

Revisiting ERP Systems: Benefit Realisation

Paul Hawking & Andrew Stein

School of Information Systems
Victoria University
MMC 14428, Victoria University of Technology
Melbourne, 8001
Victoria, Australia
Tel: 61 3 96884031

Email: Paul.Hawking@vu.edu.au

Susan Foster

School of Information Systems
Monash University
Victoria, Australia
Tel: 61 3 99032404

Email: Sue.Foster@sims.monash.edu.au

Abstract

Many companies initially implemented their ERP systems to solve Y2K and disparate systems issues. These same companies are now looking at a how to strategically leverage their investment in these systems through the implementation "second wave" functionality. This paper identifies the expected and actual benefits of "second wave" implementations. In addition it identifies barriers, which limit the benefit realisation. The findings reinforce that ERP implementations are people focussed projects which rely heavily on change management for success.

Introduction

Many of the world's leading companies consider Enterprise Resource Planning (ERP) systems as an essential information systems infrastructure to survive and prosper in today's economy. Deloitte Consulting [1] define an ERP system as a packaged business solution that is designed to automate and integrate business processes, share common data and practices across the enterprise and provide access to information in a real time environment. The level of

their sales and penetration reinforces the importance of these types of systems. A survey of 800 U.S. companies showed that almost half of these companies had installed an ERP system and that these systems were commanding 43% of a company's application budget [2]. While research into U.S. Fortune 1000 companies found that over 60% have implemented an ERP system [3], [4]. The market penetration of ERP systems varies considerably from industry to industry. A report by Computer Economics Inc. stated that 76% of manufacturers, 35% of insurance and health care companies, and 24% of Federal Government agencies already have an ERP system or are in the process of installing one [5]. The global market for ERP software, which was \$16.6 billion in 1998, is expected to have a compound annual growth rate of 32%, reaching more than \$66 billion in sales by 2003 [2] and is estimated to have had 300 billion dollars spent over the last decade [6]. The major vendor of ERP systems is SAP with approximately 50% of the market. In Australia a recent report [7] identified the top 100 IT companies by usage; this was then compared with the SAP customer list. It was determined that 9 out of the top

12 IT users were SAP customers and 45% of the total list were also SAP users.

ERP Implementation

Even though there are many benefits associated with the use of an ERP system, initially for many companies the implementation of this type of system was a technological solution to the Y2K issue [1], [8]. To facilitate an effective implementation, business process engineering was initiated for the purpose of “gap analysis” to determine what changes were needed in the company or in the ERP system. Underestimating the impact the system would have on their organization, companies initially struggled with their ERP implementation due to lack of skilled resources and inexperience with projects of this scope. For some companies these barriers became insurmountable [9]. For many companies the urgency to achieve Y2K deadlines and the lack of understanding of the complexity of these types of implementations resulted in a failure to optimize their business processes during implementation [8]. Although companies solved their Y2K issues the majority of companies did not achieve the additional benefits they had expected from their ERP system [1], [8].

A study by Davenport et al [8] identified the top ten benefits that can be gained from an ERP implementation (Table 1).

Table 1 Top Ten ERP Benefits

Benefit
Improved management decision making
Improved financial management
Improved customer service and retention
Ease of expansion/growth and increased flexibility
Faster, more accurate transactions
Headcount reduction
Cycle time reduction
Improved inventory/asset management
Fewer physical resources/better logistics
Increased revenue

This lack of benefit realization has resulted in companies revisiting their ERP implementation in an attempt to leverage their investment by attaining the purported benefits. A Computer Sciences Corporation(CSC) study [10], which surveyed 1009 IS managers from around the world, identified “optimising enterprise wide systems” as their main priority. In the landmark Deloitte’s study [1], 49% of the sample considered that an ERP implementation is a continuous process, as they expect to continually find value propositions from their system. This is a reasonable expectation as companies attempt to realise previously unattained benefits and additionally, as companies evolve, their ERP system must also evolve to support new business processes and information needs. Davenport et al [8] believes that the potential of ERP systems can be classified under three groups; *Integrate*, *Optimise*, and *Informate*. *Integrate* is where a company is able to integrate their data and processes internally and externally with customers and suppliers. While *Optimise* benefits include the standardization of business processes incorporating best business practice and *Informate* is the ability to provide context rich information to support effective decision making.

The process of achieving additional benefits from an ERP implementation is referred to as “second wave” implementations [1]. Deloitte [1] believed that there are a number of phases that occur post implementation (Figure 1). In the Stabilise phase companies familiarise themselves with the implementation and master the changes which occurred. The Synthesise phase is where companies seek improvements by implementing improved business processes, add complimentary solutions, and to motivate people to support the changes. The final stage, Synergise is where process optimization is achieved resulting business transformation.

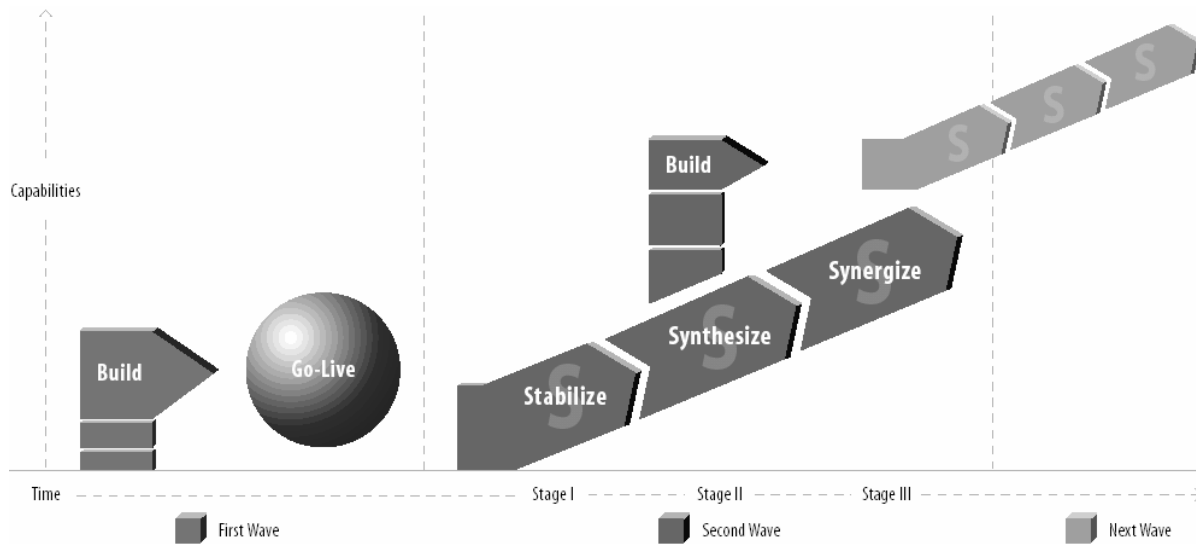


Figure 1 Deloitte (1999) Implementation Phases

The notion of different stages of ERP implementation is reinforced by Nolan and Norton [11] where they grouped implementations into levels of maturity. They argued that when evaluating costs of an ERP implementation, the company’s previous experience with ERP systems should be considered. Their maturity classifications were,

- Beginning – implemented SAP in the past 12 months,
- Consolidating – implemented SAP between 1 and 3 years,
- Mature – implemented SAP for more than 3 years.

It would be reasonable to expect that companies involved in “second wave” implementations would be in the Consolidating or Mature stages. Although not identifying specific stages, Davenport et al [8] believe that three factors are essential for a company to achieve “second wave” benefits: firstly, the organisation must have had several years experience with enterprise wide systems; secondly, the systems need to be used extensively throughout the organization and thirdly, significant resources should

be allocated to future implementations. In addition to these prerequisites for moving forward, Deloitte Consulting [1] identified a number of barriers limiting the realization of “second wave” benefits (Table 2) and categorized these as People, Process or Technology related issues.

Table 2. Barriers (Deloitte, 1999)

ERP Barriers	Focus
Lack of Discipline	People
Lack of Change Management	People
Inadequate Training	People
Poor Reporting Procedures	Technical
Inadequate Process Engineering	Process
Misplaced Benefit Ownership	People
Inadequate Internal Staff	People
Poor Prioritisation of Resources	Technical
Poor Software Functionality	Technical
Inadequate Ongoing Support	Technical
Poor Business Performance	Process
Under Performed Project Team	People
Poor Application Management	Technical
Upgrades Performed poorly	Technical

Additional factors which have been identified as contributing to failed implementations: include lack of management commitment, failure to include key personnel on the project team, poor lines of communication, poorly written or incomplete needs analysis reports, and issues such as political intrigue, conflict, hidden agendas and people issues [12], [13].

Although previous research has focussed on ERP systems' benefits and factors that limit benefit realisation, [14]; [22], [1] limited research has occurred on "second wave" implementations in Australia. This is an important area of research to identify factors which maybe country specific, enabling appropriate methodologies to be developed. This paper investigates "second wave" implementations, the expected and actual benefits and the limiting factors to this benefit realisation.

Research Method

The primary objective of the study was to survey a range of information system professionals and seek responses to such issues as current and historical ERP implementation details, expected and actual benefits from the implementation, and barriers which limit benefit realisation. In addition more specific research questions are considered:

- What are the expected versus actual benefits of ERP systems?
- What barriers and challenges exist in the attainment of ERP benefits?

Research Design And Methods

In order to study the benefits and barriers of ERP implementations a previous Australian study by Deloitte's Consulting [1] was used to set the benchmark categories of benefits and barriers. Deloitte categorised the barriers as being People (P), Business Process (Pr) or Technology (T) focussed (See Table 4.). These categories formed the basis for the survey sent to respondents. The initial survey instrument was developed based on the fields that were identified in the literature and included 30 questions covering four areas; demographics, expected versus actual benefits, barriers to benefit attainment and financial metrics used to measure benefits. Closed questions were used with Yes/No and seven point Likert scale responses. Open-ended

questions sought responses from the cohort allowing for qualitative data to be collected.

The survey distributed through the use of an email directing the respondent to a web site that incorporated a web based survey delivery platform. Several studies [15], [16], [17], [18] have compared email and Web based survey methods versus mail information collection methods and have proposed that email surveys compare favourably with postal methods in the areas of cost, speed, quality and response rate. It was necessary to preen the email address book to remove and amend email that had bounced back.

Sample

The sample was made up of the key contacts for each company, which are members of the SAP Australian User Group. SAP is the leading vendor of ERP systems in Australia with approximately 70% of the market [19] and the user group is representative of approximately 65% of the SAP customer base. The original email listing contained 166 potential respondents. A number of emails were undeliverable due to members of the cohort moving positions, having incorrect email addresses, having changed email addresses or automatic out-of-office responses. There were two unusable replies, leaving a total of 48 usable responses. The overall response rate once removing the undeliverable addresses was 26%.

Results

Demographics

Responses were received from 48 IS professionals and the data was analysed to present position, organisation type, and organisation size. A summary of responses are presented in Tables 3, 4 and 5. Respondents were predominantly high in the organisational structure being either an IS or business manager. As key contacts for the user group and their status within their companies would indicate that they were involved in the decision making process in regards to any ERP implementations and accordingly should have an understanding as to the type of information required by the survey. The companies

represented most industry sectors and were large in size from both a revenue and employee perspective.

Table 3. Position of Respondents

Position	No
CIO	6
IT Manager	10
Support & Services Manager	8
SAP Manager	8
Business Manager	14
IT Development	2

Table 4. Companies by Industry sector

Industry Sector	No
Public Service	11
Education	2
Mining Oil & Gas	6
Utility	7
Chemicals	1
Manufacturing	8
Services	4
Other	9

Table 5. Size of Companies

Number FTEs	No.
>1001	33
502-1000	3
101-500	8
<100	1
Revenue(\$millions)	No
Large(>1000)	21
Large-Med(750-1000)	8
Med-Large(500-749)	3
Medium(250-499)	10
Small(<250)	6

ERP Profile

Respondents were asked to identify their company’s experience with an ERP system, by identifying when the first implementation occurred (table 6), number of ERP users (Table 7) and any implementations of second wave products (Table 8). SAP, similar to other ERP vendors have developed a number of products which can be classified as “second wave”. These products use the ERP system as a foundation to provide added benefits. These products include data

warehouse, Customer Relationship Management, Strategic Enterprise Management, Advanced Planner and Optimiser, Knowledge Management, Supply Chain Management, Business to Consumer and Business to Business solutions.

Table 6. First Year of Implementation

Year	No
1995	5
1996	7
1997	7
1998	17
1999	8
2001	1
2002	3

Table 7. Number of SAP Users

Number SAP Users	No.
>501	25
251-500	8
101-250	8
<100	7

Table 8. Second Wave Implementations

Product	No
Data Warehouse	17
Customer Relationship Management	7
Strategic Enterprise Management	7
Advanced Planner and Optimiser	3
Knowledge Management	3
Business to Consumer	3
Business to Business	9
Supply Chain Management	1

Using Nolan and Norton’s Maturity Model [11] the sample can be categorised as 6% Beginning, 54% Consolidating, and 40% Mature. This indicates that the sample companies should have stabilised their initial implementation and be investigating “second wave” value propositions. This is reinforced by the extent of “second wave” product implementations (table 8), with 42% of the companies having implemented at least one of these products.

Expected Versus Actual Benefits

Respondents were asked to rate on a seven point likert scale the expected benefits of their R/3 systems.

They were further asked to rate the actual benefits obtained. The results are displayed in Table 9. Financial Cycle was rated highest (5.2) with Revenue Increase rated lowest (3.2). Several time based (On Time Delivery 4.4) or productivity based (Order

Management 4.4) benefits were rated highly. Comparing the expected versus the actual the benefits fell into two distinct groups, difference of less than 1 Likert point and difference of greater than one Likert point.

Table 9. Expected Vs Actual Benefits (N=48)

R/3 Benefits	Expected	Actual	Difference
Financial Cycle Close Reduction	5.2	4.6	0.6
Productivity Improvements	4.9	3.8	1.1
Procurement Cost Reduction	4.8	3.8	1.0
Order Management Improvements	4.4	3.8	0.6
On Time Delivery Improvements	4.4	3.1	1.3
Personnel Reductions	4.0	2.7	1.3
IT Cost Reduction	4.1	2.6	1.5
Cash Management Improvement	3.9	3.2	0.7
Inventory Reductions	3.9	3.1	0.8
Maintenance Reduction	3.9	2.8	1.1
Transportation/Logistics Reduction	3.5	2.8	0.7
Revenue/Profit Increase	3.2	2.5	0.7

Barriers

Respondents were asked to rate on a seven point likert scale the barriers to benefit realisation of their current ERP implementation. Each barrier can be categorised as per the Deloitte Consulting [1] study: People, Process or Technology. The results are displayed in Table 10. People based barriers seem to dominate; Discipline (4.4), Change Management (4.3), Training (4.2) and Inadequate Internal Staff (3.3) which reinforce the premise that ERP implementations are predominately people projects. Technical based barriers rated lower; which would indicate that technical issues are not insurmountable.

None of the benefits were realised to the expected level. Of further interest would be to ascertain how companies quantified the level of benefits.

Table 10. Barriers to Benefit Realisation(N=48)

Current R/3 Barrier/Obstacle	Mean	Deloitte Category
Lack of Discipline	4.4	P
Lack of Change Management	4.3	P
Inadequate Training	4.2	P
Poor Reporting Procedures	4.2	T
Inadequate Process Engineering	3.9	PR
Misplaced Benefit Ownership	3.8	P
Inadequate Internal Staff	3.3	P
Poor Prioritisation of Resources	3.0	T
Poor Software Functionality	2.9	T
Inadequate Ongoing Support	2.7	T
Poor Business Performance	2.4	PR
Under Performed Project Team	2.3	P
Poor Application Management	2.2	T
Upgrades Performed poorly	1.6	T

DISCUSSION

What are the expected versus actual benefits of the ERP implementation?

The SAP ERP system provides a range of tangible and intangible benefits to companies as identified by the sample. The benefit companies most expected to achieve with their current implementation was reduction in the financial cycle close. This may have been reflective of the time of year the survey was conducted in relation to the end of the financial year.

Did SAP or their implementation partners foster these expectations or were they quantified using internal measures and or industry benchmarks. The previous

research [1] indicated that there is a discrepancy between what companies expect to achieve and what they actually achieve with their ERP implementations. Companies usually realise a number of unexpected benefits associated with improvements in performance. These maybe negated due to the maturity of Australian companies and the associated experience of using their ERP system and the availability of industry benchmarks. A respondent commented that, "benefit analysis was difficult when strategic benefits are difficult to categorise and calculate". The respondent indicated that his organisation had won contracts based "partly" upon the fact that the IT core systems was SAP. Unfortunately "Partly" is difficult to calculate. This difficulty with strategic benefits has an impact on the cost benefit analysis.

The largest gap between expected and realised benefits was that of a reduction in IT costs. Research [1], [8] has shown that the failure of ERP systems to live up to this expectation is not limited to any one ERP vendor.

What are the barriers and challenges to the attainment of ERP benefits?

The respondents indicated that obstacles that limited benefit attainment for their ERP implementation had little to do with lack of software functionality or major technical issues, but were predominately people issues. Five of the top seven obstacles could be classified as people issues. It is interesting to note that two of the top three issues are related to change management. It is important to note that Australian companies have been working with their ERP systems for a number of years resulting in a level of maturity and even though they have been through a number of implementations they still consider change management issues impacted on the success and benefit attainment.

Researchers have identified that programs which establish positive attitudes towards the introduction of information systems are a critical success factor to their successful implementation [20]. This has led to companies placing increasing emphasis on change management strategies. Hammer [21] refers to this process as "organisational reengineering" and argues that an essential precedent to any change management strategy is the fostering of a culture for change.

SAP's ASAP implementation methodology places considerable emphasis on change management strategies and includes a number of resources to assist this process. Further research is required into the complex issues involved in change management and the evaluation of resources and tools provided to assist in the change process.

CONCLUSION

Many companies implemented an Enterprise Resource Planning (ERP) system to address a number of immediate problems such as Y2K and disparate or poor systems. These same companies have now moved beyond this initial implementation and are looking for ways to optimise their investment. This includes extending the implemented functionality of their ERP system and or "second wave" implementations; such as data warehousing, customer relationship management or advanced planning and optimisation. The purpose of this research was to explore the benefits and barriers in ERP implementations as they move into "second wave" value propositions. The results indicate that such implementations do not live up to their expectations and do not provide the expected range of benefits. IT cost and personnel reduction were two issues that had the greatest disparity between expected and actual benefits. People-related issues dominated the barriers to attaining expected benefits with change management issues ranking very high. Software, hardware or integration issues were not ranked highly. Lack of discipline, lack of training, lack of change management and poor project teams all point to organisations who do not understand the importance of change management practices. Although respondent organisations had all been through at least two ERP implementations, change management was signaled as a major problem. SAP R/3, core and upgrade implementations, have extensive built-in change management procedures. One ponders the question, why do Australian organisations continue to signal problems with change management? However it appears that change management issues are not limited to Australian implementations. Further research is required to successful change management strategies that facilitate benefit realisation.

The paper discusses "second wave" implementations in broad terms in regard to industry classification and

ERP usage. Further research should delineate between benefits and barriers between industry sectors and organizational size to determine whether or not there are other factors at play.

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