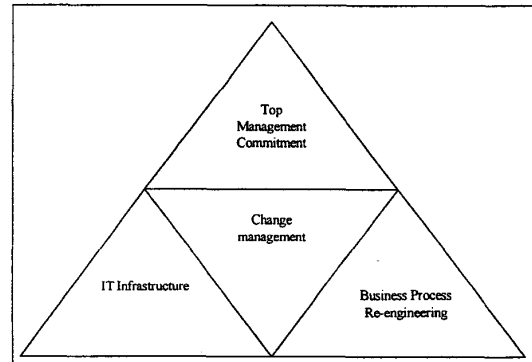

Figure 1 CSF Categories for successful ERP

The following is a brief overview of each of these categories:

1. Top management commitment: Management must be a part of ERP implementations and it has been clearly demonstrated that for IT projects to succeed top management support is critical [5]. However, top management in many organisations still view the installation of an ERP system as primarily a technological challenge and assign its responsibility to the IT departments. This is seen as a dangerous act [6] due to ERP's profound business implications. "Only top management is equipped to act as the mediator between the imperatives of the technology and the imperatives of the business" [6].

2 Business Process Re-engineering: Implementing an ERP system involves reengineering the existing business processes to the 'best business process standard' [15]. ERP systems are built on best practices that are followed in the industry, and to successfully install ERP, all the processes in a company has to conform to the ERP model.

During the ERP planning phase, companies face a question as to whether to implement the ERP

software "as is" and adopt the ERP system's built-in procedure or customise the product to the specific needs of the company [14]. Research [16] has shown that even a best application package can meet only 70% of the organisational needs. An organisation has to change its processes to conform to the ERP package, customise the software to suit its needs, or not be concerned about meeting the balance 30 %. In fact, this need to re-engineer the organisation's business processes has been cited as one of ERP's major benefits [5].

3. IT Infrastructure: Adequate hardware and networking infrastructure are required for ERP application. An ERP system relies in its operation on sophisticated information technology infrastructure. In addition to this infrastructure, clearly, the software configuration has a critical influence on the implementation process and outcome [14].

3. Change management: One of the main obstacles facing ERP implementation is resistance to change. "About half of ERP projects fail to achieve hoped-for benefits because managers underestimate the efforts involved in managing change" [17]. To successfully implement ERP, the way organisations do business will need to change and the ways people do their jobs will need to change too [18]. Thus, change management is essential for preparing a company for the introduction of an ERP system, and its successful implementation. However, change management has to be structured within an overall Business Process Management methodology to achieve its goals.

Clearly, three out of four of the main ERP CSF categories fall under the umbrella of Business Process Management (BPM). If anything, this strongly highlights the fact that ERP is not merely software implementation or an IT project. Thus, to ensure successful ERP implementation and operation, an organisation must pay sufficient attention to BPM.

4. WHAT IS BPM

A business process is set of interrelated activities which have definable inputs and, when executed, result in an output that adds value from a customer perspective. Business processes are quite simply the way work is done in any organisation. They are cross-functional and go across the organisational functions, e.g. order fulfilment which spans all organisational functions from customer order to final delivery. Business process management (BPM) is a structured approach to understand, analyse, support, and continuously improve fundamental process such as manufacturing, marketing, communications and others major elements of a company's operations.

BPM is a wide and encompassing system that starts with top management understanding and involvement, focuses on process improvement across the supply chain, instils a structured approach to change management, and emphasises people management and development.

5. BPM FOR SUCCESSFUL ERP IMPLEMENTATION

The importance and impact of BPM on ERP success will be demonstrated in this section through assessing the experiences of six organisations.

5.1 Case Study Organisations
The case studies analysed in this paper are shown in Table 1.

5.2 BPM Elements
As noted earlier, BPM has several main pillars. The following are highlights to demonstrate their importance in successful ERP implementation.

5.2.1 Top Management Commitment
The experience of Microsoft highlights the importance of having top management directly involved in planning and implementing an ERP system. Microsoft has cited the lack of top management's sponsorship as one of the main reasons for its ERP project failures in 1992 and 1994. In Microsoft's consequent success at ERP implementation, top management was instrumental in overseeing its ERP project, and the entire board reviewed and approved the plans. At ALVEO, the decision to implement an ERP system was also made at the board level, and the senior management team input was very important when selecting a suitable vendor.

Top management support and commitment does not end with initiation and facilitation, but must extend to the full implementation of an ERP system. HP noted that ERP implementation is about people, not processes or technology. The organisation went through a major transformation, and the management of this change was carefully planned (from a strategic viewpoint) and meticulously implemented. All the case studies analysed have shown that the key to a smooth rollout is the effective management of change from the top. Intervention from top management has been crucial for the adequate resourcing of the project, taking fast and effective decisions, resolving conflicts and bringing everybody to the same thinking, promoting company-wide acceptance of the project, and building co-operation among the diverse groups in the organisation, and in many times across national

borders. Top management needs to constantly monitor the progress of the project and provide direction to the implementation teams.

Table 1 Case Studies of successful ERP

Company	Major ERP Results
Monsanto	• Reduction in information systems development staff from 500 to 50. • Data integration and standardisation. • Access to timely and complete information • Leverage gained in purchasing, and globalisation. • Cut the costs of operational systems, improved the reliability of customer service, and assured timely delivery and follow-up.
ALVEO	• Annual savings of SFr 2 million. • Improved customer satisfaction • Cost reduction • Faster in the market
Microsoft	• Monthly books consistently closed in four to five days, instead of up to four weeks. • Real-time information from the consolidated database enables Microsoft managers to make faster, better informed decisions. • By moving its financial, human resources, and order management systems off legacy platforms, Microsoft saves more than $5 million in annual maintenance fees, plus more than $2 million per year in headcount costs alone.
Hewlett-Packard	• 70% Productivity improvement realised with some implemented business processes.
Epson	• Integrated applications that have led to improved business processes and have provided a platform for future systems enhancements. • Achieved integration between its previously disparate logistics and financial operations • Information can be accessed in real-time.
The Barden Corp.	• Improved inventory record accuracy • Improved accuracy of bill of material • Reduction in costs • Positive change sin company culture

5.2.2 Process Management and Improvement

The three main areas in process management and improvement that directly affected ERP success were business process re-engineering, performance measurement, and putting in place the appropriate process management structure.

(a) Business process re-engineering – the most common reason that companies walk away from multimillion dollar ERP projects is that they discover that the software does not support one of their important business processes. At that point there are two things they can do: they can change the business process to accommodate the software, which will mean deep changes in long-established ways of doing business (that often provide competitive advantage) and shake up important peoples' roles and responsibilities; or they can modify the software to fit the process, which will slow down the project, introduce dangerous bugs into the system and make upgrading the software to the ERP vendor's next release excruciatingly difficult, because the customisations will need to be torn apart and rewritten to fit with the new version [18]. In this regard, and without exception, all six organisations cited BPR as one of the main critical success factors for ERP success. Rather than attempting to modify the software, Monsanto, ALVEO, and Epson reengineered their business processes to be consistent with the software. This has proved to be critical to their projects' successes. The other organisations undertook a mix of BPR and ERP software re-adjustment. Within this context, Microsoft and HP have strongly emphasised on the criticality of structured project management approaches for ERP success.

(b) Performance measurement – it has been said that you can not manage what you do not measure, and this is especially true in the case of ERP implementation. Organisations must be able to establish a clear and well-defined performance measurement system to allow them to assess the developments, and/or problems, that are occurring. Microsoft and HP noted that having a well established measurement system was crucial in their ERP project management initiative to allow for measuring and publicising success stories for motivation, assessing progress, assigning and redirecting resources, and instilling an overall system of continuous improvement for the ERP life cycle.

(c) Process management structure - Monsanto put someone "in charge" and centralised the management structure of the project in order to avoid duplication of effort. This has been implemented by HP, The Barden Corp., and ALVEO, and all saw this as an important factor in managing the ERP implementation efficiently. However, even those with no 'ERP Process Leader' still maintained this focus by appointing a

'champion'. At Microsoft, the project leader for the ERP project was clearly a "champion" for the project, and that role was critical to marketing the project throughout the organisation.

5.2.3 Change Management
One of the main hurdle faced by all six companies was resistance to change. Employees were reluctant to learn new techniques or the IT department was reluctant to change due to attachment to its product. For users, the implementation of ERP systems meant that their computer-related tasks were completed in totally different computer environment. The complexity of these systems resulted in enormous learning curves and behavioural changes for user, implementers, and organisations. A variety of reactions by individuals, ranging from resisting to enthusiastically embracing ERP systems, were demonstrated, and unexpected difficulties often arose during all phases of implementation. Consequently, ERP users need to make sense of, and understand, their reactions to this technology, and their changing computer environment and computer-related tasks. The attributes of ERP performance are important because they can either positively or negatively influence user's learning, confidence levels, effort, persistence, and use of these systems. Unfortunately, research on individuals' reactions to ERP systems, and why they elect to use or avoid them, is limited [10].

According to HP, Microsoft, and The Barden Corp., three elements which can help reduce the resistance to change are tremendous top management support, placement of best people on implementation, and heavy involvement of people from the field [13]. The main approaches to achieve this, sought-after, people involvement and commitment is an open environment, characterised by open communication and trust.

Monsanto, Microsoft and HP agreed that effective communications should tell everyone in advance what is happening including the scope, objectives, and activities of the project, and admit that there will be change. ALVEO and The Barden Corp saw an open and honest information policy as helping the user to become acquainted with the new situation. Such a policy also helped to build up confidence in the project and its members, and finally to accept the project. Moreover, open communication and ethical behaviour generate trust. Epson and ALVEO highlighted the relationships of trust among the project members as a main success factor for ERP. HP noted that trust can be built up with intensive communication, coaching, delegation of responsibility, personal care and attention, among other things.

5.2.4 People Management and Development
People management is closely related to change management. However, some specific issues have been shown to directly affect the success of ERP implementation, and were mainly in the area of people development. The implementation of ERP requires a whole new set of skills and expertise and organisations must pay extra attention to where these skills will come from. In analysing the case studies on hand, two main sources for these new skills have emerged, and all six organisations have used a mix of both:

(a) Training and re-skilling - Training is critical in an ERP project. The most effective ERP system possible will not improve a company if its employees do not know how to use it. Installing an ERP package without adequate end-user preparation could yield drastic consequences. In this respect, Epson noted that the costs of training and support are often under-estimated, and these costs may be many times greater than originally anticipated. At HP and The Barden Corp, one of the critical workforce requirements for the project was the ability to obtain and train analysts with both "business" and technology knowledge. Instead of 200 "programmers" with average skills, the ERP project demanded, and could be accomplished with, 20 of the "best and brightest" analysts. However, retaining these professionals was a significant problem because of their market value. Monsanto invested heavily in training and re-skilling their developers in SAP software design and methodology. Monsanto considered their project a success because of investments in training and support required to overcome technical and procedural challenges in design and implementation.

(b) Using external consultants - With new technology, it is often critical to acquire external expertise, including vendor support, to facilitate successful implementation [11]. Hundreds of companies provide ERP services. Those services may include all or some combination of these offerings:
- ERP selection
- Business process planning or reengineering
- ERP implementation
- End-user training
- ERP maintenance and support

Quite simply, when they didn't have the needed expertise internally, Monsanto brought in the consultants they needed. ALVEO stressed that good consultants improve throughput time and quality. At Epson, it was noted that the success of a project depends strongly on the capabilities of the consultants because they are the ones with the in-depth knowledge of the software.

6. CONCLUSION

The case study and literature review conducted has allowed the identification of several common practices that lead to the successful operation of ERP. These include:

1. Executive support - the success of a major project like an ERP improvement hinges on the sustained commitment from top management. An overall commitment that is visible, well defined and felt is a sure way to ensure a successful outcome.
2. Business transformation - implementing an ERP system is not a matter of changing software systems, rather it is a matter of repositioning the company and transforming the business practices [5].
3. Training - whole departments must be retrained, jobs redefined, and procedures discarded or rebuilt from scratch.
4. Performance Measurement - because the successful implementation of an ERP system is contingent upon an accurate assessment of the associated organisational changes, there is a need to investigate the organisational consequences of ERP [17].
5. Using the 'best' people - Selecting the right employees to participate in the implementation process and motivating them is critical for the implementation's success.

Overall, it can be concluded that ERP is far form being an IT project, and is more of an integrated organisational development approach that changes the way organisations do business, and the way work is done. Consequently, to implement ERP successfully, organisations must treat it like a change management project and focus on an integrated approach of Business Process Management (BPM).

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