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IMPACTS OF ENTERPRISE RESOURCE PLANNING IMPLEMENTATION ON DECISION MAKING PROCESSES IN AUSTRALIAN ORGANISATIONS

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1 ABSTRACT

This paper reports on findings from the first phase of research investigating Enterprise Resource Planning (ERP) and its impact on decision making process in Australian organisations. The focus of the study is to reveal if and how the vast amount of data which is generated by ERP systems could improve decision making process on strategic and tactical levels.

The findings are based on data consists of information collected by fifteen semi-structured interviews and observation in fifteen medium-size organisations in different industries operating in Australia who have been using ERP systems for at least five years.

Findings

Managers and stakeholders perceive substantial level of importance and potentials for utilising ERP system and data in order to improve decision making process on strategic and tactical levels. However operational issues such as integration, upgrade spiral and decoupled implementations prevent these benefits to be materialised in Australian organisations. These factors and their impacts on utilising ERP towards more strategic benefits are discussed and analysed in this paper.

Limitations

The study utilised a purposefully selected sample that was neither large nor random; thus, the findings cannot be generalised in the manner presumed by a quantitative study. The researchers' knowledge and experience on the subject reflected upon the way findings been emerged.

Practical implications

The resultant learning issues in conjunction with the conclusion of the study may help ERP customers in identifying the potential enhancements to utilise customers' investment on ERP towards more strategic objectives such as supporting decision making process. It also may help ERP vendors to identify key areas in ERP systems which require improvement to support decision making process.

Keywords: ERP, Decision Making, Decision Support Systems

2 INTRODUCTION

2.1 ERP Definition and evolution

In recent decades, the term ERP has been used by both practitioners and academics in divergent applications and as a result it has acquired number of different meanings and also allowed for confusion regarding the meaning of the term. In fact, the term ERP itself could have contributed to the confusion, as 'Resource Planning' is not the main purpose of acquiring ERP systems.

ERP is a set of integrated, configurable information systems applications software that can be bought 'off-the-shelf' and tailored by an organisation in order to integrate and share its information and related business processes within and across functional areas (Davenport, 2000a). Such off-the-shelf packages (as opposed to applications built in-house) help organisations manage important aspects of their business, such as accounting, finance, manufacturing, distribution, human resources and sales (Kumar, 2000; Kumar, 2002). ERP eventually enables organisations to achieve inter-organisational supply chains (Boonstra, 2005; Akkermans et al., 2003) by evolving into Extended ERP systems that can exploit technological advances in the areas of internet and electronic commerce, and support inter-organisational processes on an extended network of supplier and distributors (Gupta and Kohli, 2004).

The fundamental capabilities of ERP systems come from transaction processing and structured record keeping of those transactions, and not 'planning' as the name Enterprise Resource Planning suggests. Although planning and decision support applications can be optional add-ons, they are not the core capabilities of the system (Jacobs and Bendoly, 2003).

During the 1990s, ERP systems evolved as a logical extension of manufacturing information systems, such as inventory control, Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRPII), and became a de-facto standard in industry (Akkermans et al., 2003).

Driving forces behind this evolution were software vendors and manufacturing companies. Software vendors were trying to design standard software packages that required minimum customisation and that could be sold across organisations within multiple markets. The rationale was that all contemporary organisations follow a set of generic and similar business processes that could be standardised and built upon 'best practices' with minor customisation. This aim was achieved by incorporating enterprise processes such as operations, logistics, finance, accounting, sales, order management and human resources into the MRPII systems (Kumar and Hillegersberg, 2000).

Another driving force behind ERP evolution was that large number of enterprises unstintingly established ERP systems with the hope of regaining control over their scattered separated systems and saving their company from the potentially devastating Y2K (millennium) bug (Klaus et al. 2000; Kremers and Dissel, 2000).

The rise of ERP peaked in the mid-1990s as many of the organisations found themselves increasingly situated within a global context. They started to move away from decentralised computer systems in favour of enterprise-wide initiatives for organisational transformation and with hope for cost reduction, improved productivity and integration (Walsham, 2001).

However, the anticipated reduction in costs and improvements in productivity and integration in many cases were not realised. Many companies found that, by adopting ERP, their IT expenditure had increased because of high maintenance costs and failure rates, and, furthermore, they failed to utilise the new systems to an optimum level (Krumbholz, 2005). Numerous surveys, case studies and reports have highlighted implementation problems and failures (e.g. Bingi et al., 1999; Brynjolfsson and Hitt, 1996, 1998; Buckhout et al., 1999; Davenport, 1998b, 2000a). For example, Standish Group's report,

indicated that, on average, ERP implementation projects were 178% over budget, took 2.5 times as long as intended and delivered only 30% of the promised benefits (Krumbholz et al., 2000).

By the start of the new century, maturing ERP market and general pessimism towards ERP which was a result of high failure rate in ERP implementations caused several years of stagnation and even zero growth in ERP market. The situation was exacerbated by the post-Y2K harsh economic climate, with shrinking IT budgets and severe restrictions on capital expenditure. These driving forces have changed ERP vendors' strategies, products and structures dramatically, leading to more consolidation and mergers, second tier and service sector market exploration and vertical market specialisation (Frost and Sullivan, 2004; IDC, April 2004; Locke and Moncrief, 2004).

ERP systems have been considered to enable organisations to reorient their departmental functions into enterprise business processes and utilising their investment in ERP not only to cut costs, but also to generate profit by leveraging transactional data into information to help the decision-making process (Davenport, 2000b; Jacobs and Bendoly, 2003). However, operational issues surrounding ERP implementation and usage have stopped many organisations to realise such strategic benefits. In this research we have been investigating if such benefits are materialised in Australian organisations that have been using ERP for the last five years. Also we investigate the main obstacles and contributing factors in this process.

The results will be beneficial to ERP customers, ERP vendors and industry practitioners and academics in identifying the potential key areas in ERP systems which require improvement to support decision making process and in better ways to utilise customers' investment towards more strategic objectives.

2.2 ERP and Decision Making

Decision making is the process of reaching a decision by searching, identifying, analysing and assimilating data via communication and drawing inferences. This process requires supporting information and systems. Information used for decision making have to possess qualities such as accuracy & precision, timeliness & currency, relevance, conciseness, completeness, good presentation and cost-effectiveness. Systems supporting decision making process have to provide benefits such as reduction of communication barriers, uncertainty and noise and regulating decision process. (Soliman and Youssef, 2003).

As an integrated system with perceived benefits of increasing efficiency and effectiveness in all business processes, ERP is a logical candidate for permeating managerial processes such as planning and decision making at tactical and strategic levels by providing required data and supporting system for making quality and timely decisions (Cook and Peterson, 1998; Davenport, 2000a; Holsapple and Sena, 2005). Also, the name ERP suggests 'planning' as an ERP attribute indicating that ERP systems should help management in their planning and decision making activities (Shang and Seddon, 2000; Spathis and Constantinides, 2003). However, despite its potentials, the perceived role of ERP in decision making process has not been investigated rigorously and the vast majority of literature both in the industry and academia spheres has focused on operational issues such as initiation, adaptation and support (Duff and Jain, 1998; Shang and Seddon, 2000; Hayes et al., 2001; Spathis and Constantinides, 2003).

Increasing volume of research on implementation issues and less focus on crucial managerial concepts such as decision making, return on investment and strategic benefits could be associated to the substantial operational challenges that organisations face in ERP implementation and support activities. Davenport (1998b) and Jacobs and Bendoly (2003) argue that operational complexity, and the tedious job to get the system to work, has contributed to less focus on such crucial issues such as improved decision making at tactical and strategic level, return on investment and gaining competitive advantage, although such issues represent potential long-term rationales for ERP acquisition.

Decision support is not explicitly recognised as a major reason for implementing ERP systems and main objectives behind such a big investment remain highly operational issues such as elimination of conflicting information, reduction in data redundancy, standardisation of business processes across business units and efficiency in managing transactions, however operational challenges become less important as companies become more mature in their adaptation process and vendors gain more experience and awareness about design and implementation of ERP systems. As a result, companies who initially implemented ERP to overcome operational and transactional problems tend to subsequently leverage their expectations to more strategic benefits such as decision making. Hawking et al. (2004) argue that companies who are becoming mature in their ERP implementation by achieving operational objectives, start exploring the possibility of leveraging their investment on ERP towards more strategic benefits such as supporting decision making process and information analysis activities. It is only at this stage that the anticipated benefits from the investment in ERP will eventually be realised (Cook and Peterson, 1998; Davenport, 2000a; Holsapple and Sena, 2005).

In addition to literature indicating the importance and need for research in this area, organisations who are looking for ways to leverage their investment on ERP to more strategic benefits and vendors who are facing saturated markets and are looking for ways to add extra features and functionality to their products to keep or extend their market share are driving forces behind the need for research on ERP utilisation beyond its transactional and operational capabilities. However, this area of research remains highly under-researched especially within the Australian context considering the importance of the topic and its impact on both enterprise systems users and vendors. From our literature review, there is clearly a need for research that provides insight on tactical and strategic decision support features and functionality of ERP systems from different perspectives such as user expectations, exhibition of decision support features in ERP systems and actual realisation of such benefits in organisations.

3. ERP SYSTEMS IN AUSTRALIA

ERP market in Australia is made of two tiers. First tier market is made of multi-national companies as customers which is mainly dominated by international giant vendors such as SAP and Oracle. Second tier market is made of SMEs as customers and is more accessible to Australian players with local industry specific knowledge and experience.

The first tier ERP market is highly saturated with estimated 75 to 95 percent of all potential ERP rollouts already completed or underway (Woodhead, 2001; Stein, 2002; Industry Sector Analysis, 1998). Public sector organisations make good portion of this tier along with private organisations in manufacturing, utilities, banking/finance and insurance, mining, defence, retail and human resources sectors. In this research we focus on this tier base don the assumption that they are among the most mature organisations in their ERP adaptation process.

The impacts of harsh economic climate in the start of this century, such as shrinking IT budgets and severe restrictions on capital expenditures has changed the ERP vendors, strategies and products. As its being experienced these driving forces in the ERP market have led to more consolidation and mergers, second tier market exploration, vertical market specialisation and ERP vendors partnership with consultants and integrators.

ERP related research in Australia have been conducted by market research firms and by academia who have strong bounds with the industry. Market research firms such as Frost & Sullivan, Gartner Group Asia Pacific, IDC and PricewaterhouseCoopers have studies ERP market in Australia and Asia. Their reports are mainly market driven and their audiences are ERP vendors.

In the academic world, the need for graduates with ERP experience has urged some universities to collaborate with ERP vendors to create special research groups to overcome some of the skills shortage in the ERP market. ERP researches which have been conducted within the Australian context could be categorised into ERP implementation issues, impacts of ERP on accounting practices, ERP and functional integration and ERP implementation in universities.

4. RESEARCH METHODS

This research is a preliminary step to examine the extent to which adapters of ERP systems benefit from potential decision support characteristics of such systems. The aim is to investigate the problem from different perspectives such as user expectations, exhibition of decision support features in ERP systems and actual realisation of such benefits in practice within Australian organisations.

Decision support characteristics of ERP systems and its utilisation in practice has not been the focus of notable number of research both in industry and academia spheres. The lack of knowledge and theory on the underlying research question is the main reason to design this research as a two-stage study based on qualitative and quantitative methods. In the first stage of this research qualitative methods are utilised to investigate the current status of Australian organisations and industry practitioners in regards to utilising ERP systems towards decision making process. In this stage, semi-structured exploratory interviews with purposefully selected participants were conducted in order to cater for the lack of underlying knowledge and theories and comprehensive studies on the main subject of the research in the Australian context.

In the second stage, gained insight from the qualitative stage is utilised to provide necessary foundation to make effective use of qualitative methods to investigate the subject in more depth and details.

This paper represents findings from the first stage of the research. Paradigm advocated in this paper is qualitative and culminates to assumption that reality is subjective and multiple, and the world can be understood best from the point of view of the individuals directly involved in the activities in question. The emphasis is on understanding the unique features of the phenomenon in subjective reality rather than its totality in objective reality. As a result managers and senior managers involved with ERP systems in Australian organisations were regarded as the most appropriate informants. Semi-structured interview approach with open-ended questions was utilised to collect data consisted of real stories, experiences and insights. Researchers' personal experience with ERP systems also contributed to the construction of meanings throughout the research process (Nightingale and Cromby, 1999, p. 228).

4.1 Participants

Research participants were purposefully selected from Australian organisations in technology, defence, financials, logistics and telecommunications. All of these organisations are in the first tier ERP market and have been using at least two of the main ERP modules (manufacturing, financials, and human resources) for the last five years. Participants were senior managers and middle managers and professionals who can potentially benefit from ERP decision making capabilities or have been involved with implementation and day to day use of ERP systems in those organisations.

4.2 Data collection

For the first stage of this study data consists of material collected from semi-structured interviews with open-ended questions conducted with twenty participants, reflection notes which were taken during interviews and researchers' personal experience with ERP systems. In order to enhance interview process and to improve interviewer's skills and questions quality, few pilot interviews were conducted with researcher's colleagues. After pilot interviews, interviews with participants were conducted in participants' offices and in two cases by phone.

Prior to each interview, interviewee was briefed of the study objectives. Also information statement and consent form were presented to each participant for their review and signature. Also, with participants' permission all interviews were digitally recorded and interview transcripts were produced after each interview. Reflection notes were attached in each interview transcript as an appendix. Audio

files were repeatedly listened to ensure no omissions. Final transcripts were emailed to participants for their review and approval.

4.3 Data Analysis

Interview transcripts were analysed according to an open coding technique (Strauss and Corbin, 1990). Data was first broken down by taking apart sentences, paragraphs, reflection notes and observations. Each separate idea or event was given a name. Data were then regrouped into categories that pull together groups of ideas and events that become subcategories. The next step was the axial coding which aims to identify main categories and to make connections between them and their subcategories. At this stage of coding researchers' personal experience reflected upon the way these categories and relationship between them was shaped.

3   INTERVIEWS EMERGING THEMES

The followings were the main themes emerging from the interviews. Emerged themes cover a wide spectrum of issues surrounding ERP implementation and usage and it might seem not being directly related to the main question of this research. However, documenting these themes, identifying key parameters and establishing relationship between them, provided valuable fundamental data to build a Systems Dynamic model which is the methodology for studying behaviour of complex feedback systems over time. The System Dynamics model uses quantitative data collected from second phase of data collection. The model, quantification and simulation of this system will be presented in a separate paper.

A summary of emerged themes was communicated with interviewees via email to validate the findings. The validation process raised some discussions and feedbacks helping researchers to increase the validity and reliability of findings and increase the researchers' confidence that these themes are major factors playing roles in ERP implementation and its effects on decision making process within Australian organisations.

3.1 Decision support as an objective for ERP adoptation

There are different views in the literature in regards to decision support as an objective for ERP adoption. For instance, Davenport (1998b) identifies the 'need to make sound and timely business decisions' as a major reason for adopting ERP systems. However, this view is not supported by research and based on most of the current literature; decision support is not explicitly recognised as a major reason for implementing ERP systems (Holsapple and Sena, 2005). Literature suggests that expectations will be changed as organisations reach certain stage of maturity in their adaptation process. Hawking et al. (2004) argue that companies who are becoming mature in their ERP implementation by achieving operational objectives, start exploring the possibility of leveraging their investment on ERP towards more strategic benefits such as supporting decision making process and information analysis activities. It is only at this stage that the anticipated benefits from the investment in ERP will eventually be realised (Cook and Peterson, 1998; Davenport, 2000a; Woodhead, 2001; Stein and Hawking, 2002; Holsapple and Sena, 2005). However this proposition has not been investigated vigorously and it is not supported with empirical evidence.

Based on different studies the first tier ERP market in Australia is highly saturated with estimated 75 to 95 percent of potential ERP rollouts already completed. This includes organisations which could be categorised under the first tier ERP market and most of them completed their ERP rollouts before year 2000. Based on the theory of changing expectation in first paragraph, this community of mature ERP users who are entering the final stage of their evolutionary process of maturity should now be looking for ways to leverage their investment in ERP to the next level, by utilising ERP capabilities towards

decision making and information analysis activities (Woodhead, 2001; Stein and Hawking, 2002). Our interview participants were mainly from this category of organisations.

In line with the literature, an emerging theme in our interviews data analysis is that decision support is not an objective for implementing ERP. The following sentence extracted from one of the interviews highlights this finding:

"My expectations in terms of [ERP] as a decision support tool is pretty low. I think it[ERP] efficiently does the transactions processing and it is integrated, so you can have high degree of confidence in any reports you looking at because it is integrated"

Despite what is suggested in the literature, our data analysis indicates that stakeholders and decision makers' expectations do not change towards strategic benefits by going through maturity process. In fact, the notion of maturity process was questioned and rejected. Based on our finding organisations do not get matured in their ERP implementation in the same way as assumed in the literature. Many factors such as operational obstacles, upgrade spirals, integration complexity and so on emerged as affecting maturity process preventing organisations to exploit the use of ERP for more strategic benefits such as decision making, data analysis and business intelligence (BI). These factors will be discussed in coming paragraphs in more detail. Some of these factors and reasons for most organisations not reaching maturity state are reflected in the following extracts from some of the interviews:

"I have had BI layer in my wish list for almost five years and [I know] for the next five years I know other things that are in front of that. You know it just would not get up. It wouldn't get up because, because of so may things that we still need to do on the basic fabric of the business before that would..."

"I think the other thing you have to keep in mind is always few extraneous things, one is the need to replace stuff or substantially/re-implement, two is vendors that change stuff like PeopleSoft dropping out, Oracle coming in, three is a number of big companies who have done and also acquired other companies they have got all sorts of legacy systems that other companies within the group are using and a lot of their time probably tends to get focused trying to standardise that so you wind up taking them off BAAN or something and putting them on Oracle or whatever, and that takes up quiet a bit of time for a number of companies."

"Probably all things being equal you would imagine that someone who is in steady state business that nothing being acquired, nothing is changed on the outside environment, they have fully implemented ERP for seven years, logically you would say they would exploring more functionality and maybe there some companies out there that are in steady state that could fall into that profile"

"My guess is when you take the core modules that people need to run the business, by the time you get to implementing those five six, whatever core modules you probably then are into a major upgrade of one of the earlier ones and it is major to the extend that almost it is a re-implementation. And you are in that sort of spiral just to keep you core machinery going, let alone getting beyond that"

3.2 ERP decision making features is not an important factor in evaluation process

An emerging theme from our data analysis is that decision support features are not considered to be an important factor in evaluation and selection process. This finding come as no surprise as we also found that these features were not objectives for ERP implementation and as a result they have no role to

play in the evaluation and selection process. This is in line with the findings of limited number of research that investigated the subject (Cook and Peterson, 1998; Davenport, 2000a; Holsapple and Sena, 2005).

Stakeholders' low expectation of ERP decision support features could play a role in the lack of utilisation of existing features and capabilities and also lack of improvement on such features from the vendors side.

3.3 Perceived importance of ERP for decision making process

Although decision making was not found to be an objective for implementing ERP, however, one of the strong emerged themes from our data analysis indicates the substantial level of importance that participants perceived for using ERP data for decision making. However such strong perception that ERP could potentially improve decision quality and timing by providing required data and process fails to materialise as it is explained in the next finding.

3.4 The role of decision support features of ERP in strategic and operational decision making process

One of the perceived benefits of implementing ERP systems is increased efficiency and effectiveness in business processes permeating managerial processes such as planning and decision making at all levels. Benefits such as real-time data availability and integration, are thought to have positive impacts on decision support process (Shang and Seddon, 2000; Spathis and Constantinides, 2003). However, most of these propositions are based on the assumption that integration, data availability and data accuracy which are immediate benefits of a successful ERP implementation should automatically lead to better decision making process across an organisation. In fact none of the above propositions is based on empirical research.

An emerging theme in our data analysis is that information provided by ERP and decision support features of ERP are not playing an important role in strategic decision making, however, we found that in some instances operational decision makers partially benefit from features such as standard and ad-hoc reports and queries. In both strategic and operation decision making processes we did not observe ERP decision making features to be utilised to facilitate the process.

Participants were senior managers in their organisations indicated that their decisions in the boardroom and their day to day decision are not directly affected by information extracted from ERP system let alone utilising ERP as a decision making facilitator. This is reflected in its strongest form in the following statement from finance director of one these companies:

"In fact, in my many years as finance director I can not remember even in one instance walking into the boardroom with a bunch of ERP reports to help us make decisions. We might have referred to reports and figures as supporting materials for our arguments, but formulise or shape a decision purely based on this information never happens."

3.5 Integration and Business Intelligence (BI)

Chou and Tripuramalu (2005) argue that more and more organisations are turning to BI tools that make data collected by ERP and other data-intensive enterprise application meaningful for decision makers and in order to justify their return-on-investment. BI was coined by Howard Dresner of Grthner Group in 1989 to describe a set of concepts and methodologies designed to improve decision making by proving easier and faster access to corporate data across ERP and other enterprise systems. They argue that while ERP systems are designed to capture transactional data, BI tools provide analytical features to examine large volumes of data and generate essential information for decision

making. Integration of BI and ERP systems contributes additional values by providing meaningful analysis such as online analytical processes (OLAP) and data mining tools to discover trends and patterns. Such capabilities increase decision making effectiveness and quality through utilising analytical capability of BI on ERP data which ultimately help organisations to gain competitive advantages (Chou and Tripuramallu, 2005).

Despite the literature and marketing materials indicating the rise of BI as a decision support tool and its acceptance at all levels of the organisation, we found that BI is not utilised in the first tier ERP organisations and is not one of the management priorities in their ERP program. This is reflected in the following extracts from interview transcripts. Chief executive of operations of one of the big defence companies says:

"If anyone says that we are getting ay ROI around BI soon, I don't believe we are. I believe, what'll happen is as we implement every tactical solution toward tactical need and we manage to drive that tactical solution in through the ERP and add yet another foundation building block then people will start to see some benefits of integration"

Many reasons were expressed as contributing factors preventing organisations to utilise BI and to benefit from potential strategic benefits. Operational difficulties such as implementation issues, integration difficulties, spiral upgrades as a result of technology enhancements and rapid waves of merger-acquisition among ERP vendors were some of the issues expressed as these obstacles. These obstacles consume available resources and take first priorities over "non-critical" features (according to the following extract from one of the participants) such as BI constantly. However as an emerging theme, integration between ERP modules and between ERP and other enterprise systems suck as CRM were identified as the main obstacle to BI utilisation. BI can provide real strategic benefits and decision making support when utilised on enterprise level across all departments and functions and this is only achievable if ERP modules and are integrated and sufficient links between other enterprise systems and ERP are established. We found that none the organisations achieve acceptable level of integration between ERP modules and between ERP and other enterprise systems. The following extracts from interviews with financial director of a logistic organisation refer to this theme:

"However, it's more about the fact that you can not have good BI if you do not have the foundation to call on, at the moment we just building the foundation. Integration is the key to BI and this is the only way which BI could be differentiated from reports."

"most people seem to struggle with the cost of implementing and supporting these core modules to be reasonably current with half dozen modules to use this to run the business, as I said we would like to have four or five to put in before we even put the BI on the list and that's just around the core business."

"it is fair to say that there is a lot of what I would call basic functionality that we are not using in number of these things. Around commitment reporting and things I call fundamental to the basic integrity of transaction processing that we are not using and I am far more worried about not using that at the moment than the added layer BI. So BI, I sort of look at it like a lost opportunity but when we are not using the basic functionality it is a risk."

3.6 Decoupled ERP modules

Integration realisation at enterprise level is considered to be one of the main justifications for investment on ERP. In different ERP related studies integration has been directly linked to gaining strategic competitive advantage as a result of leveraging EPR to it full extent (Shang and Seddon, …;

Spathis and Constantinides, 2003; Wieder et al. 2006). However, integration on enterprise data and process levels are proved to be a challenging task for most organisations.

The complexity of integration has forced many organisations to answer such a complex question with a simple answer: decoupled ERP. When companies who invested millions of dollars to integrate their processes and data across the whole organisation find themselves in integration battlefield, they tend to compromise integrated systems for the sake of functional decoupled modules in different departments. Degree of decoupling could be different in different organisation: in some cases there is no real-time connection between any two ERP modules and in some instances vital links exists and only hard to achieve integration goals are compromised.

As an emerging theme in our investigation we observed that ERP systems have been implemented and being used in decoupled model in first tier ERP market in Australian organisations. In these cases implementation complications have forced management to accept decoupled model as a compromise to provide at least operational and transactional functionality across different functions.

Such decoupled ERP modules provide the minimum core transaction functionality across different departments. Usually these departments come up with procedures and mechanisms to pass information between decoupled modules to establish necessary data flow. However, with such compromised setup one of the main objective of ERP implementation which is integrated real-time data availability across organisation (Shang and Seddon, 2000; Spathis and Constantinides, 2003) never materialises.

As integration between ERP module is a vital necessity in order to utilise enterprise system data for decision making (Kalakota and Robinson, 2001), decoupled ERP systems dose not provide such a vital platform for decision making and to utilise Business Intelligence (BI) modules of ERP.

In addition to decoupled ERP systems, departmental centric mentality also seem to be a contributing factor to downgrade ERP valuable data from being utilised in organisational level strategic decision making to departmental data useful for day to day operational use. The following statements from two participants highlight this issue:

"In the ERP evaluation process, if you go back to the debate, everybody in the HR world wanted to have a dedicated tool which was HR exclusive and my view was that it would address the tactical issue. Well, [HR] will be always fundamentally concerns about HR issues; they have the responsibility to deliver a service…"

"I do not believe people here have yet got the context –although it is changing- that we are actually implementing both foundation building box to give us a full ERP. I do no think that people were thinking outside their tactical needs."

3.6 Adaptation process

The majority of the ERP literature is concerned with ERP adaptation. The term 'adaptation' is borrowed from the six-stages model of Kwon and Zmud (1987). In this model adoption refers to acquiring resources, technology and installation and the term adaptation refers to the process of adjustments and changes following the installation of such technology (Kwon and Zmud, 1987; Tyre and Orlikowski, 1994). The term adaptation signifies the importance and complexity of adaptation between the organisation and ERP which include process, technical and cultural issues. While ERP vendors advocate that ERP embodies universally-applicable best practices, in reality adaptation between a company and ERP involves a process of change in both the ERP and the company via customisation, business process review and cultural changes. Numerous studies have investigated adaptation issues including evaluation, implementation, project management, success and failure factors, usage and maintenance, upgrade and extension, change management, business process review and socio-cultural factors affecting ERP implementation and usage.

An emerging theme in our data indicates that one of the main obstacles preventing the utilisation of ERP towards decision making is adaptation process. Numerous implementation issues are among main factors preventing ERP program managers to plan for utilising ERP towards more strategic benefits. The same factors reflected in dollar figures prevent top level management to support spending on decision making features which the main objectives of ERP has not been met yet. This is reflected in the following extract from the interview with finance manager of a big telecommunication company:

"I think we still in transactional issues. Even each module that we have is probably under utilised in terms of its functionality. That's even in the module level. We have just deployed HR. ok, so we would not give ourselves a fantastic score. We would say we survived the transition with the skin of our teeth. But I look at it now and I think Ok, we have now the ability to operate HR at a transacting level in an integrated way across the company. Before, we would ever able to do that. So, I look forward to seeing more and more coherence as we develop … at the moment I would say we just survived, people just got paid, we just managed to maintain the integrity of our data. But it's a survival proposition"

Implementation and operational issues are diverse and covers a broad spectrum from evaluation to business processes and cultural issues. In this research we do not investigate these factors and only investigate them in the context of decision making process and the role they play in that process. However, the following extract from interview with financial director of an aerospace company summarises these issues and their impact on decision making very well:

"I think most companies struggle just to implement the basic stuff and then it becomes affordability issue and … you have less paper and things accelerated and so on and it winds out actually costing you much more than   you think to implement much more you think to run, you don't tend to get the saving you assume you would at the time of implementing it."

"You know our customer is the [governmental organisation] and they struggle to produce their basic accounts. They have been under qualified for the last five years and that's around their basic accounting modules and so on. So there are lots of, assumingly most organisations whether they be in commercial world or NGOs are also affected a lot by outside factors and will have a bearing on whether their priorities in IT spender and the affordability and the rate that they can bring this on, the rate in which their people can assimilate the change and so on. I am not sure if you find a high percentage of companies who fit the profile."

"I am reasonably happy if we get all of our transactions in every area of the business optimised through using an ERP with its speed, accuracy and timeliness. Three very important building blocks to have. If you can get that done and if can do that cost effectively, I would say that's achieved. Probably 80% of what we want from an ERP system and then the other 20% of what would be nice to have from it if we ever could devote the time to getting it an using it, would be some sort of BI layer."

3.7 Upgrade Spiral

Technological advancments, ever increasing rate of merger-consolidation and aqusition among ERP vendors and increasing rate of merger and consolidation among organisations that use ERP systems have contributed to create an upgarde spiral which prevents ERP users to acheive reasonable level of maturity in their adaptation process. As an emerging theme, we found that never ending upgarde spiral consumes most of allocated budget to enterprise systems programs, preventing program managers to

plan for utilisation of ERP in decsion making process. The following extract from interview with the CEO of a defence company expresses this problem:

"…Then it perpetual to some sort of upgrade path which cost you an arm and a leg, licensing and everything else. So, it is a very expensive investment: ERP for us and has been for many companies. Not sure that pay back are being there….. To my mind it has very good transaction processing capabilities and assurance around the output of that which is a good start for any decision making. But I never really seen it to use much beyond that, in my experience….

3.7 Other emerging themes

In our data analysis, the following themes were emerged which are categorised under other factors preventing the utilisation of ERP systems in decision making process:

Selective use of information: in the absence of uniform and standard decision making and business intelligence tools which provides unbiased visibility to organisational data, decision makers and managers give particular weight to information supporting their ideas and actions. At the same time they ignore information which does not support their ideas and actions. This tends to contribute undermining the importance of ERP data for decision making among managers and stakeholders.

Training: in our findings the potential importance of ERP data for decision making was recognised by all participants anonymously, however, we found that majority of managers and decision makers never had any official training on using EPR, interpreting data and the potential benefits gained by using BI modules.

User friendliness and cognitive: many ERP vendors have already invested on making their systems user friendly and equipped with intuitive report writers and BI modules, however, most of legacy systems and older versions of enterprise system which are in use in first tier ERP adapters suffer from the lack of user-friendliness, intuitive report and query generators or any BI modules.

4   FINDINGS AND DISCUSSIONS

There has been little examination on the extent to which decision-support benefits accrue to ERP adopters, or the extent to which they relate to various objectives in an ERP implementation (Holsapple, 2005). Such study in the context of Australian organisations is particularly rare. In this research we utilised semi-structured interviews to gain insight to the current status of Australian organisations and industry practitioners in regards to utilising ERP systems towards decision making process. Based on our data analysis, ERP stakeholders and users perceive ERP to have strong potentials to improve decision making process on strategic and operational levels. However, such important potentials are not among main objectives for investment on ERP. Also we found that these potential benefits are not materialised in practice. Some of the main barriers and factors having effects on this are discussed in this paper and based on these finding some correctional actions are suggested which could be beneficial to both customers and vendors of ERP systems.

Based on our findings ERP adapters perceive substantial level of importance and potentials for utilising ERP data in order to improve decision making process on strategic and tactical levels. Perceived importance of decision support features is also recognised and been identified as a critical feature of such systems in the literature (Holsapple, 2005; Jacobs and Bendoly, 2003). However, supporting decision making process is not among stakeholders' objectives for adopting ERP.

We also found that decision support features of ERP systems do not play an important role in evaluation process which could contribute to minimal materialisation of such benefits in practise. This finding is supported by prior finding that supporting decision making process is not among

stakeholders' objectives for adopting ERP. As supporting decision making process is not an objective then it is not part of evaluation process.

We found that although ERP is perceived to have an important potential role to support decision making process, these benefits are not materialised among first tier Australian ERP adapters. Some of the barriers and contributing factors preventing materialisation of these benefits are discussed in this paper. However, identification of all contributing factors or cause and effects relationship has not been an objective of this research.

We found that ERP adaptation process with its numerous obstacles and difficulties reported in the vast amount of research is among main factors preventing utilisation of ERP towards more strategic benefits. Probably the biggest obstacle of all is achieving reasonable level of integration across enterprise processes and data which in many cases lead to decoupled or semi-integrated ERP implementation. Decoupled or semi-integrated ERP modules implementation is a major compromise on one of the main objectives of investing on ERP. Decoupled modules along with departmental centric mentality also seem to be contributing factors to downgrade ERP valuable data from being utilised in organisational level strategic decision making to departmental data useful for day to day operational use.

In addition to issues related to adaptation process and integration, we found that upgrade spirals as a result of technology advancements, ERP vendors and customers' merger-acquisition consumes most of ERP program allocated resources and prevent BI implementation to be taken seriously among top management and operational teams. In the absence of uniform and standard decision making and BI tools selective use of information to support or reject individual actions and ideas leads to increased mistrust on ERP data and lack of confidence that ERP can provide vital information and can provide necessary process for better decision making.

Some other factors such as management training and systems user friendliness were identified among contributing factors. We found that although potential importance of ERP data for decision making is recognised by all participants anonymously, the majority of managers and decision makers never had any official training on using EPR, interpreting data and the potential benefits gained by using BI modules. Also, although many ERP vendors have already invested on making their systems user friendly and equipped with intuitive report writers and BI modules, most legacy systems and older versions of enterprise systems which are in use in first tier ERP adapters suffer from the lack of user-friendliness, intuitive report and query generators or any BI modules.

Practical Steps

Overall, the need for decision support functionality in ERP systems is widely recognised and, in principle, ERP should support decision-making processes. However operational issues and especially integration complexity prevents organisations to achieve any of the above. In this situation, organisations should consider more manageable implementation scenarios which are suitable for their requirements and could minimise their risk of being trapped in integration battleground. By taking advantage of new technological advancements in integration techniques, integrating separate systems does not seem to be as difficult as before and building interfaces between these systems does not require huge amount of investment. Also we found that many ERPs are being implemented in a decoupled fashion and as such the real benefits of highly priced integration never gained.

As a result, despite the perception that integration is only achievable through native modular integration which is available in ERP, we argue that Best of Bread (BoB) solutions could be a viable option for many organisations and they should certainly consider BoB as an option in their evaluation process. By considering BoB, these organisations could minimise their implementation risk and cost. Also they could distribute implementation cost and efforts over a period of time which is suitable for the business. Taking advantage of BoB could save organisations thousands of dollars by utilising their current system in the new implementation by investing in integrating them with the new systems

rather than scraping them all together. The end result could be a cheaper system with even higher degree of integration compare to a decoupled ERP.

For most organisations that are struggling to overcome their operational issues, BI implementation seems to be highly idealistic. However, utilising available data in ERP does not need to be waiting for a complex BI implementation. Using new integration, web and programming techniques building data marts based on ERP and other disparate systems which eventually lead to data warehouse and potentially BI are practical steps towards utilising ERP data for decision making.

Management commitments and support is one of the main success factors to any to BI programs. By providing necessary training to management training on using EPR, interpreting data and the potential benefits gained by using BI, organisations could increase their chance for utilising valuable ERP data towards gaining competitive advantage. Increasing management knowledge could contribute to high expectations of ERP decision support features which could have a positive impacts on the utilisation of existing features and capabilities within the organisation.

ERP vendors should consider investing in integration techniques and building intuitive BI modules.

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