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Going Beyond Operations with Enterprise Systems

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Abstract

Enterprise Systems have become the preferred type of IT systems in most large organizations in the last few decades. These, large-scale, integrated, packaged software suites have been shown to enable operational efficiency by several prior studies. This paper reviews a number of such studies and identifies a gap in the literature. The primary contribution of this paper is that it proposes that Enterprise Systems can create business value, in addition to operational efficiency, by achieving innovation (in product, process and alliance) and enabling better strategic decision making in the adopting firms. The paper also provides empirical evidence using detailed secondary data that supports this proposition. In addition, this study also provides additional evidence for concepts identified in earlier research. This paper reports on the first study of a research-in-progress and this model will be tested further through extensive primary case studies

Keywords

Enterprise Systems, Strategic value of IT/IS, Information Technology Innovation, Business Value of IT

INTRODUCTION

The contemporary corporate world cannot be imagined without Information Technology and a variant of such technology, called 'Enterprise Systems', has recently become popular with large local and multinational firms and increasingly so in small to medium scale businesses. Enterprise Systems (ES) can be defined as large-scale, packaged, software systems that can be used to integrate and streamline all or most of the business processes of a firm and radically enhance information and knowledge levels within the firm as well as with its supply chain partners and other stakeholders. In modern times, this is an 'umbrella' term that includes a number of systems like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) Supply Chain Management (SCM) and so on. However, for the purpose of this paper, the term 'Enterprise Systems' is limited to Enterprise Resource Planning (ERP) and/or Customer Relationship Management (CRM), with built-in Business Intelligence technologies. This decision is made because of their clear dominance, both in the scope of activities as well as the number of adopting organizations, over their counterparts in the market.

The user base of Enterprise Systems has been growing significantly in the last two decades with more and more organizations choosing such systems over developing their own custom software. By the end of 1990s, more than 70% of the 'Fortune 2000' firms had implemented Enterprise Systems (AMR 1999). This number has been growing. Large and well-known organizations in Australia and the around the world like Commonwealth Bank of Australia, ExxonMobil, University of Melbourne, Microsoft, Canadian National Railways, Colgate-Palmolive, Kraft Foods, BHP Billiton and hundreds of others run their business using Enterprise Systems now. In addition, a number of medium-sized organizations are going down this path.

In the last decade, the Enterprise Systems market had many vendors namely SAP, Oracle, Baan, PeopleSoft, JD Edwards and so on. However, as a result of recent mergers and acquisitions, there are two key players who dominate this market at present - SAP and Oracle.

Enterprise Systems, when adopted effectively, have been reported to yield operational benefits like error reduction, faster transaction processing, access to timely, and better quality information for the adopting firms (Davenport 2000; Markus and Tanis 2000). However, implementing these systems involves enormous

expenditure and long periods of time and effort. Due to the highly complex nature of such systems, they require substantial and continuous involvement from the organizations that implement them. On an average, a typical Enterprise System implementation takes one to three years to complete and the cost is at least US\$10 million for a US\$50 to \$250 million client (Minahan 1998). However this figure is exclusive of related costs like planning and implementation which can be between five and ten times the cost of the software.

Since most large firms have already adopted Enterprise Systems or are intending to do so, they expect to make the most of their return on such enormous investments. In other words, they are looking for getting more out of these systems than merely improving operational efficiency; they are seeking the ability to compete better. Enhancing competitive position in the market has been proposed to be a function of two factors: (a) cost of providing goods and services and (b) customers' willingness-to-pay for these (Ghemawat and Rivkin 2006). Firms need to minimize the first factor or maximize the second, or both, to compete better than their rivals. Technology, and especially Information Technology, has been said to have the potential to play a significant role in such efforts. Adopting Enterprise Systems and exploiting these systems to create business value have of late become a trend in the corporate world. However, there is very limited research that actually explores the strategic potential of Enterprise Systems to create business value (especially beyond the operational benefits from it). This leads to the research question:

How can the adoption of Enterprise Systems in large organizations create business value, especially beyond operational efficiency?

PRIOR RESEARCH

A review of the available literature on the different benefits from using Enterprise Systems was conducted. In particular, given the premise of the paper, it was considered necessary to look at studies on how Enterprise Systems can create business value in addition to enabling operational efficiency – the strategic potential of such systems.

Benefits of Using Enterprise Systems: Improving Operations

One of the key goals of adopting Enterprise Systems has historically been to improve operational efficiency of the organizations. Realizing operational benefits happens over time and there are different stages of Enterprise Systems adoption. Ross (1999) identified them as Design, Implementation, Stabilization, Continuous improvement and Transformation, while Markus and Tanis (2000) said that the stages were Chartering, Project, Shakeout and Onward and Upward. A survey of 62 of the Fortune 500 companies found that these stages are implementation, stabilize, synthesize and synergise (Deloitte 1998). From the above, it can be concluded that broadly the stages of Enterprise Systems life cycle are Implementation and Post-Implementation. The benefits are achieved in the Post- Implementation stage.

Optimising business processes and getting them streamlined is facilitated by Enterprise Systems in the adopting firms (Davenport 2000; Al-Mashari 2003; Spathis and Constantinides 2003 ; Siau and Messersmith 2003; Botta-Genoulaz and Millet 2005; Chand et al. 2005; Rikhardsson and Krammergaard 2006). This has contributed , or can do so, to better stock management (and lean production and a therefore significant dip in the costs in these firms. The existence of an integrated framework of data and systems across the organization can enforce a standard structure and assist in the coordination of different interdependent business units in an organization. (Davenport 2000; Markus 2000; Al-Mashari 2003; Grant 2003; Spathis and Constantinides 2003; Gattiker and Goodhue 2004;Puschmann and Alt 2004; Utecht and Hayes 2004; Kelle and Akbulut 2005; Volkoff et al. 2005; Karimi et al. 2007). Enhanced customer satisfaction and retention is identified as a benefit resulting direct out of Enterprise Systems, as revealed by several studies (Davenport 2000; Murphy and Simon 2002; Chand et al. 2005). Availability of good quality information in real time is recognized to be a key product of ERP systems by several studies in several countries (Davenport 2000; Spathis and Constantinides 2003; Botta-Genoulaz and Millet 2005; Rikhardsson and Krammergaard 2006; Harley and Wright 2006). This capability has facilitated better operational control and decision making in organizations.

Research has been done to identify the key drivers of the benefits from Enterprise Systems. Kennerley and Neely (2001) said that better information availability and better designed business processes are the ingredients to realizing organizational benefits. Another significant addition to the literature is a model by Davenport et al. (2004), which identifies the primary drivers of organizational benefits from Enterprise Systems as being 'informate', 'integrate' and 'optimize'. Further studies revealed that to successfully use Enterprise Systems, the key tasks are continuous improvements, re-evaluation of business processes and enhancement of functionality (Ross 1999; Markus and Tanis 2000; McKinley 2000).

Creating Business Value beyond Operations: the Strategic Potential

Next, studies done specifically on Enterprise Systems were reviewed to identify the potential of such systems in particular, to support the strategic endeavors of an organization. Hammer (1999) has described Enterprise systems as “the most potent and subversive contemporary instrument of business revolution”. As a consolidation of prior literature and additional contextual interviews on the benefits of Enterprise Systems, Shang and Seddon (2002) developed a useful Classification System of the benefits derived from Enterprise Systems and classified them into 5 categories: Operational, Managerial, Strategic, Organizational and IT Infrastructural benefits. Sammon et. al. (2003) extended this to state that while classical ERP functionality reaps operational and IT infrastructural benefits, the BI type technologies now bundled with ERP enables the managerial and strategic benefits.

Davenport (2000) suggests that the key strategic areas in which Enterprise Systems can play an important role are the sense –and respond business models, globalization and in extending the value chain. A research on the use of Enterprise Systems after implementation using a stage maturity model concluded that adopting organizations ultimately aim to use ERP for strategic purposes (Holland and Light 2001). This strategic potential of ERP systems was supported by Hayes et al (2001). This was complemented by another study which concluded that an alignment of the Enterprise Systems with the Business Strategy was a key ingredient to realize value from Enterprise Systems (Grant 2003; Somers and Nelson 2003). A survey revealed that ERP systems enable profitability analysis by business segments and non financial indicators that assist in top management strategic decision making (Spathis and Constantinides 2004). CRM systems have been said to have strong strategic potential for increasing market share by using them to manage customers through better promotion of products/services, better customer service, better product/service designs and better profitable customer identification (Bligh and Turk 2004). A study by Rom and Rohde (2006) suggested that a tight collaboration with ERP and Strategic Enterprise Management Systems (which is built-in to ERP Systems now) is very beneficial for a coordination of tactical and strategic decision making. ERP systems were considered instrumental in assisting integration in post-merger phase of organizations, thus helping inorganic growth of companies (Gupta 2000; Grainger 2007; Motiwalla and Thomson 2009).

As discussed in the literature review, several researchers have acknowledged that Enterprise Systems create business value especially in enabling operational efficiency. In addition, some researchers have started suggesting that such systems have a potential beyond enabling operational efficiency. However, despite claims from vendors and consultants, not much research has been carried out in this area. In particular, there is little research on how such systems can assist the adopting organization to support, execute or even revise its business strategy. So there is a clear opportunity to explain how Enterprise Systems can create business value beyond operational efficiency, like in enabling innovation or making strategic decisions. The following section proposes a model as an attempt to do so.

CREATING BUSINESS VALUE WITH ENTERPRISE SYSTEMS

A new model is proposed by synthesizing and extending the models/frameworks discussed in the earlier section to explain the creation of business value. Figure 1 is a process model showing how implementation and use of Enterprise Systems can lead to business value. Process models focus on dynamics of social change and the series of events over a period of time to elucidate how and why particular results are reached, and is found suitable for this research (Mohr 1982; Newman and Robey 1992).

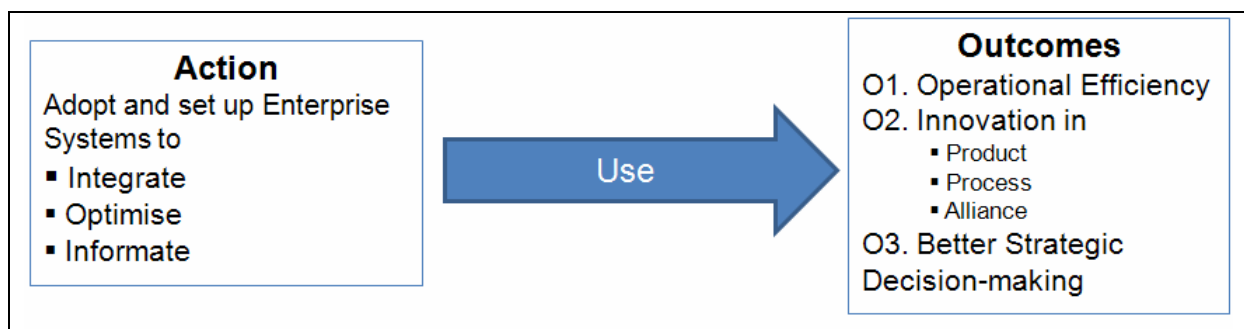


Figure 1: A model depicting how ES implementation and use leads to business value (three types of outcome)

Figure1. How Enterprise Systems create Business Value

. The model in Figure 1 consists of three main parts: Action, Use, and Outcomes.

Action (A)

Action begins with an appropriate Enterprise System being selected, purchased and licensed from an appropriate vendor. Once the Enterprise Systems has been licensed, the organization embarks on one or more implementation projects to employ this system successfully to do the following, as suggested by Davenport (2004).

<i>Construct</i>	<i>Meaning</i>
Integrate	harmonize the data, processes and systems within the organization as well as beyond the boundaries, extending to customers, suppliers and other stakeholders
Optimize	standardize the processes(both front-end/ customer facing and back end/ administrative) by aligning them with best practices or modify/ enhance processes to meet the strategic needs of the organizations that yield competitive advantage
Informate	provide access to real time data and the capability to analyse the internal organizational performance and the behaviour of external stakeholders like customers and suppliers; and aid decision making at different levels of management including at corporate/ business strategic levels

Table1. Drivers of Business value with Enterprise Systems

As a result of the aforementioned implementation projects, it is absolutely necessary that a working system is delivered, as defined by a successful ‘go-live’ of the projects. It is also essential that the adopting organization does **all three**, i.e. Integrate, Optimise and Informate to achieve a desired platform for creating business value, as explained in the forthcoming section.

Use

After the Enterprise System is put in production, the organization then uses this system-enabled platform, post the ‘shakedown’ phase (as defined by Markus and Tanis 2000) to run their business.

Outcomes (O)

As outcomes of the platform created by Optimizing, Integrating, Informating and using Enterprise Systems, business value is created for the organization in **one or more** of three ways:

- O1. Operational Efficiency
- O2. Innovation in product, process or alliance
- O3. Ability of Better Strategic Decisions

This is explained in table 2 below.

<i>Construct</i>	<i>Meaning</i>
Operational Efficiency (O1)	The organization achieves a platform that makes them capable to run their operations/ business to achieve operational efficiency. This operational efficiency can come from Operational and IT Infrastructural benefits as identified by Shang and Seddon (2002). This is measured using standard measures like operating margin, stock turnover ratio, Degree of Operating leverage etc.
Innovation (O2) in: <ul style="list-style-type: none"> • Product • Process • Alliance 	<p>Product Innovation: This can be accomplished by introducing a new Product/Service or revamping an existing product/service by a) using information and analytics gained from ERP/CRM Systems (b) integrating the organization with its value chain members, backward or forward using ERP based EAI tools</p> <p>Process Innovation: This can be accomplished by creating new processes/wholly redesigning existing processes. This can be in the following fields a) operational/back-end processes by using the so-called ‘best practices’ of the Reference Models in such ERP Systems, (b) front-end/customer-service processes by implementing the marketing-sales-service cycle of CRM systems.</p> <p>Alliance Innovation: This can be accomplished by the means of mergers, acquisitions and consolidations of business units enabled by the integration of data and process</p>

	frameworks enabled by ERP between the acquirer and the acquired.
Ability of Better Strategic Decisions (O3)	The optimized, integrated and informing platform enabled by Enterprise Systems also support identification and assessment of new opportunities available to the adopting organization. This activity will lead to reconsideration, reframing or revisions of the existing business strategy. The adoption of Enterprise Systems enable identification of new strategic opportunities using the 'Informating' capability of Enterprise Systems in the following ways: determine profit drivers, grouped by business units, to develop with a new corporate strategy; shift to product/ service differentiation strategy from the data and analytics available from the informing platform and so on. To asses such opportunities, Specialized tools for strategic management activities are also provided within most ERP systems, like SAP's Business Planning and Simulation (BPS), Corporate Performance Monitoring (CPM), Business Consolidation (BCS) which assist in both 'optimising' and 'informating' to carry out the strategic management process.

Table2. Business Value Created using Enterprise Systems

The model in Figure 1 is, in part, aligned to a model proposed by Weill and Ross (2009) wherein they propose that Information Technology in general could open up business opportunity in the following ways: Operational performance improvement, Accelerated product/ service innovation, Integration of merger and acquisition and reorganizing towards customer centricity. However, the proposed model extends this to the special case of Enterprise Systems. Also, these outcomes map to some of the categories of benefits proposed by Shang and Seddon (2002). However Shang and Seddon do not explain Innovation to any depth and do not mention the ability to make strategic decisions.

A PRELIMINARY TEST OF THE MODEL

Data Collection

To conduct a preliminary test of the model in Figure 1, particularly of the claims that use of ES can lead to benefits such as innovation and better strategic decision making, a sample of 100 case studies of large firms across the world using an Enterprise System from the market leader vendor, SAP, was found online at www.sap.com/solutions/business-suite/erp/customers/index.epx and www.sap.com/solutions/business-suite/crm/customers/index.epx. Some of these cases were 15 to 20 pages long and contain information about the journey of the organizations using Enterprise Systems and the benefits achieved; others were shorter, but with similar information but with less details. These cases were endorsed by the adopting organizations and published as business transformation cases of customer organizations enabled by SAP ERP and/or CRM systems (including in-built business intelligence technologies). Though published by the vendor, these cases also contain contact details of the organizations as well as its top management members, with quotes from their interviews, and can therefore be treated as credible information provided by the client organizations themselves. These case studies served as secondary data for a preliminary test of the model in Figure 1. The use of secondary data in conducting research has been advocated by several researchers like Jarvenpaa (1991), Ticehurst and Veal (2000), and Newman (2003). This data was analyzed as described below.

Data Analysis

Part 1: Illustrative Cases

Each of the 100 case studies was analysed for evidence of (a) whether concepts mentioned in the model were discussed in the case, and (b) there was evidence of the process depicted in Figure 1 being followed by the implementing organization. As it is not possible to report details of the analysis of 100 cases, a few cases from the sample are used to illustrate how the case studies were analysed. The three cases discussed below are about 15-16 pages long each and provide a sufficient level of detail to explain the phenomenon described in the model. These cases were searched for evidence of Action A, Outcomes O1, O2 and O3, and the proposition that "Action A" led to 'Outcomes' O1, O2 and O3 through 'Use'. Such evidence were marked and written up as mini cases to support the proposed model, as shown below.

Case A: Canadian National Railway Company (CNRC)

Canadian National railway Company (CNRC) is one of the earliest freight railroads around the globe and a leader in the North American rail industry, based in Montreal Canada. Its annual revenue in 2006 was CAD 7.7 billion with 22,250 employees. CNRC made a strategic decision to adopt ERP to address the following key themes: assist its growth strategy through mergers and acquisitions of 4 other railways, improve information levels and analytics capability for operational efficiency, assist in Innovation and agility.

Adopting Enterprise Systems and Setting up an Integrated, Optimised and Informating Platform

The organization got SAP ERP and Product Lifecycle Management (PLM) suites licensed in 1999. CNRC set up the platform to integrate, optimize and informate. CNRC adopted SAP/s best practices wherever possible for optimizing processes and used the system for sharing information with its 22, 250 employees widely dispersed across North America.

“CN has integrated and consolidated the functionality and data from over 100 computer applications into one seamless SAP platform. In addition to improving numerous key business processes, this consolidation has enhanced management decision making by providing CN managers with quick, efficient access to integrated real-time data.” (F. Grisby, Senior Vice-President and CIO)

Business Value Created through a)Operational Efficiency and b)Innovation in Alliance

CNRC saved over 100 million CAD in annually in asset procurement, labour and technology. They retired more than 100 legacy systems and. SAP ERP and PLM helped to simplify its platform. Also, the availability of high quality information greatly assisted in managerial decision making- a key factor of the smooth running of their ‘Precision railroad’ project. A significant achievement attributable to its ES adoption was the fact that CNRC achieved the lowest operating ratio (61%) in the industry- a symbol of operational excellence.

SAP ERP assisted in consolidating the IT systems that resulted from the growth strategy of CNRC- Mergers and acquisitions. The CN Mergers with Illinois Central in 2001, Wisconsin Central in 2003, Great Lakes Transportation in 2005 and British Columbia Rail in 2005 were supported by the ES platform. CNRC’s profits rose 34% to CAD 2 billion in 2006. It is now the largest scheduling railways in the world.

“We are extremely pleased that CN and SAP work together to further leverage our SAP investment.” (F. Grisby, the Vice –President and CIO)

Thus in the above case we find evidence that the Action of Adopting Enterprise Systems and setting up an Integrated, Optimised and Informating Platform, followed by Use, led to the Outcomes of Operational Excellence and Innovation (in Alliance), as suggested by the proposed model.

Case B: Checkpoint Systems

Checkpoint Systems, Inc., was established in 1969 and designs, manufactures, and sells identification and security products for the retail industry. Checkpoint is a public listed company and earned revenue of \$688 million in 2006. Checkpoint had a diverse range of local and non-integrated applications across Europe.

Adopting Enterprise Systems and Setting up an Integrated, Optimised and Informating Platform

In 1999, the organization decided to standardize all European business on the SAP R/3 platform, and this was rolled out to European subsidiaries from 2000 to 2005. Checkpoint used SAP ERP to achieve an integrated, optimised and informating platform. Checkpoint standardized all European administrative processes on the SAP R/3 platform. Also, Checkpoint centralized back-office operations in two European shared service centres: one in Bratislava, Slovak Republic, and the other in Barcelona, Spain.

"It is all about a common set of standards, processes, and applications. Previously, we tried to knit together different systems to automate processes but we couldn't make it work. It was too complex. Now, with a common platform we have much better insight."

(Richel Kleiweg, European Controller, Checkpoint)

"We believe we have further centralization potential in Europe. The shared service centers still follow a country-centric approach, but eventually all European operations should follow the same blueprint for standards and processes. Over time we will also look to consolidate the various shared service centers into one."

(Sal Dona, CEO, Checkpoint)

Business Value Created through a) Operational Efficiency and b) Ability of Better Strategic Decisions

The shift to shared service centres and a single IT platform has made it possible for Checkpoint to decommission most local systems and reassign the IT staff members who maintained these. Also because of the shared service centre, local accounting and order management staff has been reassigned. For example, in U.K., Norway, Benelux, Spain and Finland, 15 local full-time positions were eliminated.

“We have gotten our IT costs down and streamlined our European operations”

(Sal Dona, CEO, Checkpoint)

"Previously, customer shipments were executed from 15 local warehouses around Europe. These have now been consolidated into two central warehouses as a result of the SAP implementation. This has

enabled us to ship more orders directly to the customer and achieve faster delivery times. In our business, the ability to deliver rapidly is a key competitive differentiator."
(*Stieghard Nuss, European SCM Operations Manager, Checkpoint*)

"The fact that we have centralized IT and greater scale has enabled us to become much more ambitious in terms of establishing automated EDI-based links to customers and suppliers. Because one EDI connection now serves all of Europe instead of an individual country, the set-up cost per transaction has been reduced enormously. Therefore, we can establish EDI connections to many more customers and partners."
(*Paul van der Mark, European Applications Manager, Checkpoint*)

Also, with the SAP system in place, Checkpoint is in a better position to make more informed strategic decisions.

"We can now pull out meaningful reports at the European level. Reporting has really been a major advantage of SAP and the feedback from users has been excellent. We cannot quantify the value of timely and high-quality management information, but we know it has been of paramount importance to us."
(*Paul van der Mark, European Applications Manager, Checkpoint*)

Thus in the above case we find evidence that the Action of Adopting Enterprise Systems and setting up an Integrated, Optimised and Informating Platform, followed by Use, led to the Outcomes of Operational Excellence and better strategic decision making, as suggested by the proposed model.

Case C: Medline

Medline is the biggest private-owned manufacturer and distributor of healthcare products in the USA. The organization supplies more than 100,000 items like wound-care products, gloves, and wheelchairs and others. Headquartered at Illinois, it had an annual revenue of 2.4 billion USD in 2005 and employs 4500 people.

Adopting Enterprise Systems and Setting up an Integrated, Optimised and Informating Platform

Medline has used SAP software for inventory management and accounting processes since the mid-1990s. It decided to adopt mySAP Customer Relationship Management (mySAP CRM) to improve its ability to manage orders, pricing and customer information. Medline created an integrated, optimised and informating platform using SAP ERP and CRM. Medline discovered that the seamless integration between mySAP CRM and the mySAP ERP systems provides many benefits – for example, visibility by field sales into up-to-date order status, pricing, and customer information, enabling faster and better decision making in the field. These processes are optimised too.

"Everything is more real time, now the sales reps know the standard price, which allows them to set an appropriate customer-specific price. For example, a rep can sit down with a customer at 9 a.m., agree on a price by 9:15, and place an order by 10 – well in advance of the delivery cutoff time in placing an order for that day. That's a very seamless process, and we didn't have that capability before."
(*Jeff Boswell, IT manager, e-commerce and CRM, Medline*)

Business Value Created through a) Operational Efficiency and b) Innovation in Process

The system helped improve the operations of Medline considerably. As mySAP CRM is integrated with mySAP ERP, the cycle time for completing pricing requests has decreased from days to hours.

"We are able to provide our internal users – both sales and management – with efficient, modern tools so they can do their jobs more effectively."
(*Dave Rolston, Vice President of E-Business, Medline Industries Inc.*)

The E-commerce component of the system has enabled Medline to innovate new 'self-service' processes for customers. Medline.com enables customers to place orders, track existing orders, confirm pricing, and perform other transactions, enabling direct access by customers.

"The Web site is being very well received, Customers tell us that they like being in control – they can access the site at their convenience, place orders, and find all the information they need."
(*Dave Rolston, Vice President of E-Business, Medline Industries Inc.*)

"We're more likely to order from Medline. Whether we use the Internet or place an order directly with a Medline representative, we have real-time information about product availability and the immediate

offer of a suitable substitute for out-of-stock items. We can place orders in less than half the time it takes on the competitors' sites."

(Coral Johnson, A Member of the Central Supply Organization of Libby Care Center Libby, Montana)

Thus in the above case we find evidence that the Action of Adopting Enterprise Systems and setting up an Integrated, Optimised and Informating Platform, followed by Use, led to the Outcomes of Operational Excellence and Innovation in Process, as suggested by the proposed model.

Part 2: Summary of Evidence from the Full Sample

For each of the 100 case studies, evidence of Action A and Outcomes O1-O3 were recorded in a spreadsheet by placing a "1" in a cell as shown in Table 3. In addition, evidence for the overall process model, i.e. 'Action' A was taken first to achieve the 'Outcomes' O1, O2 and/or O3 through 'Use', were also recorded in a separate column. In other words, the fact that Action A preceded the Outcomes O1, O2 and/or O3 was recorded. Table 3 shows the first ten rows of 100 rows in the spreadsheet.

No.	Case	Action A	Outcome O1	Outcome O2	Outcome O3	The Overall Process
1	Synopsis	1	1	1		1
2	Bentoel Group	1	1	1		1
3	Coca Cola Bottling		1		1	
4	Digital GSM	1	1		1	1
5	Lennox		1	1	1	1
6	OKI Data	1	1	1		1
7	Greenheck Fan	1	1	1		1
8	HP IPG Latin America		1	1		
9	Fujimoro Kogyo	1	1	1		1
10	Graybar	1	1	1	1	1

Table 3. Analysis of Cases

This analysis in Table 3 was further summarised by adding the number of '1's in each column in the table. Totals in each column are reported in Table 4.

Total No. of Cases in the Sample	100
No. of Cases with Evidence of Action A: Integrate, Optimised and Informate	85
No of cases providing evidence that the process depicted in Figure 1 is valid	85
No. of Cases with Evidence of Outcome O1: Operational Efficiency	100
No. of Cases with Evidence of Outcome O2: Innovation	86
No. of Cases with Evidence of Outcome O3: Ability to make Strategic Decisions	67

Table 4. Summary of Evidence found in the Case Studies

DISCUSSION OF RESULTS

The results in Table 4 show that 85 % of the case-study firms analysed used Enterprise Systems to achieve an integrated, optimized and informing IT platform. In terms of outcomes, all of them achieved operational excellence; 86% of the cases achieved innovation in product, process or alliance; and 67% of the cases achieved the ability to make better strategic decisions. As can be seen, 85% of the cases show evidence of the model proposed.

Further, as illustrated in the three detailed cases discussed above (CNRC, Checkpoint Systems and Medline), there was evidence in 85 of the 100 cases that the outcomes reported were *achieved by* each firm following a process that involved, first, adopting an Enterprise System, then building an Optimised, Integrated and Informating platform, then using the platform then resulted in creating business value. through operational

efficiency, Innovation, as well as the ability to make better strategic decisions. Therefore, the data provide strong evidence that the model in Figure 1 is valid. .

CONCLUSION

The key contribution of this paper is that it both proposes, and provides evidence to support that, in addition to operational efficiency, Enterprise Systems can create business value by achieving innovation (in product, process and alliance) and enabling better strategic decision making in the adopting firms. This is important as few researchers have suggested and provided empirical evidence for the use of Enterprise Systems to achieve this. The paper also confirms the findings of earlier research (e.g., Davenport et al. 2004), Seddon et al. (2010)) of the importance of the integrated, optimized and informing IT platform enabled by Enterprise Systems. The primary limitation of this study is that it is only a preliminary test based on secondary data. Further research is required to test the model rigorously through primary case studies. Details of such a study, which is currently underway, will be reported in a later paper.

REFERENCES

- Al-Mashari, M. (2003) 'A Process Change Oriented Model for ERP Application', *International Journal of Human Computer Interaction* 16(1): 39-55.
- AMR (1999) 'Industrial enterprise applications market will reach \$66.6 billion by 2003', AMR Research.
- Bligh, P. and Turk, D. (2004) *CRM Unplugged Releasing CRM's strategic value*: John Wiley & Sons Inc.
- Botta-Genoulaz, V. and Millet, P. (2005) 'A classification for better use of ERP systems', *Computers in Industry* 56(6): 573-87
- Chand, D., Hachey, G., Hunton, J., Owoso, V. and Vasudevan, S. (2005) 'A balanced scorecard based framework for assessing the strategic impacts of ERP Systems', *Computers in Industry* 56: 558-72.
- Davenport, T. (2000) *Mission Critical: Realising the Promise of Enterprise Systems*: Harvard Business School Press.
- Davenport, T. (2000) *Mission Critical: Realising the Promise of Enterprise Systems*: Harvard Business School Press.
- Davenport, T., JG Harris and Cantrell, S. (2004) 'Enterprise systems and ongoing process change', *Business Process Management Journal* 10(1): 16-26.
- Delloitte (1998) 'ERP's Second Wave: maximising the value of ERP-enabled Processes'.
- Gattiker, T. and Goodhue, D. (2004) 'Understanding the local-level costs and benefits of ERP through organizational information processing theory', *Information & Management* 41(4): 431-43.
- Ghemawat, P. and Rivkin, J. (2006) 'Creating Competitive Advantage', *Harvard Business Review*.
- Grainger, N. and Mckay, J. (2007) 'The Integrative Role of ERP Implementation in Merger and Acquisition ', *Research into Information Systems in Organisations*: Swinburne University of Technology.
- Grant, G. G. (2003) 'Strategic alignment and enterprise systems implementation: the case of Metalco', *Journal of Information Technology* 18: 159-75.
- Gupta, A. (2000) 'Enterprise resource planning: the emerging organizational value systems', *Industrial Management and Data Systems*.
- Hammer, M. (1999) 'Up The ERP Revolution', *Information Week*.
- Harley, B. and Wright, C. (2006) 'Management Reactions to Technological Change: The Example of ERP', *The Journal of Applied Behavioural Science* 42(1): 58-75.
- Hayes, D., Hunton, J. and Reck, J. (2001) 'Market Reaction to ERP Implementation Announcements', *Journal of Information Systems* 15(1).
- Holland, C. R. and Light, B. (2001) 'A Stage Maturity Model for Enterprise Resource Planning Use', *The DATA BASE for Advances in Information Systems* 32(2): 34 - 45
- Jarvenpaa, S. L. (1991) 'Panning for Gold in Information Systems Research: 'Second-Hand' Data', *Information Systems Research - Issues, Methods and Practical Guidelines*: Alfred Waller Ltd.
- Karimi, J., SOMERS, T. M. and BHATTACHERJEE, A. (2007) 'The Impact of ERP Capability Implementation on Business Process Outcomes: A Factor Based Study', *Journal of management Information Systems* 24(1): 101-

- Kelle, P. and Akbulut, A. (2005) 'The role of ERP tools in supply chain information sharing, cooperation, and cost optimization', *International Journal of Production Economics* 93: 41-52.
- Kennerley, M. and Neely, A. (2001) 'Enterprise resource planning: analysing the impact', *Integrated Manufacturing Systems* 12(2): 103 - 13.
- Markus, M. and Tanis, C. (2000) 'The Enterprise Systems Experience-From Adoption to Success', *Framing the Domains of IT Research*.
- McKinley, J. M. (2000) 'Planning for Success after go-live', *Strategic Finance* 81(10): 54-8.
- Minahan, T. (1998) 'Enterprise Resource Planning: Strategies not included', *Purchasing*: 112-27.
- Mohr, L. B. (1982) *Explaining Organizational Behavior*, San Francisco, CA: Jossey-Bass.
- Motiwalla, L. and Thomson, J. (2009) *Enterprise Systems for Management*: Prentice Hall.
- Murphy, K. and Simon, S. (2002) 'Intangible benefits valuation in ERP projects', *Information Systems Journal* 12: 301-20.
- Neuman, W. L. (2003) *Social Research Methods*.
- Newman, M. and Robey, D. (1992) 'A Social Process Model of User-Analyst Relationships', *MIS Quarterly* 16(2): 249-66.
- Puschmann, T. and Alt, R. (2004) 'Enterprise application Integration Systems and architecture-the case of the Robert Bosch Group', *The Journal of Enterprise Information Management* 17(2): 105 - 16.
- Rikhardsson, P. and Kræmmergaard, P. (2006) 'Identifying the impacts of enterprise system implementation and use: Examples from Denmark', *International Journal of Accounting Information Systems* 7: 36-49.
- Rom, A. and Rohde, C. (2006) 'Enterprise Resource Planning, Strategic Enterprise Management Systems and Management Accounting A danish study', *Journal of Enterprise Information Management* 19.
- Ross, J. W. (1999) *The ERP Revolution: surviving vs Thriving*, Cambridge: Sloan School of Management
- Sammon, D., Adam, F. and Carlton, F. (2003) 'Benefit realisation through ERP: the re-emergence of Data warehousing', *Electronic Journal of Information Systems Evaluation* 6.
- Shang, S. and Seddon, P. (2002) 'Assessing and managing the benefits of enterprise systems: the business manager's perspective', *Information Systems Journal* 12: 271-99.
- Siau, K. and Messersmith, J. (2003) 'Analyzing ERP Implementation at a Public University Using the Innovation Strategy Model', *International Journal Of Human-Computer Interaction* 16(1): 57-80.
- Soh, C. and Markus, M. L. (1995) 'How IT Creates Business Value: A Process Theory Synthesis', *International Conference on Information Systems*
- Somers, T. and Nelson, K. (2003) 'The impact of strategy and Integration mechanism on Enterprise Systems Value: Empirical Evidence from Manufacturing Firms', *European Journal of Operational Research* 146(2): 315-38
- Spathis, C. and Constantinides, S. (2003) 'Usefulness of ERP Systems for Effective Management', *Industrial Management and Data Systems* 103(9): 677-85.
- Ticehurst, G. and Veal, A. J. (2000) *Business Research Methods: A managerial Approach*: Longman.
- Utecht and Hayes, R. (2004) 'Enterprise Resource Planning and the Competitive Advantage', *Competitiveness Review* 14(1).
- Volkoff, Strong, D. M. and Elmes, M. (2005) 'Understanding Enterprise Systems enabled Integration', *European Journal of Information Systems*: 110-20.
- Weill, P. and Ross, J. (2009) *IT Savvy: What Top Executives Must Know to Go from Pain to Gain*.

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