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Benefit Realisation and ERP Systems

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ABSTRACT

The global ERP industry blossomed in the 1990's automating back office operations and in the new century moves have been made to introduce a "second and third wave" of functionality in ERP systems to facilitate benefit realisation. Research up to date has been limited in respect to these "second wave" implementations. The benefits and barriers to attaining benefits are presented with analysis of the extent that financial metrics are used to measure benefit attainment in core SAP systems. The main findings of the paper indicate that many ERP implementations do not attain expected benefits and the main reason for this lack of attainment are people related issues namely change management.

INTRODUCTION

ERP sales now represent a significant proportion of total outlays by business on information technology infrastructure. A recent 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 the company's application budgets (Carlino, 1999a). 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 (Carlino, 1999b) and is estimated to have had 300 billion spent over the last decade (Carlino, 2000). More recent estimates show a slowing in demand for core ERP systems with an increasing emphasis on upgrades and extended functionality "bolted on" to existing systems especially with a move towards e-business. Companies are focussing on benefit realisation. This research focuses on the expected benefits how, they are measured and the barriers preventing this realisation.

ERP Market Penetration

Market penetration of ERP systems varies considerably from industry to industry. A recent 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 (Stedman, 1999). Over 60% of the U.S. Fortune 1000 companies are using ERP systems and this has resulted in the major ERP vendors targeting small to medium enterprises (SME's, also known as SMB's) to generate new sales (Stein, 1999; Piturro, 1999). This has seen the development of new implementation methodologies and modifications of ERP systems to reduce implementation complexity and the associated costs. Vendors are also extending beyond their core ERP systems to support web-based applications, e-commerce, and customer-relationship management.

The 5 leading ERP vendors (SAP, Oracle, Peoplesoft, JD Edwards, and Baan), account for 62% percent of the total ERP market revenue (Carlino, 1999b). SAP is the largest ERP software vendor with approximately 39% market share. The company has approximately 27,800 employees and 17,500 customers in 110 countries representing 44,500 installations (SAP, 2002)

SAP Australasia

In the Australasian region there are 387 SAP customers. Of these, 329 were based in Australia and 58 in New Zealand. Business Review Weekly (2000) annually produces the *BRW1000*, which is a ranking by revenue of the largest listed, private, government and foreign enterprises operating in Australia. Using the BRW1000 it was ascertained that SAP had the following market penetration:

- The largest 5 employers use SAP
- 3 out of top 5 private companies
- 4 out of top 5 public companies
- 2 out of top 3 building materials companies
- 2 of top 3 diversified resources companies
- 2 of top 3 diversified industrials companies
- 2 out of top 3 energy companies
- 3 out of top 5 mining companies

The managing director (Bennett, 2002) of SAP Australia was quoted recently:

> "What we're seeing here now is that Australian … businesses are gradually and steadily rolling out IT systems that will enable them to take advantage of and grab opportunities when the global economy bounces back."

He was reporting on the expansion of mySAP.com licenses in the Asia-Pacific region and the move to "second wave" products. MySAP.com is a new term used to describe SAP's range of products. Many companies initially implemented their ERP systems to cope with the Y2K issues and replace poor exiting and disparate systems (Deliotte 1999, Krumwiede et al, 2000). Once companies had stabilized their ERP implementation they then started looking for avenues whereby they leverage their investment to gain a competitive advantage. This was usually achieved by business process optimization, implementing added core ERP functionality, and or by implementing add on products such as data warehousing, customer relationship management, advanced planner and optimizer, and e-business functionality. This expansion of the existing core R/3 system with either third party "bolt-on" products or SAP new products is referred to as "second wave" (Deliotte 1999). Along with the move to added functionality, SAP Australia moved to restructure their internal business units to move the focus from the product to the customer, which seems to take account of the need to build the business through customer retention and value adding rather than plumbing new markets (Bennett, 2001). One additional market being explored is the small to medium enterprise (SME) market, with SAP launching two new solutions to cater for this (Bennett, 2001).. In Australia, there are 10,000 small-medium enterprises with the subsidiaries of multi-nationals constituting 40% of the SME's

SAP Australasia Implementations

From 1989 to July 2000, 387 customers implemented or were in the process of implementing SAP software. This does not include update or upgrade implementations. Nolan and Norton (2000) grouped implementations into levels of maturity. The data indicates that approximately 65% of companies have had their ERP systems for at least two years. 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.

Applying the maturity classification to the above data indicates that the majority of Australasian companies are in the Consolidating stage (58.4%) then followed by the Mature phase (37.2%) and the

Beginning phase (11.6%). It could be argued that companies in the consolidating and Mature phases are those most likely to be involved in second wave implementations. Therefore it would be expected to see an increase in "second wave" products post 2001 as the majority of ERP implementations occurred pre 2000.

SAP's "second wave" products include Business Information Warehouse (BW), Knowledge Warehouse (KW), Strategic Enterprise Management (SEM), Customer Relationship Management (CRM) and Advanced Planner and Optimisation (APO). SAP recently has grouped these "*second wave*" products and its ERP system (R/3) with added e-Commerce functionality (Workplace/Portal and Marketplace) and referred to it as mySAP.com. Table 1 reinforces the premise that a significant increase in the implementation of "second wave" products as companies move into the consolidating and mature phases.

Table 1. Second wave Implementations by Year (Bennett, 2001)

Software	Pre 2001 Implementations	Live 2001 Implementations	% Increase	KeyMarket
R/3	506	na		All
CRM	19	69	363%	AU/NZ
eProc	25	56	224%	AU/JP/SG
BW	168	263	156%	AU/JP
APO	32	73	228%	AU/NZ
Workplace	44	122	277%	AU/Korea

ERP Benefits & Barriers

In order to study the benefits and barriers of ERP implementations a previous Australian study by Deloitte's Consulting (1999) was used to set the benchmark categories of benefits and barriers. Deloittes also categorised the barriers as being People (P), Business Process (Pr) or Technology (T) focussed (See Table 2). These categories formed the basis for the survey sent to respondents.

Table 2. ERP Benefits & Barriers (Deloitte, 1999)

R/3 Benefits	R/3 Barrier	Focus
Financial Cycle Close Reduction	Lack of Discipline	P
Productivity Improvements	Lack of Change Management	P
Procurement Cost Reduction	Inadequate Training	P
Order Management Improvements	Poor Reporting Procedures	T
On Time Delivery Improvements	Inadequate Process Engineering	PR
Personnel Reductions	Misplaced Benefit Ownership	P
IT Cost Reduction	Inadequate Internal Staff	P
Cash Management Improvement	Poor Prioritisation of Resources	T
Inventory Reductions	Poor Software Functionality	T
Maintenance Reduction	Inadequate Ongoing Support	T
Transportation/Logistics Reduction	Poor Business Performance	PR
Revenue/Profit Increase	Under Performed Project Team	P
	Poor Application Management	T
	Upgrades Performed poorly	T

RESEARCH QUESTIONS

The primary objective of the study was to survey a range of information system professionals and seek responses to issues including the current & historical SAP implementation details and to further ascertain the penetration of "second wave" products together with the degree by which organisations use metrics for their core and "second wave" systems. The first part of the study as presented in this paper provides an analysis of the views of 48 IS professionals. More specifically the research questions of the paper are:

RQ1. What are the expected versus actual benefits of ERP systems?
RQ2. What are barriers to attainment of ERP benefits?
RQ3. What performance metrics are used to analyse ERP products?

METHODOLOGY

The research questions were studied by gathering data in a survey of those information system professionals listed as working within a cross-section of the Australian marketplace. The SAP Australian User Group(SAUG) commissioned this research to provide added value to their members and to contribute to the ERP research base in Australia. The user group lists many of Australia's leading companies as its members and represents approximately 50% of the SAP customers. The key contact details for each member company (166) were provided to the researchers for the purpose of this study. The initial survey instrument was developed based on the fields that were identified in the literature and used email and Web based survey as the delivery platform. Several studies (Stanton & Rogelberg, 2001; Dillman, 1998; Comley, 1996; Mehta & Sivadas, 1995) have compared email and Web based survey methods versus mail information collection methods and have proposed that email surveys compared favourably with the postal methods in the areas of cost, speed, quality and response rate. The use of an email directing the respondent to a web site was used with the initial web direction being sent to 166 user group members. It was necessary to preen the email address book to remove and amend email that had bounced back.

RESULTS

Survey Instrument

The survey instrument had 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 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 2 unusable replies leaving a total of 48 usable responses out of 151 possible respondents. The overall response rate once removing the undeliverable addresses was 31%.

Demographics

Responses were received from 48 IS professionals and the data was analysed to present position, organisation type, organisation size, revenue and number of SAP users. Responses for the whole cohort are presented in Table 3. Respondents were predominantly high in the organisational structure being either an IS or business manager. They were mainly from a spread of organisations that spanned most sectors of the Australian marketplace. Respondents came from all spectrums of business as determined by organisation spend.

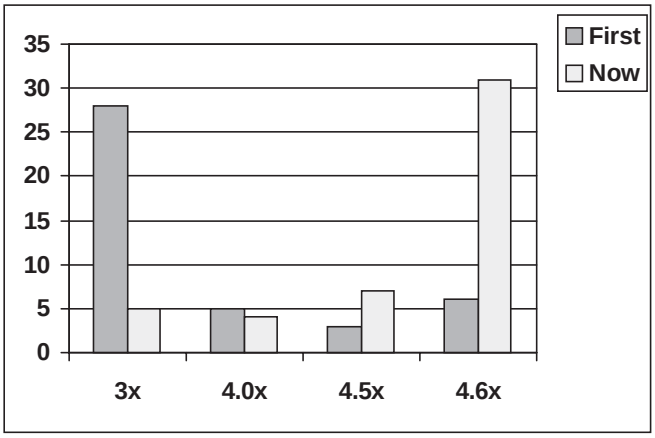
Table 3. Demographic Breakdown Of Respondents (N=48)

Position	No	Organisation type	No	Organisation	No
Revenue($AUDmillion)		No			
CIO	6	Public Service	11	Large(>1000)	21
IT Manager	10	Manufacturing	8	Large-Med(750-1000)	8
Support & Services Manager	8	Utility	7	Med-Large(500-749)	3
SAP Manager	8	Mining Oil & Gas	6	Medium(250-499)	10
Business Manager	14	Services	4	Small(<250)	6
IT Development	2	Education	2		
		Chemicals	1		
		Other	9		
		Number FTEs	**No.**	**Number SAP Users**	**No.**
		>1001	33	>501	25
		502-1000	3	251-500	8
		101-500	8	101-250	8
		<100	1	<100	7
Total	48	Total	48	Total	48

R/3 Profile

The R/3 profile was sought from the sample. As would be expected many organisations had a 3.x version as their initial implementation but

Graph 1. Core R/3 System Profile (N=48)



have upgraded to the later 4.6 version. The 4.6 version has the increased functionality to introduce second wave "e" functionality and these organisations are well positioned to move to these new applications. Graph 1. shows the implementation histories.

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 4. 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 actual benefits fell into two distinct groups; differences of less than 1 likert point and difference of greater than one likert point (Table 4). IT Costs seem to be the most under-performed benefits with a difference of 1.5.

Table 4. 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

Core R/3 Barriers

Respondents were asked to rate on a seven point likert scale the expected barriers of their R/3 systems. AS mentioned previously the Deloitte categories were used to specify the nature of the barriers and these are shown in Table 6. People based barriers seem to dominate; Discipline (4.4), Change management (4.3), Training (4.2) and Internal Staff (3.3) all show that the implementation are firstly people projects. Technical based barriers were rated lower; Software (2.9), Upgrades (1.6) and Application (2.2). This would show that technical issues are not insurmountable and are really well supported.

Table 6. Current R/3 Obstacles/Barriers (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	PR
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

P = People, PR = Process, T = Technology

Financial Performance Measures

It was considered important that for companies need to move towards benefits realisation then there should be some form of assessment of the current level of benefits from their ERP system. The respondents were asked to indicate if their organisation had formal financial measures for their core R/3 systems. The majority (72%) of the organisational had no formal ROI in place. Further, the majority of organisations had no ROI (52%) or break-even (64%) planned or estimated. The financial responses are in Table 7.

Table 7. Financial Performance Data (N=48)

Formal ROI In-Place	%	Time-Frame	ROI Planned %	Break-Even Estimated %
No	72	Less 2 Years	5	10
Yes	28	2-5 Years	32	16
		Greater 5 Years	10	10
		None Planned	53	64

DISCUSSION

What are the expected versus actual benefits of core R/3 systems?

The SAP ERP system provides a range of tangible and intangible benefits to companies as identified by the sample. A respondent commented on the ability of SAP to provide a platform for future business operations,

"SAP benefits - consolidation of IT systems, a common view (or "a single truth") as data is common to all".

Additionally another respondent commented,

"SAP provides the framework to add required additional functionality and expand its user base with future business expansion".

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. Previous research (Deliotte, 1999) 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. The trouble was that the "partly" was difficult to calculate. This difficulty with strategic benefits has an impact on the ROI type cost benefit analysis. Another

respondent to the survey also commented on this strategic benefit,

The largest gap between expected and realised benefits was that of a reduction in IT costs. Research (Deloitte, 1999) has shown that this failure of ERP systems to live up to this expectation is not limited to any one ERP vendor.

What are barriers to 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 related to people issues. Five of the top seven obstacles could be classified as people issues. It interesting to note that two of the top three issues are related to change management. A respondent touched upon this point,

"… additionally the culture was not geared for the solution when it was rolled out. Change Management was poorly handled and this showed in user acceptance of the system".

A number of the respondents commented on the lack of management support and understanding,

"*….Insufficient management awareness of SAP capability, leading to sub-optimal use of SAP in the business*".

"*A big part of our issue was lack of management support for implementation due to changes in mgmt team and direction mid-stream".*

Another respondent commented on the inability of the organisation to properly integrate the ERP with current business operations,

"Like many public sector organisations we have implemented SAP and only use a fraction of the functionality without attempting to integrate with operational systems. This has resulted in the cost and effort required for an ERP when we only have an accounting system".

What performance metrics are used to analyse core SAP and second wave products?

The study indicated that the majority (73%) of the sampled companies had no formal measures in place to measure return on investment from their ERP implementation. However when companies were asked to estimate the time frame for ROI twenty-one companies responded. Of these 81% expected a ROI in less than five years. Respondents indicated that the lack of formal ROI in place in organisations can have several explanations. Older implementations may have had ROIs done initially but once the implementation consultants/team moved on the ROI was not a priority task. There was also some comment how an upcoming upgrade or the adoption of added functionality means that the R/3 system never stands still long enough to be measured.

CONCLUSION

Many companies implemented an 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 implementing new components such as data warehousing, customer relationship management or advanced planning and optimisation. The purpose of this research was to present the findings of a research project investigating the nature of ERP implementations in Australia, the benefits and barriers in implementation, the measures for measuring the investment in the ERP system and the push into "second wave" applications. Australian SAP customers have reached a level of maturity in their use of ERP systems. First implementations have been in-place between 2-4 year with the majority of the sample undertaken at least one major upgrade. Further, a significant number have implemented "second wave" functionality with at least one of the mySAP component. The results show that when considering a range of benefits implementations do not live up to their expectations. People-related issues dominated the barriers to attaining expected benefits with change management ranked very highly. Software, hardware or integration issues were not ranked highly. There was a lack of metrics used to measure the financial "success" of the core implementations. The main reasons for the lack of financial metrics seemed to be constantly moving implementations that are difficult to measure, difficulty in quantifying and measuring benefits and the fluid nature of organisations in stressed commercial environments.

In the Australasian region many companies are now looking at how to get added benefits from their initial investment in their ERP system. They are increasing the level of functionality offered by their ERP system or implementing some of the "bolt on" solutions such as data warehousing and customer relationship management. It appears that many companies were pushed down the ERP path by year 2000 compliancy and or poor disparate systems. These implementations have matured to a certain extent enabling companies to investigate how they can further leverage their investment in the ERP system. The second-wave of implementations are proactive compared to the reactive nature of initial implementations and are strategic in nature forming the basis for future initiatives.

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