

BEYOND ENTERPRISE RESOURCE PLANNING PROJECTS: INNOVATIVE STRATEGIES FOR COMPETITIVE ADVANTAGE

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ABSTRACT

A rapidly changing business environment and legacy IT problems has resulted in many organisations implementing standard package solutions. This 'common systems' approach establishes a common IT and business process infrastructure within organisations and its increasing dominance raises several important strategic issues. These are to what extent do common systems impose common business processes and management systems on competing firms, and what is the source of competitive advantage if the majority of firms employ almost identical information systems and business processes? A theoretical framework based on research into legacy systems and earlier IT strategy literature is used to analyse three case studies in the manufacturing, chemical and IT industries. It is shown that the organisations are treating common systems as the core of their organisations' abilities to manage business transactions. To achieve competitive advantage they are clothing these common systems with information systems designed to capture information about competitors, customers and suppliers, and to provide a basis for sharing knowledge within the organisation and ultimately with economic partners. The importance of these approaches to other organisations and industries is analysed and an attempt is made at outlining the strategic options open to firms beyond the implementation of common business systems.

INTRODUCTION

Traditional systems design methods focus on the technical development of systems and their organisational implementation. A wide range of proprietary and generic methodologies have been developed, e.g. Andersen's Workbench, IBM's critical success factors and generic methodologies such as SSADM. These approaches were designed to improve the success rate of IT projects by improving the formal project management and also by providing a standard, 'best', structure for the evolution of an IT project. In the past five years there has been a dramatic shift away from bespoke systems to standard systems (Price Waterhouse 1996). Whilst this does not invalidate the concepts developed in the earlier models, it does dramatically change the focus of effort from traditional systems design to software configuration and business process change. In this paper the authors investigate the impact of standard systems

on organisation design and strategy. The research question that becomes paramount in the era of standard systems is what are the sources for competitive advantage in individual firms? Are there different strategies that organisations can employ to exploit standard enterprise computing infrastructures to achieve competitive advantage. Early research into IT and competitive advantage centred on IS application development related to unique business strategies. The research question raised by the stampede towards standard systems is what will be the basis of competitive advantage if organisations are effectively adopting standard business models which are globally dominant? What is the potential for developing differentiation or novel business strategies if the underlying IT infrastructures are almost identical? These problems are addressed through an analysis of three case studies and future research opportunities in this new and important area are outlined.

ERP SYSTEMS

Enterprise Resource Planning (ERP) systems are highly integrated software packages that automate core corporate activities such as finance, human resources, manufacturing and supply and distribution. They superseded manufacturing resource planning or materials requirements planning (MRP) systems towards the end of the 1980s and have become the strategic de facto standard in many companies over the past five years. AMR Research (1998) state that market for ERP systems in 1997 was worth \$15.68 billion and that this is likely to increase at a compound rate of 36% to \$72.63 billion by the year 2002. Furthermore, Deloitte and Touche LLP (1997) state that ERP is now the preferred method by which businesses replace legacy systems. The market is dominated by five major players SAP, Oracle, Baan, Peoplesoft and JD Edwards, who in 1996 accounted for over 60% of the market (Edmondson Baker and Cortese 1997). The rest of the market is occupied by smaller vendors that have either focussed upon smaller companies or that have been swamped by the leaders. The consultancy associated with the implementation of ERP systems is also a large market currently standing at around the \$30 billion mark (Baker 1998). The sectors adopting ERP solutions are diverse. Implementations are currently in progress throughout industries such as chemicals, retail, electronics, IT, textiles and the public sector in areas such as health care and higher education.

The major reason for the shift towards ERP/standard packages has already been noted - the need to deal with legacy systems. Many existing systems have become so difficult and costly to maintain, inflexible and misaligned with business strategy that firms have taken a clean slate approach towards their IT strategy. There are two key reasons for the occurrence of this situation. First, markets and industries have become more international requiring organisations to adopt business and IT strategies that are congruent with this. Only five years ago software was usually purchased and implemented locally but now as companies are having to manage international operations international systems and strategies are the imperative (Newing 1998a). However, the systems and structures present within these organisations could not be modified to support this need thereby creating misalignment. The second reason for the shift towards standard systems is concerned with the year 2000 problem (Taylor 1998). As many organisations had developed their systems over a long period of time, the IT legacy systems have become characterised by high levels of entropy and degradation meaning that making them year 2000 compliant would be difficult.

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These two issues combined sealed the fate of IT legacy systems displaying these characteristics and firms looked for alternative solutions that appeared to overcome these problems.

There are several other reasons for the stampede towards standard systems that are similar to those given for the implementation of MRP systems. Lockett Barrar and Polding (1991) highlight that the growing competition between organisations led to the need for efficiencies and integration - MRP purported to do this. Roberts and Barrar (1992) summarise literature on further reasons for implementing MRP systems and these included the reduction in inventories, lead times and costs, market responsiveness, improved control, increased competitiveness and improved organisational communication. Many of these reasons are highlighted in the current literature on ERP systems (Holland and Light 1999, Kay 1998, Martin, 1998, Appleton 1997). In addition to these, and the broad legacy and year 2000 problems, ERP and standard systems have been embraced as they are a step in the direction for controlling escalating IT costs, increase development speed and reduce development staff requirements, offer greater functionality and give firms a constantly current IT capability (Price Waterhouse 1996).

RESEARCH PROBLEM AND METHOD

ERP Systems such as SAP, BAAN and Intenia incorporate standard technical approaches to solving business problems across a wide range of industries. These standard packages implicitly contain an organisational model or information blueprint of how the company should operate:

An enterprise system, by its very nature, imposes its own logic on a company's strategy, organization and culture... it pushes a company towards generic processes even when customized processes may be the source of competitive advantage.

Davenport, 1998, p. 122.

The ERP systems are process oriented and require organisations to adopt this process oriented philosophy leading to the abandonment of functional silos. Organisations are forced to reengineer their businesses in order to align business and IT in a way that was not possible with their existing legacy systems. ERP systems align business and IT strategies with an IT and business process infrastructure embedded within the standard software that is based upon 'best practice'. This thinking is supported and marketed by

consultancy companies. Coopers and Lybrand state that companies can change their processes to match package software and offer any SAP implementation as an example (Knowles 1997). KPMG (1998) state that organisations spend too much time and money adapting the package to meet their own preconceptions. They advise that a better approach is to reach a 'workable compromise of best practice business processes' and that modern packages often deliver equal or better quality business solutions than organisations. The idea that the business might have to change procedures in order to work with a standard package has long since been recognised (Lucas Walton and Ginzberg 1988). However, standard packages have not, until now, had such a significant influence. ERP systems are much more than simple standard systems because they prescribe standard business models of how organisations should manage and control business processes. Previously, standard applications provided only a common platform out of which a bespoke development could be moulded. The extent of the standardisation of business processes has been estimated by Intenia to be over 80% across all industries. KPMG (1998) also state that around 80% of an organisations business processes can be performed by a standard package. Within a specific industry this could be over 90% although the dearth of finished ERP projects makes this difficult to assess in practice. However, it is reasonably certain that the level of standardisation of both systems and business processes is extremely high and in some industries such as petrochemicals the top 10 organisations in the world have all implemented the same standard software package.

Until the last year, the ERP band wagon had not been driven down the roads of small and medium sized companies, the major reason being high implementation cost. However, the major players are developing their software to tap into this market with SAP being particularly aggressive. They have developed Accelerated SAP - ASAP (Dolmetsh Huber and Fleisch 1998) and a joint venture with Intel in the form of Pandesic (Edmondson Baker and Cortese 1997). Both of these ventures are aimed at the small and medium sized business market and both based on systems with less functionality than SAP R/3 but which still incorporate standardised IT and business processes. Furthermore, big businesses are going through the ERP implementation process and are requiring their suppliers to have ERP software (Brown 1997). Consequently, there is the potential for all sizes of players in diverse industry sectors to have adopted common IT and business processes.

It is becoming increasingly clear that the resulting operational synergies generated by implementation

of these systems alone are no longer likely to be powerful enough to provide competitive advantage in an increasingly dynamic global market place. This raises important and interesting research questions that are considered in this paper:

- a) To what extent do standard systems impose standard business processes on organisations?
- b) If organisations are adopting standard systems and business processes, is IT still viewed as providing competitive advantage? If it is, how is this facilitated by the organisations adopting standard solutions?

CASE STUDY METHOD

The ideas in this paper are based upon case study research conducted in seven international companies representing various industries. The data from three of these cases is presented here. The aim of using the case study method was to build theory that contributed to developing an understanding of the effects of standard systems upon business processes and how competitive advantage can be achieved by companies with common business processes and IT infrastructures (Eisenhardt 1989). A case study research strategy was also employed as the area under investigation was contemporary and understanding it posed explanatory process and context questions which dealt with operational links over time (Yin 1994). Cases were sought and included by a process of *theoretical sampling* and this enabled theoretical development. That is, organisations were approached that were actively engaged in the research problem area. A specification of a-priori constructs was developed and revised as the research progressed. This structured enquiry allowing for efficient and relevant data collection. The cases were compiled on the basis of material from interviews conducted with key personnel within the organisations. Further documentary evidence included IT and business plans, strategy documents, consultancy reports and annual accounts. Case data ceased to be collected when it became clear that theoretical saturation had been reached. That is, when a clear pattern in respect of the research problem was evident in the case data collected from the organisations. The case data shows the wide range of companies and industries adopting standard software solutions indicating the pervasive nature of legacy systems problems and the move away from bespoke development throughout the business environment. This reinforces the need to further understand the whole area of standard software and particularly ERP software.

RESEARCH FRAMEWORK

The research framework is shown in Figure 1. It aims to explain the issues and relationships in respect of the adoption of standard systems by organisations. Organisations will face business pressures and, over time, will have developed legacy systems. This combination of legacy systems and business pressures has necessitated many organisations adopting a common systems strategy. The common systems strategy

incorporates a common IT strategy and common business process strategy which in turn necessitates the development of novel IT and business strategies by the organisation in order to maintain or obtain competitive advantage. The common systems strategy and innovative strategies for competitive advantage will then form the basis of the organisations future legacy systems. Each of the constructs is now defined before the framework is applied to three cases from the theoretical sample.

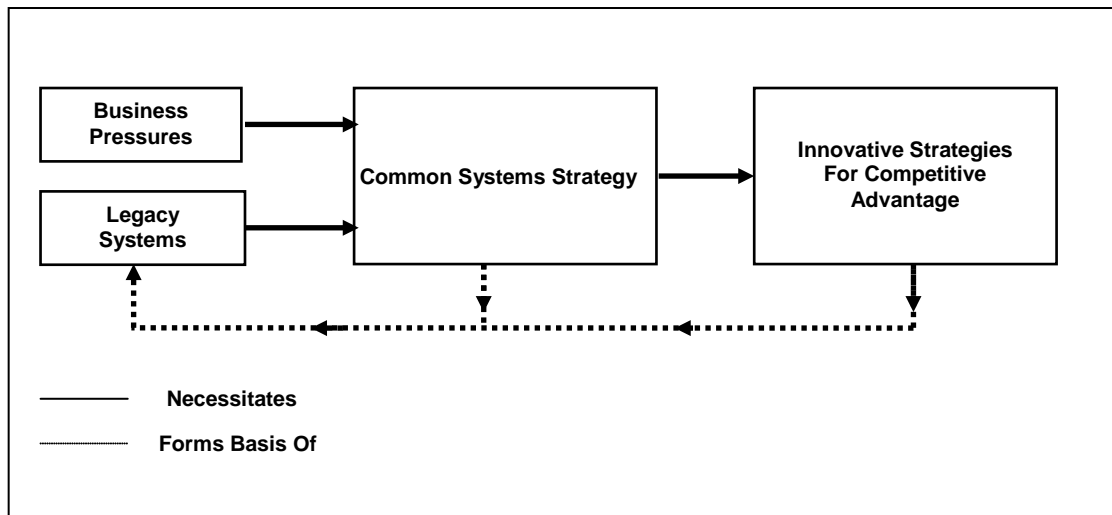


Figure 1. The Research Framework

Business Pressures

Business pressures are those factors which may impact upon organisations generating opportunities and threats (Porter 1980). This paper identifies four broad categories of pressures: globalisation – those stemming from the transformation of the world's economy from a set of national and regional markets to set which operate without regard to national boundaries, deregulation – emergent pressures resulting from the liberalisation of previously regulated markets, technology – those factors affecting business driven by existing and emerging technologies, competitive forces – the factors which influence the positioning capability of organisations in relation to their rivals. These pressures may trigger change which may result in organisations having to deal with legacy systems issues.

Legacy Systems

Definitions of legacy systems are numerous. Ward (1995) refers to the notion of inheritance and the idea that IT legacy systems run out-dated software on yesterdays technologies. Young-Gul (1997) states that they are software systems that are hard

to maintain. These definitions and the others that have focussed upon the technical nature of IT legacy systems such as Adolph (1996) and Sneed (1995) provide a valuable insight into the technical nature of legacy systems however, they provide a limited explanation of their impact upon organisations. Bennett (1994) takes a greater business focus stating that they are software systems that are vital to organisations but ones which they do not know how to cope with. In addition to the technical dimension, the authors propose a business aspect to legacy systems. Johnson (1992) states that an organisation's strategies will emerge in the light of a cultural web which includes organisational rituals, routines, stories and myths, symbols, power structures and organisation structures. The authors extend this idea to that of a business legacy which comprises the existing characteristics of an organisation such as its structures, processes, strategy and cultures.

Common Systems Strategy

A common systems strategy is increasingly becoming the most popular method for many organisations to, as they would say, "effectively deal with their legacy systems". It involves the

adoption of a standard package information system with minimal modifications and results in standard business processes. This approach is also referred to as a 'Vanilla' implementation (Newing 1998b). A common systems strategy is comprised of *common IT* and *common business processes*. Common IT is formed when an organisation chooses to implement a standard system and perform only minimal or zero modification to it. It is referred to as common because organisations taking this approach will end up with similar systems to those of others doing the same. Common business processes will also be evident as a result. These are the set of business processes implicit within the common IT that is being implemented. It has already been noted that ERP systems impose implicit business process logic upon organisations that implement the software (Holland et. al 1999). As with common IT, two organisations implementing the same system are therefore likely to have very similar business processes where supported by the ERP system. By accepting the IT and its implicit business processes, organisations are forced to undergo reengineering to achieve the IT - business fit. These processes are often proposed to be best practice by vendors of the systems and consultants working on implementation projects. This ethos is therefore used to encourage the organisation to adopt a common systems approach.

Innovative Strategies For Competitive Advantage

Innovative strategies for competitive advantage harness IT and business thinking in the light of a common systems strategy. They are comprised of a novel IT strategy and a novel business strategy. Like other strategies which incorporate a business and IT component a high degree of alignment should present between the two (Henderson and Venkatraman 1991, Boynton et. al. 1992, Reich

and Benbasat 1996). Consequently, novel IT and business strategies are likely to support and augment each other. Novel IT strategies afford organisations the ability to obtain or retain competitive advantage in the light of adopting a common systems strategy that is likely to have left them with IT systems and business processes similar to their competitors. Examples of Novel IT strategies include the use of IT packages such as Lotus Notes to manage non-transactional data, internet technology based systems that facilitate the customer and supplier facing aspects of the business plus computer aided design (CAD) and computer aided manufacturing (CAM) systems which aid the design and manufacturing processes. Novel business strategies focus upon generating competitive advantage for an organisation in much the same way as novel IT strategies do. However, here the focus is upon generating distinctive capabilities from a common set of capabilities laid down by the common business processes the organisation may share with competitors whom have adopted a common systems approach. Examples of this may include the development of inter-organisational co-operation and co-ordination along the supply chain, the enactment of time based strategies or shifts towards disintermediation.

CASE DATA

Table 1 summarises a selection of the cases in the study which demonstrate the idea of Beyond ERP. The first case, Pump, is based a global manufacturing company and their sales support system. Case two, Chemical, is based on a global chemical conglomerate and their marketing information system. The final case, CompCo, is based on a national IT services provider and their customer service system.

Table 1. Case Data

| Company-Industry | Pump - Manufacturing | Chemical - Chemicals | CompCo - IT |
|--|--|--|--|
| Construct | | | |
| Business Pressures | It was necessary to co-ordinate and consolidate world-wide operations due to global competition. The national entities could no longer afford to source materials individually, particularly for large orders. | The industry's mode of competition was mostly cost based which required efficient business processes. Chemical was also globalising, requiring integrated systems that could give the perspective required to operate in the market. | The sector was becoming increasingly customer oriented and more technologically advanced. Customer service and the associated information support were a prerequisite in the market. CompCo were lacking in this respect. |
| Legacy Systems | Pump was a conglomerate of national entities each with individual histories, ways of work and management teams. The IT infrastructure reflected this. The European headquarters had a standard package MRP system from the early 1980's which was not year 2000 compliant. It had been modified, had become bespoke in nature and not supported by the vendor. The rest of the national entities were in a similar position. | Chemical had been acquired which resulted in a reorganisation. It was functionally organised but process oriented due to an abandoned MRPII implementation (due to the acquisition). Systems had been developed in house during the 1980's, were highly bespoke, complex and lacked integration. They were also not year 2000 compliant. | CompCo had a history of change due to the recession in the UK throughout the early 1990's and the fragmentation of the parent company into three divisions (Compco being one of the divisions). Systems had been developed in the early 1980's by a software house and were not year 2000 compliant. The systems were bespoke and as a result, this meant that there were significant maintenance and business alignment issues. |
| Common Systems Strategy | A standard package ERP system was implemented without modification. A skeleton approach was taken in order to facilitate the implementation process. That is, the adoption of a basic business process model so as to take advantage of the system's capabilities in a short period. | A standard package ERP system was implemented without modification. The system was implemented with full functionality as Chemical were already process oriented which meant that they did not have to undergo as much of a radical change as would generally be the case. | A standard package ERP system was implemented with modifications. These were held in a separate file which allowed upgrades and did not invalidate vendor support. A skeleton approach was adopted for a rapid implementation without major organisational upheaval. |
| Innovative Strategies For Competitive Advantage | Implementation of a sales force support system using a Lotus Notes database. The sales force could record customer needs and identify future sales opportunities. The system can be accessed from anywhere enabling them to act in an efficient and cohesive manner. | Implementation of a marketing information system based upon a Lotus Notes database. Global market information about customers was combined with enterprise information in order to provide a more complete strategic view of the marketplace and customers. | Implementation of a customer service system using internet technologies. The systems aid customer dealings with the company. An internet site provides public access to the company and its products. An extranet provides information to customers and staff which is more detailed. |

CASE DISCUSSION AND COMPARISON WITH LITERATURE

The cases of Pump, Chemical and CompCo are instructive. They suggest that companies are increasingly adopting standard solutions. These solutions are different to previous generations of standard applications because they promote standard business processes. Previously, the dominant approaches to systems development emphasised the development of bespoke solutions upon generic platforms. With ERP there is a much greater emphasis upon adapting the business to the software leading to common IT and business processes as shown in each of the cases. This has

prompted us to look at whether IT is still viewed by these companies as a source of competitive advantage and, if it is, how this advantage is brought about. The cases provide a consistent answer: IT remains a source of competitive advantage through the development of bespoke solutions in critical business areas. This approach can be described as going beyond ERP. Analysis of the cases suggests what some of the motivations for going beyond ERP may be; to support activities that require non-transactional data, the desire for dynamic information systems and, most importantly to afford competitive differentiation. An example of the first motivation is clear in the case of Sales Support System at Pump where sales staff were able to report rich and varied facts about customers in order to facilitate the development of

long term relationships. The same reliance upon non-transactional data can be seen at Chemical in the form of global strategic marketing information. ERP systems are transaction based. Hence, by supporting non-transactional data Pump and Chemical are going beyond the normal capabilities of ERP. The second motivation is clear in all of the case organisations and concerns the degree of responsiveness of ERP systems to the business. When a company chooses to adopt ERP it effectively outsources a considerable component of its change process to the ERP vendor. Therefore, companies are left waiting for the next upgrade before they can change (Radding 1998). Easily maintainable, easily programmable systems created in systems like Lotus Notes offer the organisation a higher degree of responsiveness than ERP. The final motivation for going beyond ERP is probably the most profound. It is the issue of differentiation itself. It means that companies such as Pump, Chemical and CompCo still view IT as a source of competitive advantage, albeit in a more tightly focused way than they did previously. Each organisation realised that the synergies resulting

from the implementation of a common systems strategy were not powerful enough to enable them to compete effectively. They therefore had to cloth their common systems with other information systems and supporting business strategies provide this. This process is now explained in more detail and compared with current thinking in the area.

The three cases presented here share commonalities. Each were facing a major change in the business environment and each had legacy systems that could not support the necessary strategic response. The legacy systems were fragmented and, at best, had limited integration capabilities (Figure 2a). As a result of this, the organisations adopted a common system strategy which gave them a single integrated solution (Figure 2b). The organisations then discovered that the common system alone was not a sufficient mode of differentiation and they decided to cloth their systems with further IT solutions and employ accompanying innovative business strategies (Figure 2c). This is where going beyond ERP begins.

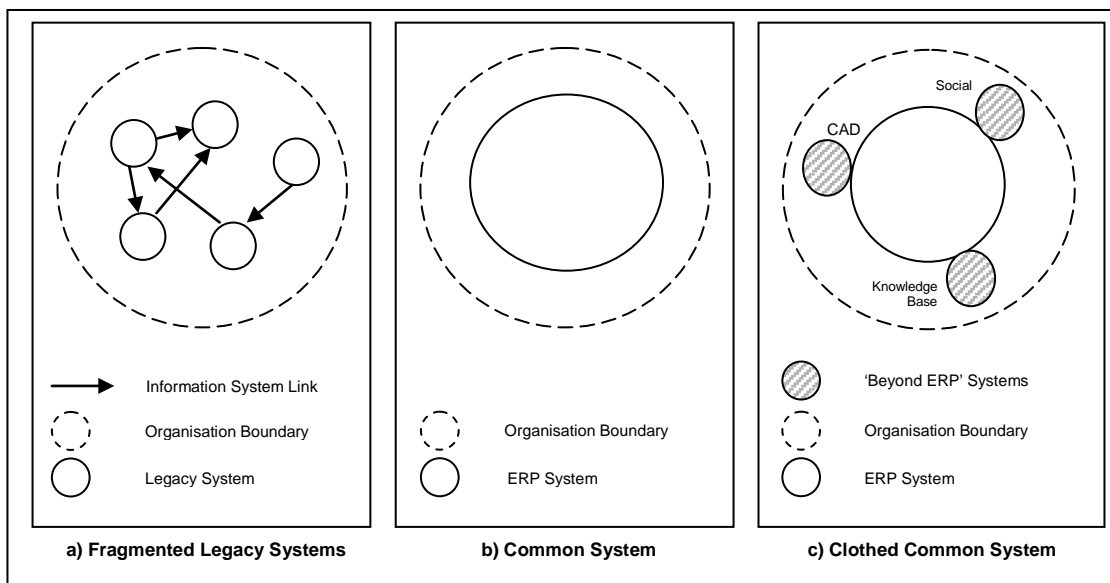


Figure 2. The Development Of The Information Systems In The Cases To Beyond ERP Strategies

The business literature has just begun to highlight the deficiencies of ERP in relation to competitive advantage and the idea of extending ERP or going beyond ERP is starting to receive attention. Byron Miller of Giga Information Group states that the next big thing beyond ERP is supply chain management (Stein 1998). A Deloitte Touche Report (1998) concurs with this but labels the idea as enterprise commerce. Going beyond ERP is much more than automated supply chain management - the concepts of interorganisational systems and integrated supply chains have long

been recognised (Holland 1994, Konsynski 1993, Johnston and Vitale 1988 Cash and Konsynski 1985). Furthermore, ERP vendors have seen the market for supply chain management software and are hurriedly incorporating this into their systems (Radding 1998). Automated supply chain management is merely going to become another ERP module and hitherto part of a common systems strategy. The same could be said about other attempts at extending the range of common systems by common systems vendors. SAP's Strategic Enterprise Management Software aims to

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support high value management processes such as strategic planning and risk management (Business Week 1998). The most effective strategies for going beyond ERP are those that will provide innovative *and* individual ways of leveraging distinctive capabilities throughout organisations. The cases detailed here indicate but a few of the modes by which this could be achieved on an organisational basis. The componentisation of ERP software - 'best of breed' may provide a limited scope for differentiation if it arrives. However, it is becoming increasingly clear that many of the business functions supported by ERP are non-value added. Stories of renting ERP and other modes of outsourcing enterprise software and business processes are becoming common place with SAP,

JD Edwards and Oracle all announcing these intentions or already making the offer (Baker 1998, Busse 1998, King 1998, Poston 1998).

Going beyond ERP in the future could mean much more than clothing organisational systems or automating supply chain management. Organisations that have adopted a common systems strategy and developed innovative organisationally based strategies for differentiation may form new strategic business and IT links along the supply chain as shown in Figure 3. These links may be created between enterprise systems and the innovative IT capabilities in the respective organisations.

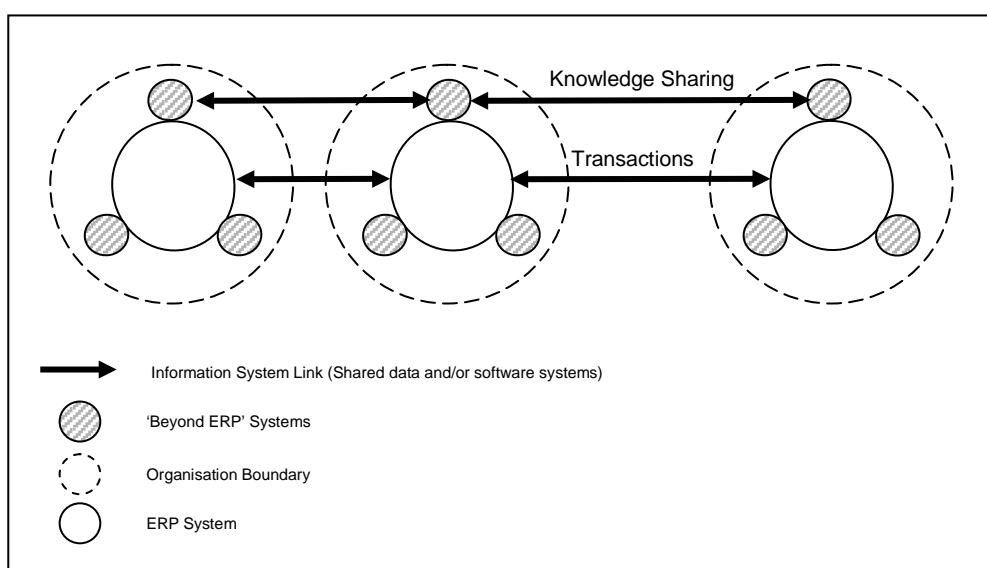


Figure 3. Beyond ERP Along The Supply Chain

CONCLUSION

The growth of ERP represents a significant departure for IT development in modern organisations. The plethora of development methodologies that have been developed (e.g. Yourdon, OO, Jackson) have all promoted the creation of bespoke systems which serve bespoke business processes. This emphasis is fundamentally challenged by the growth of ERP. Here the emphasis is upon standard systems that support standard business processes. The case research undertaken suggests that companies consider this to be an appropriate response to the business and technical pressures they face. Clearly then, in an age of increasingly standard solutions, the traditional view that IT can be a source of competitive advantage is subject to question.

This paper has sought to consider what the effects of standard systems are upon business processes. It has also considered whether IT can still be viewed as a source of competitive advantage following the adoption of a common systems strategy. It is clear that in response to the common business processes and IT that are created during the implementation of a common systems strategy, organisations are developing innovative strategies that go beyond what has become the base line for performance. Whilst standard solutions support the core of a business's operations, organisations are seeking competitive differentiation through focused projects. Hence, a new paradigm for modern systems emerges: they are part standard and part bespoke. These hybrid systems combine efficient and well proven standard systems with bespoke solutions which are aimed at obtaining competitive advantage.

The current industry practice is predominantly concerned with developing solutions to support transactional supply chain management functions. We have proposed that going beyond ERP has to be driven by the need for competitive differentiation and that this may be accomplished by several means including adopting best of breed strategies, the clothing of common systems and the extension of ERP and innovative systems on an inter-organisational basis. We have also taken into account IT and business perspectives. The base line for competition throughout organisations is likely to shift further as more organisations adopt innovative beyond ERP strategies. The original justifications for implementing common systems such as the reduction of inventories and efficiently integrated intra-organisational operations will no longer be enough to sustain competitive advantage due to the widespread implementation. Time based competition between supply chains may no longer be enough. In the beyond ERP era, value added, time based competition throughout a virtual value chain may be just one of many keys to success.

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