Critical Success Factors in "Best of Breed" ERP Implementation

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ABSTRACT

The research on ERP project challenges and critical success factors deals with large-scale ERP implementation using a single, organization-wide ERP package. The integrated nature of ERP software provides an incentive to implement a single ERP solution. However, the "best of breed" approach where the organization picks and chooses ERP modules which best support its business processes from various vendors is an alternative strategy. By examining the experiences of two organizations, this study identifies the critical success factors associated with the "best of breed" approach and the differences between these critical success factors and the critical success factors associated with implementing a single vendor ERP.

Keywords: Enterprise resource planning systems, best-of-breed ERP systems, critical success factors.

INTRODUCTION

The research on ERP critical success factors deals with large-scale ERP implementation using a single, organization-wide ERP package. The "best of breed" approach to ERP implementation is an alternative strategy. One of the significant issues with ERP is the need to re-engineer business processes to "fit" the best practices supported by the software. In the "best of breed," approach, the organization picks and chooses ERP modules which best support its business processes from various vendors. For example, one vendor may provide an optimum solution to HR practices, while another supports production and manufacturing processes better. In the "best of breed" approach, the organization mixes and matches ERP modules to support its business practices most effectively. These companies follow an approach of integrating multiple enterprise systems using a "best of breed" solution.

There is limited research on the "best of breed" approach. Light et al. used a case study approach to compare "best of breed" ERP implementation with single vendor ERP. In their analysis, the "best of breed" approach enabled the organization to support functionality and unique business process requirements (Light, Holland, and Wills, 2001). In their case study of an organization in the entertainment industry, these unique processes included release management, copyright and royalties management, and invoicing. In addition, the "best of breed" approach is less disruptive to organizational processes because it supports existing processes. However, the "best of breed" approach presents a number of difficulties, including the costs of developing interfaces among a suite of applications and higher degrees of maintenance due to complex connections between various components.

Another study indicated that users prefer a "best-of-breed" solution when each department has a unique mission, information transfer among departments is minimal, data translation across systems is easy, and the discount on purchasing the uniform solution is small (Dewan, Seidmann, & Sunderesan, 1995).

RESEARCH QUESTIONS

This paper will provide case studies of two organizations implementing "best of breed" ERP projects and will provide insight into each of these questions based upon their experiences:

1. What are the critical success factors associated with implementing "best of breed" ERP?
2. What are the differences between these critical success factors and the critical success factors associated with implementing a single vendor ERP?

LITERATURE

ERP and IT literature were reviewed using the five functions of management theory as a lens. Possible critical success factors were identified in the areas of planning, organizing, staffing, leading and controlling.

Planning

Integration of business planning and IS planning is a top problem reported by executives and IS managers (Reich & Benbasat, 1996). An A. T. Kearney study indicates that firms that integrate IS plans with business planning outperform other firms (Das, Zahra, & Warkentin, 1991). Most executives do not understand the connection between modern business and technology and "leave technology compartmentalized within the I/T department with disastrous effects (Severance & Passino, 2002)." This literature suggests that the higher the level of integration of ERP planning with business planning the more likely the ERP implementation will be successful.

H1. The level of integration of ERP planning and business planning is positively related to implementation project success.

Organizing

Organizations must deploy resources to attain goals. A common view is that a user must head the project team and it must be a full-time job (Wight, 1974). Another view is that systems knowledge is the least important skill of the project manager (Flosi, 1980).

H2. Organizing the ERP implementation project under the direction of a project manager whose sole responsibilities are the project is positively related to ERP implementation project success.

H3. An organizational structure in which the project manager reports to the business unit's senior manager is positively related to implementation project success.

Staffing

Tasks associated with staffing include recruitment, selection, appraisal and development of employees. Current literature emphasizes the business skills of the project manager. Project leaders must be veterans who have 'earned their stripes' leading projects (Brown & Vessey, 2003) .

H4. Staffing the ERP project manager position with an individual with extensive experience is positively related to project success.

A positive initial experience with a new software package is important to users. A tendency to cut training budgets can result in negative user attitudes (Lassila & Brancheau, 1999).

H5. The quantity and quality of training are positively related to implementation project success.

In most ERP implementations consultants are retained to assist with the project. One practitioner states "the success of the project depends strongly on the capabilities of the consultants…" (Welti, 1999)

H6. Use of an ERP consultant for guidance is positively related to implementation project success.

Leading

Executive support is generally regarded as critical to implementation of management information systems. Senior management communicates direction, allocates resources, delays conflicting projects and deals with organizational resistance (Laughlin, 1999).

H7. CEO involvement in the planning and implementation of ERP systems is positively related to implementation project success.

A champion is critical to new systems. Champions "are more than ordinary leaders…(they) inspire others to transcend self-interest for a higher collective purpose (Burns, 1978). "Successful champions can break down bureaucratic barriers…(Beath, 1991)."

H8. The existence of a champion is positively related to implementation project success.

ERP implementation projects involve change in almost every area of business process. These major changes result in "resistance, confusion, redundancies and errors (Somers, Ragowsky, Nelson, & Stern, 2001)." Change management must be rigorously planned and generously resourced (Brown & Vessey, 2003).

H9. Management's effectiveness in reducing user resistance to change is positively related to implementation success.

Controlling

A process of systematic controls regulates organizational activities. A common method of control in information systems projects is management steering committees. These committees can be viewed as a method to get top management involved, ensure IS/BP planning fit, improve communications and change user attitudes toward IS (Gupta & Raghunathan, 1989). A study of 12 manufacturing firms found that steering committees with executive leadership were a characteristic of projects that stayed on time and on/under budget (Mabert, Soni, & Venkataramanan, 2003).

H10. The use of a steering committee that a.) is headed by the CEO, and b.) meets at least every four weeks is positively related to implementation project success.

Table 1. Case study site characteristics

	Case 1-M-I	Case 2-Boeing
Project start date	1995	1993
Software vendors	Oracle, Datalogix	Manugistics (was Western Digital), Baan, Oracle, Peoplesoft
Revenue	Approx. $1 billion	Approx. $6 billion (defense)
Project cost	$7 million, US only	$16 million, ongoing
Data Source	Multiple interviews and archival data	Multiple interviews (CIO, project leaders)

RESEARCH METHODS

A multiple case study method is used in this research. An open-ended questionnaire was developed. In some cases multiple in-person interviews were conducted, in other cases questionnaires were completed by e-mail with e-mail or phone follow up was used. The validity of the data collected was verified by conducting multiple interviews and by making enhancements to assure completeness and consistency. Interviewees were asked to read case summaries and offer corrections.

CASES

Case 1

M-I Drilling Fluids is a global energy services company. Before the ERP project the company was using home grown information systems on an outsourced IBM platform. The legacy systems were islands of automation. The information provided by these systems was accounting oriented, not operations oriented. Even inventory data was of limited use because of incomplete, inaccurate and late data for receipts and shipments. M-I's aging legacy systems would be very costly to upgrade and would still leave the company with an outdated system The ERP project, begun in 1995, was the company's effort to get up to date and improve the scalability of IT costs, reducing the need for cycles of layoffs and hiring as the economy fluctuated.. The impetus was the foreseeable Y2K problems in the legacy systems. Computer Science Corporation was selected as consultants on the feasibility study and implementation project. The project would be the most significant change effort the company with deeply embedded organizational practices had started.

M-I decided on a "best of breed" solution to their information needs because their drilling mud production required a process manufacturing package. Oracle did not provide a process cost solution at the time the project was begun in 1995, so Datalogix's Global Enterprise Manufacturing System (GEMMS) was selected for purchasing, manufacturing, inventory, cost accounting and sales order entry. The interface software between Oracle and GEMMS was the source of many implementation problems. It is interesting to note that Oracle acquired Datalogix in the midst of the implementation project at M-I. This acquisition actually impeded the project as an exodus of Datalogix employees after the acquisition created a shortage of knowledgeable customer support for the GEMMS software.

The application of the proposed critical success factors to the M-I implementation is now examined.

H1. Business and IT planning. At the time of the ERP adoption decision, IT planning supported business planning at M-I but was not integrated with it. The business plan called for cost control in IT, scalability of IT costs, more transparency of information throughout the organization, and improved financial and operating information. The IS department proposed the ERP system to accomplish these goals.

H2. Full time project manager. Computer Science Corporation was hired as consultants and full time project managers. In addition, two M-I employees, one from the IT department and one from the accounting department, were selected and full time co-managers.

H3. Reporting level of project manager. The project managers did not report to directly to top management at M-I. The project managers reported to the IT director who in turn reported to the CFO.

H4. Project manager skills. The project manager for CSC is described as having excellent project management skills and a good working knowledge of the Oracle financial software, but limited knowledge of the GEMMS manufacturing and distribution software. Also, the CSC project manager had little knowledge of M-I's business process. The M-I co-managers provided the team knowledge in that area.

H5. Training. M-I provided employees primarily keystroke and data entry training. Business process training was not conducted. A major deficiency in training materialized on implementation start-up. On the advice of the consultants, employees were provided with training on the report writer software and were expected to write their own reports. The complexity of the Oracle report writing software proved too much for the average user, so few reports were available in the first few months after implementation.

M-I's IT staff scrambled to design reports for individual users resulting in a proliferation of reports, rather than the fewer multi-purpose reports the company had anticipated.

H6. Consultants. Consultants participated in M-I's ERP feasibility study and implementation project. Consultants drove the project forward, but M-I employees knew the business processes and customer needs. A project co-manager observed that the project really started going well when the company started managing the consultants, rather than the consultants managing them.

H7. CEO role. M-I's CEO did not play an active role in the project, but supported it fully. Top management team members involved in the project were the CFO and VP-Supply Chain Management.

H8. Champion. Project team members identified the two M-I co-managers as the champions for the project. The co-managers worked to reduce user resistance and coordinate the needs of the various functional areas of the business.

H9. User Resistance. Management used an active employee communications program to inform the employees of the importance and progress of the ERP project. The culture at M-I is a top down style of management. Management made it clear to employees that the project was going to succeed so they "might as well get on board." Reduction of user resistance was key to project success. Few M-I employees had any IT sophistication or vision of how a well-designed system could help them do their jobs better.

H10. Controlling the project. The steering committee included the CFO, VP-Supply Chain Management, IT Director, CSC project manager and the IT Director from M-I's majority owner. One member complained that spotty attendance at committee meetings by some functional members contributed to the lack of a broad base consensus to decision making. The finance operation drove the implementation with operations playing a minor role.

MI management considered the implementation successful. The project was completed on time and on budget and met management's expectations of improved transparency, better scalability of IT costs and improved operating efficiency.

Case 2

Boeing is an aerospace-defense industry company with their Integrated Defense Systems (IDS) based in St. Louis. Boeing IDS is a $6 billion division supporting 140 applications provided by 23,000 separate software contracts costing $250 million each year. As background, the systems before ERP were a series of legacy non-integrated mainframe systems. The overall goal in acquiring ERP and commercial off-the-shelf packages (COTS) is to reduce the overall number of systems. For example, Boeing had 16 different procurement systems before acquiring several common procurement systems.

Boeing decided upon a "best of breed" solution because the company did not feel that one ERP system could be used to integrate 140 different applications. They decided to use multiple ERP packages from different vendors. Since Boeing was not willing to change its processes to fit the best practices supported by a package, the company required the software vendor(s) to customize the ERP packages to meet its unique business requirements. Since government contracting entails unique processes, Boeing required its vendors to customize and to maintain specific government contracting modules to meet its needs.

Using the "best of breed" approach, Boeing acquired a variety of commercial off-the-shelf software supporting different applications, including: Procurement/Manufacturing: Manugistics (e.g. was Western Digital); Commercial Procurement: Baan; Financial: Oracle; and HR: Peoplesoft. In each case, Boeing selects large vendors, because they contract with these vendors to customize the software to meet their needs. Every time an upgrade is installed, the software must be customized again. Once a vendor is selected, the partnership can last for as long as ten years.

The overall success strategies for ERP implementation at Boeing were: (1) ERP project leadership by end-users; (2) building capability (e.g. enhancements) into the ERP implementation; and (3) the vendor partnership. As one executive put it, "Boeing is not in the software business, so we have created a partnership with a vendor who can meet our ERP software needs and work with us to modify their package to meet our needs."

The application of the proposed critical success factors to the Boeing implementation of "best of breed" ERP systems is now examined.

H1. Business and IT planning. ERP is a critical strategy to achieve lean manufacturing, and ERP planning is important to achieving these business outcomes. The actual business objective to be achieved was inventory reduction, which is key to lean manufacturing and supply chain management. Management was committed to the value of ERP based upon this business case.

H2. Full time project manager. A customer leads each ERP project. Three ERP project leaders represent core business functions, including Production, Engineering, and Operations. A co-lead from IT handles administration and project management.

H3. Reporting level of project manager. The ERP project leaders were end-user managers at Boeing with extensive experience and business knowledge. The project was continuously reviewed by a Steering Committee, led by the project managers. They reported to senior division management.

Table 2. Findings in "Best of Breed" ERP

	MI	Boeing
H1. IT and business planning integration	IT plan supports the business plan	IT plan supports the business plan
H2. Full time project manager	Consultant served as project manager	ERP project managers are business leaders representing Production, Engineering, and Operations
H3. Reporting level of project manager	Steering committee headed by IT director	Steering committee led by the project managers
H4. Experience of project manager	CSC project leader with excellent project management and software skills	ERP project managers had extensive business knowledge
H5. Training	Limited to keystroke/ data entry	Extensive training on relevant modules
H6. Consultants	Used heavily	Used extensively
H7. CEO Involvement	Limited to approvals, support	Management was committed to the value of ERP based upon the business case
H8. Champions	Two co-managers	ERP project managers were the champions
H9. Management effectiveness in reducing user resistance	Heavy employee communications and top down support	ERP project managers were the change agents. Strategies included education and communications
H10. Steering Committee	Steering committee used, but not headed by CEO.	Steering Committee continuously reviewed the business case for ERP. Steering Committee was headed by the project leaders

H4. Project manager skills. The project managers had extensive business knowledge in Production, Engineering, and Operations.

H5. Training. Software vendors provided training to Super-Users within each business area, and the Super Users became trainers within specific areas. The project managers noted that the importance of training could not be under-estimated. If anything could have been done differently, it would be to provide more extensive training.

H6. Consultants. Some of the team members represented consulting firms, including Ernst and Young and Anderson Consulting. Consultants were active in requirements planning and testing. The change management issues were dealt with by the management team, not by external consultants.

H7. CEO role. Top management drove and communicated the need for change. Management was committed to the value of ERP based upon the business case. Top management said that they could not live with disparate systems and did not see any alternatives to ERP.

H8. Champion. Project leaders were the champions.

H9. User Resistance. The project leaders were the change agents. Management dealt with user resistance through education, continual reviews, and communications. The implicit assumption was that people needed to make the change, or else move on.

H10. Controlling the project. The Steering Committee met regularly to review the business case for the ERP projects, including the business value of the investment. According to one of the project leaders, "the Steering Committee reviews the cost if we don't do the project, and the cost if we do the project." There are ongoing measures of the impact of the project on achieving business results. The major business benefit of the manufacturing ERP project was inventory reduction.

COMMON CRITICAL SUCCESS FACTORS

Several common critical success factors emerged in the "best of breed" projects, and several "new" critical success factors emerged in importance. In each case, ERP was aligned with business objectives, and the ERP projects had full top management support. Top management received briefings on these projects, and the Steering Committees were responsible for closely monitoring these projects. In each case, the project manager(s) were end-user managers with extensive business knowledge, including knowledge of production, manufacturing, and operations management processes. In each case, the champions were the ERP project managers. Steering Committees in both cases continuously reviewed the projects, including the business case.

UNIQUE CRITICAL SUCCESS FACTORS

Boeing and M-I Drilling decided to use the "best of breed" approach because they did not want to change their business practices. Instead, they wanted to select vendor packages that fit their business requirements. The most significant challenge with the "best of breed" approach is the need to integrate ERP modules from different vendors. This requires building interfaces between different ERP modules (e.g. Peoplesoft to Oracle). In addition, if any of the modules are customized, then upgrading to new versions of vendor-supplied modules requires creating new customizations and building new interfaces. The cost implications of the "best of breed" approach are significant and must be continuously justified in terms of business results.

CONCLUSIONS

An analysis of "best of breed" ERP projects, using two case studies, reveals that certain critical success factors in "best of breed" projects are common to vanilla ERP implementations, including alignment with business objectives, effective project management, the role of the champion, and the role of the Steering Committee in monitoring project issues and in measuring project results. In "best of breed" projects, supplier management is magnified in importance because vendors are entrusted with customizing their software to fit the unique business requirements of the customer. Interface management between multiple vendors requires effective vendor management and cost justification—since this approach is more costly to negotiate and more costly to maintain. In Boeing's case, experience with the "best of breed" approach between 1993 and 2006 drove them to justify customization only for "must-have" processes. These customizations were handed over to the vendor, so that the vendor was responsible for building unique modules and for integrating these unique modules with common systems. Leadership by end-user managers assures that only "must have" processes are customized and that these customizations have a business case associated with them.

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