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Managing process deficiencies with enterprise systems

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Abstract

Purpose – The purpose of this paper is to examine the deficiencies and the sources of deficiencies in process changes associated with the implementation of enterprise systems (ES).

Design/methodology/approach – In-depth studies of four firms and additional verification in seven other firms.

Findings – Results reveal that deficiencies of process changes with ES are mainly associated with the packaged and integrated nature of enterprise system software, particularly its configurability, in-built processes, multiple options, data and process integration, streamlined processes, and standard processes. In order to eliminate deficiencies and gain benefits, organizations need to invest in on-going software exploration, business examination, and process and software changes that align new processes and management responsibilities.

Originality/value – In the expanding world of ES research, this study is significant because it explores the sources of deficiencies associated with process change and provides guidance to user organizations on ways to manage such deficiencies. The results of the study may also be of benefit with other packaged software that integrates processes within and between organizations, for example, customer relationship management and supply chain management.

Keywords Systems software, Organizational processes

Paper type Research paper

Introduction

Enterprise systems (ES) use packaged and integrated software to support a wide range of organizational processes. Packaged software contains in-built processes, which replace in-house development efforts, and can enable or force organizations to change to vendor-claimed best practice (Boersma and Kingma, 2005). The integrated software provides seamless control of operations at all levels, and streamlines inefficient processes. The advantages of such packaged and integrated software have persuaded many organizations to invest in the software in the expectation of beneficial process changes. However, it is unclear whether these process changes are all effective. Are deficiencies associated with use of this packaged software, and if so, what are they?

Deficiencies, in this paper, are defined as the exposure to unfavorable outcomes for the organization, caused by the process changes flowing from ES implementation and use. Rather than estimating probabilities for potential undesirable outcomes (Boehm, 1991), this study takes the behavioral view (Lyytinen *et al.*, 1998; Barki *et al.*, 1993) in identifying and analyzing threats to success (i.e. deficiencies) and actions taken to reduce the chance of failure. Process failure is usually reflected in extra workforce or

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extra cycle time; more errors; low responsiveness; reduced service quality; and user complaints. These problems are linked to negative impact on earnings. They seem to occur with ES software implementation or upgrading.

Many studies have identified factors affecting the success of on-time on-budget system implementation and stressed the importance of large and complex project management (Holland *et al.*, 1999; Parr *et al.*, 1999), but few have tried to trace the consequences of process changes after system implementation. Some studies observed performance dips (Shang and Seddon, 2002; Markus *et al.*, 2000; KPMG, 2000; Gartner Group, 1998; Ross and Vitale, 2000) after system implementation and attributed these to the long learning process and to complex change management, but did not examine the sources of these deficiencies. As such innovative information systems differ in their characteristics from in-house or custom-built systems, it would be reasonable to expect the outcomes of process change with ES to be different as well. The questions we seek to answer are:

- What sorts of deficiency are uniquely associated with the changed processes with ES?
- What are the sources of these deficiencies?
- What can organizations do to eliminate these deficiencies and gain benefits?

As a result of in-depth study of four Australian organizations, and additional verification in seven other firms, this study argues that implementation of ES is risky not only because of strengths or weaknesses in factors such as top management support, user involvement, clearly-defined goals and scope, adequate resources, etc. (Parr *et al.*, 1999), but also because six software-specific factors associated with process change have the potential to bring either benefits or problems to the adopting organization. If each of these characteristics is managed well, the outcomes for the organization are likely to be good. If not, implementation and subsequent use of the software can cause problems.

In the expanding world of ES research, this study is significant because it explores the sources of deficiencies associated with process change and provides guidance to user organizations on ways to manage such deficiencies. Other packaged software such as customer relationship management, supply chain management and others, which integrate processes within and between organizations, may also benefit from the result of this study in terms of eliminating deficiencies and developing benefits from packaged software implementation.

Influences of packaged software and process integration

Packaged software was first used to save system development costs, but little was understood about its effects on process changes. However, the influence of information systems on organizational process changes was noted as long ago as 1959 by Jasinski (1959), who said that new information technology could drive changes in organizations but that it would be a challenge for the organizations to manage the ensuing technological and organizational changes. About 25 years later, more forceful power was observed with word processing packages (Johnson and Rice, 1987), in that the in-built processes drove users to alter daily operations in producing documentation. The same work-pattern change was also found with decision-making packages (Lassila and Brancheau, 1999). With the move to ES, the force for change was found to

be even stronger; organizations adapted their processes to the software more than ever before (Gattiker and Goodhue, 2002). It was even claimed that enterprise system software could drive businesses to lose their competitive advantages by "putting the enterprise into the enterprise system" (Davenport, 1998). The effect of process changes is critical in enterprise system implementation (Sumner, 2000; Kirchmer, 1998). One reason for this is the deficiency involved in improperly modifying the software for business requirements and overly changing organizational processes for the sake of best practice (O'Leary, 2000).

Process integration has been praised by many studies (Manners, 1998; Ratliff, 1995; Schroeder, 2001) for providing better control and coordination. However, studies of its downsides are limited. One study observed manufacturing process integration and found that greater data integration tends to lead to more bureaucratic delay (Goodhue *et al.*, 1992), and tightly linked processes may lead to loss of flexibility in responding to unanticipated events. Since, data integration can reduce a local subunit's efficiency in responding to special customer needs, choosing the appropriate level of data integration may require trading off improved control against increased local flexibility (Gupta and Govindarajan, 1986; Conti, 1989). Meanwhile, practitioners also noted that, while all-in-one packages offer some benefits of integration, users must at times sacrifice high quality in one function for high quality in another (Gasaway, 1985).

Although studies are limited, the driving force of packaged software and the effects of integration seem influential in facilitating process changes. No study on ES to date has focused on these two unique characteristics, nor is there a contextual explanation of their influences. In sum, the unique consequences of packaged integration software are yet to be investigated.

Research method

After initial discussions with a number of different ES-using organizations, it was decided that the study would focus on ERP systems in four utility firms. These four mid-size organizations (described in Table I) were selected because by the time of the study they had all used their ES for more than three years, so there was time for organizational learning to have occurred. Further, although they chose software from two different ES vendors (three SAP R/3, one PeopleSoft), they had all chosen similar application modules for their core processes of finance, human resources, sales, and project and material management.

In each organization, interviews were conducted with five to seven people in a range of roles, including project managers, key decision-makers, frequent users and process owners. Interviews lasted typically for 1 hour. A total of 31 interviews were conducted, with multiple interviews with some key informants. During each interview, subjects

Case	ES adopted	Total sales	ES users	Major processes changed
Firm A	SAP	$700 million	450	Project and material management, sales, finance
Firm B	SAP	$600 million	320	Material management, work management, finance
Firm C	PeopleSoft	$711 million	420	Material management, project management, sales, inventory finance, human resources
Firm D	SAP	$690 million	630	Project and material management, sales, finance, human resources

Table I.
Description of cases studied

were asked to think retrospectively regarding the details of business conditions, the implementation project and the performance of the changed processes in the years since implementation, and the causes of those results. They were also asked to supply examples and other supporting evidence to illustrate their arguments.

Using an approach similar to that described by Eisenhardt (1989) for within-firm and cross-firm analysis, all interviews were transcribed, compared with other interviews and documents from the same organization. Tables of consequences in the first and later years, and interviewees' explanations for those consequences, were prepared.

The next step was to use coding techniques to screen various common process problems and identify links between deficiencies and factors of deficiencies. The findings presented in the remainder of this paper emerged from this process. The findings were then verified by ES managers and process managers in seven large organizations in a wide range of industries. Although some have pointed to different problems in changed processes with the enterprise system, the main patterns of deficiencies and sources of deficiencies were agreed upon.

Findings: deficiencies and sources of deficiencies

After going live, most of the four case study companies experienced process problems in the early post-implementation stage. These problems arose mainly from inappropriate changes made to organizational processes. Looking deeply into the problems revealed that most were related to the influential features of packaged and integrated enterprise system software. Packaged software is configurable, with in-built processes and multiple options to support various business situations.

Such software integrates enterprise data and processes, streamlines over-complex processes, and provides a wide range of standard processes. These influential features seem beneficial but are complicated to understand. In most of the firms, they interplayed and created mixed problems in the organizations. These features, their functions and the deficiencies are summarized in Table II and discussed below. To clearly explain the deficiencies of each feature, typical examples were abstracted to show the unique consequences of these features.

Enterprise systems are configurable but inefficient processes can also be configured

The first source of deficiency identified in Table II is configurability. Packaged software is configurable to support a variety of processes but it can also support inefficient processes. In Firm A, the new system was an imitation of the previous finance process. As the finance staff were under time pressure to complete the implementation as soon as possible, they decided to adapt the new system to support their old processes. The old ledger, old order types and the old way of data processing were put in:

> We had a brand new system real time on-line processing the old stuff (Financial Controller – Firm A).

Every month end, the A/P clerk needed to verify goods received with employees who issued the purchase orders. The process could have been easily modified by having staff update purchase order status when goods were received so that when invoices arrived, the clerk could process payments and allocate job costs immediately. But in reality, the inefficient processes were not changed and more problems occurred:

Sources of deficiencies – influential features of ES	Functions of the influential features of ES	Deficiencies
Configurability	Support a variety of business processes	Support inefficient processes, repeat redundancies, ignore functionality excesses
In-built processes	Save time in designing appropriate processes and opportunities to learn or to change to the best practice	Businesses adapted to misaligned processes
Multiple options	Manage a wide range of business situations	Complicated data input and data retrieval processes reduced the efficiencies and created errors
Data and process integration	Complete information for detailed data analysis and thorough business controls	Bureaucratic processes with excessive crosschecks and reduced responsiveness
Streamlined processes	One time data entry, duplicate tasks reduced	Increased work and accountability making it hard for end-users to adjust to new roles
Standard processes	Can build inter and intra enterprise integration across a wide range of functional areas	Incomplete or insufficient functions and inconsistent quality between modules

Table II.
Deficiencies and sources of deficiencies associated with ES

> This process has never been evaluated and changed. And it has caused more administrative work at month end to manually verify these wandering invoices all over the company and manually allocating costs to jobs. Also, because of the delay of staff reply, more mistakes were developed and required further corrections (Financial Controller – Firm A).

Enterprise systems contain in-built processes with knowledge of best practice, but misaligned processes can also be imposed on user organizations

The second source of deficiency identified in Table II is in-built processes. Embedding as it does the accumulated experiences of many businesses, ES software contains so-called "best practice" processes. Unless reconfigured, the software will suggest some processes as defaults. The advantage for businesses in using these processes is that they can adopt best practice. For instance, Firm C and finance management in Firm D reviewed business requirements and changed to a few selected ES processes and produced early operational benefits. However, in-built processes also create process difficulties if systems are not configured according to the needs of the business. For instance, Firms A and B transformed their centralized human resources systems to self-managed processes, in which employees entered their own work hours and were responsible for their own payroll and job costs. This sounds fine. However, Firms A and B used the new time-recording process in SAP that made workers record job times every quarter hour. This process works well with law or engineering firms that need to allocate costs of highly paid staff to various clients. But the jobs provided by the four case study companies are mostly regular, such as fixing light poles or installing pipes, and the costs are quite standard and apply to one job at a time. Frequent time recording frustrated workers and decreased work efficiency.

Another example of troublesome in-built processes was automatic procurement. In Firms A and D an integrated process linked project planning with purchasing. After a project was planned, the required materials were purchased automatically to be ready for the project to start. This process assumption works well for companies that have stable project planning. However, Firms A and D had many projects that needed to be planned beforehand but changed frequently. Automatic purchasing created overstocking for subsequently cancelled or changed projects. The obvious conclusion from these examples is that the built-in out-of-the box functionality in ES may fit some companies but will not be ideal for all.

Default enterprise system processes can serve various situations, but operational errors and inefficiencies from complicated processes can occur

Third, to provide comprehensive support for all kinds of businesses, ES software has multiple options for processes and data retrieval. The advantage of these options is that users can configure processes to suit a wide range of requirements and collect a wide range of information for different situations. However, these multi-level processes and data retrieval flows require extra effort from end-users when entering transactions and accessing data.

In Firm A, it took nine data entry screens to enter control data for a small project. Staff needed to go through three screens to review the different levels of employee costs and another five screens to specify different types of materials required in the project. As a business manager in Firm A commented: "It took 100 man-hours to close a $100 job." Similarly complicated data processing and retrieval were noted in the early stages in Firms B and D. These problems caused process deficiencies, difficulty in reporting, and low organizational acceptance.

Enterprise systems integrate data and processes for better control, but bureaucratic processes with excessive crosschecks can also occur

Fourth, integrated processes link closely all stakeholders and their activities. The benefit is that managers can obtain complete information with detailed data analysis, enabling them to build comprehensive control reports. However, in order to maintain a complete flow of resource movements, ES require inputs from every single process point. One missing point can delay the whole process. In other words, an ES can impose a bureaucratic process with excessive crosschecks on an organization. For example, "detail-tracked" project control and "everyone-involved" procurement in Firms A and C not only required more work from busy project managers but also confused occasional users. Each person who wanted to obtain business services was responsible for creating a purchase requisition in the system. To do this, everyone needed to learn the purchase requisition process and make sure they entered purchases correctly. Occasional users, including external contractors, were required to enter requisitions. Many incorrect orders were posted and it took days to trace these wrongly-processed documents. The whole accounting process was consequently delayed. Additionally, users were afraid that their manual flexibility was being diminished because the bureaucratic processes allowed no flexibility for exceptions and urgent customer requests.

Another example of problems arising from tightly-linked tasks was with the project control process in Firm A. This required data entry even for "nuts and bolts" spent on each small job. The supervisor needed to enter the cost allocation for each object.

There was a link from each piece of equipment to each part in an order, and these items were kept in the asset file. For an order with multiple objects and components, users needed to go through multiple assets to divide the costs. It took a long time to assemble an order. To speed the process, users estimated. This created many mismatched links between jobs and costs, and delayed job close-off.

Enterprise systems streamline processes, but increased work and accountability can make it difficult for end-users to adjust to new roles

Fifth, a centralized database with streamlined processes can reduce redundancies by using one-time data entry. The advantages are that duplicate tasks can be reduced, processes made more efficient, and end-user accountability increased. The role and skill of all levels of stakeholders are changed but such dramatic change can bring higher resistance and low morale if the changes are not aligned with management practice.

One-time data entry can mean that some end-users need to input more data than they had to in the past, to meet the needs of managers in other departments. For example, in their new system, supervisors in Firm B needed to enter details of work hours and materials movements. These figures had been previously entered by data-entry clerks, purchasing officers and warehouse clerks. Business managers were pleased to receive reports quickly with comprehensive information, but supervisors complained about the extra work needed for tracking and reporting small job costs and goods movements.

Enterprise systems provide wide-ranging standard processes, but uneven quality of different modules may cause difficulties

Finally, the sixth source of deficiency identified in Table II is standard processes. ES are designed to provide standard industry processes for all organizations. Organizations can build enterprise processes with a wide range of functions, but the large scope means that some modules may not be as stable as others.

To build a large suite of application modules, ES vendors rush to develop new modules as well as to acquire other vendors' packaged products. System integrity is thus compromised, and users experience inconsistent quality, and incomplete or insufficient functions in some modules. For example, the SAP finance module has been used and enhanced for more than 20 years. Likewise, the PeopleSoft human resources modules have been used and enhanced for more than ten years. These modules have mature functionality and a wide variety of options to fit many business needs. Other modules, however, do not have the same quality. The inventory module in PeopleSoft V6.0 for Firm C and the payroll module in SAP for Firm D were difficult to apply because they were first versions in Australia. The inventory replacement, and leave management functions, respectively, were incomplete. Users had to work around these inefficiencies by manually maintaining an inventory record and employ attendance sheets.

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From the firms studied, business managers had a number of ways of managing these deficiencies. Their approaches, summarized in Table III and explained in the six bulleted paragraphs below, were applied to prevent or fix problems either during system implementation or after the system went live. Although some of these

Sources of deficiencies – influential features of ES	Explore process-enhancement opportunities	Assess relevance of the ES processes	Make required changes and align management programs
Configurability	Explore opportunities for redesigning processes	Examine the effectiveness of existing processes	Change processes and configure the software for process effectiveness
In-built processes	Explore improvement opportunities inspired by the inbuilt "best practice" processes	Assess the relevance to the business	Select appropriate process options according to business situations
Multiple options	Learn available optional processes and analyze their fit to current and future business needs	Review data input for operation smoothness; review data retrieval according to specific management objectives	Simplify multiple levels of data input processes; customize data retrieval processes
Data and process integration	Explore new uses of integrated data	Assess proper level of process integration and data control	Adjust the links between processes and sub processes
Streamlined processes	Explore opportunities in reducing redundant tasks	Review work changes of all stakeholders and recognize increased or decreased work loads	Educate users overall view of process, and adjust job responsibilities and the reward systems
Standard processes	Explore opportunities for system expanding and extension	Analyze processes quality of different modules	Reconcile inconsistencies between ES modules

Table III.
Managing deficiencies

management tasks were implemented as individual projects, many were undertaken together. In summary, organizations did three things interactively and continuously while implementing or enhancing the software:

(1) explore process-enhancement opportunities with ES functions;

(2) assess relevance of ES processes to business situations; and

(3) make necessary process and software changes and align management programs.

These three types of action to manage deficiencies are summarized in Table III.

Examine the effectiveness of existing processes; explore opportunities for improving processes

In Firm A, a task group of business users was formed to explore the available process options in the software and review existing financial processes for improvement. As a result, the ledger was rebuilt, the order was redesigned, a few processes changes were implemented and the software was reconfigured to support the redesigned processes.

Explore opportunities for improving business performance inspired by the inbuilt "best practice" processes; assess the relevance of these in-built processes to the business and configure ES processes according to business situation

After suffering for a year with its misfit SAP time-recording process, Firm A learned to reconfigure the system to meet their needs. The new process assumed fixed job hours

for employees and required exception entries only when overtime or leave occurred. When the operation became smooth, many new time-management functions were tested and applied. In Firm B, some third-party software was added to protect errors. Occasional manual checks were put in place as an extra level of data quality control.

With the automatic purchasing, Firm A changed the process by allowing automatic purchasing only for projects that had certain confirmed criteria. Firm D also reviewed its order-releasing process and put in an extra confirmation process.

Learn available optional processes and analyze their fit to current and future business needs; simplify multiple levels of data input processes and data retrieval according to specific operational and management objectives

Business leaders and users in Firm C reviewed all the possible alternatives during the design phase for their new financial management processes. Many summarized screens were designed so that users did not have to fight their way through a maze of screens and transactions. Operational benefits (i.e. time and cost savings) for this process were apparent within a short time after implementation. On the other hand, Firm A learned to review the relevance of all the fields a year after implementation. In Firm A, system-tailoring options (screen masks, workflow programming, and extended reporting) were applied and a 38-screen project closeout process was condensed into three screens.

Assess the appropriate level of process integration and data control and adjust links between processes; explore new uses of integrated data

Firm A formed a team of business users who reviewed the level of linkage between financial and work management functions. A variety of ways of modifying the system (configuration, workflow management, some ABAP/4 programming) were adopted. The project management module was reconfigured to loosen tight links, allowing the project coordinator to roughly divide the costs between jobs. This gave work managers flexibility in managing their jobs. The module sped up job closing and asset management, and maintained reasonable links with the financial system. Firm C added error checking and re-established batch data-processing staff to process occasional-user jobs. As operations went more smoothly, managers started to request new ways of processing and organizing the integrated data.

Explore opportunities for reducing redundant tasks; educate front-end-users in an overall view of processes; simplify data-entry screens while adjusting the workloads and responsibilities of front-end-users

To assist supervisors to adjust to the new process, Firm B reviewed its information and data capture requirements with its business managers. Instead of the generic SAP front-end that had numerous screens, a customized version of data entry was designed (with workflow management) to collect needed information. Moreover, process training was conducted for front-end-users to explain the overall business effects of single-point transaction entry and many end-users' job responsibilities were adjusted. Change management was implemented for all levels of stakeholders; aligned measurement and reward system were rebuilt. Guidance for system use was provided for regular users as well as casual workers.

Reconcile inconsistencies between ES modules and explore opportunities for expanding enterprise integration with more functions

To ensure smooth integration with other implemented ES modules, Firms C and D modified their systems and developed their own functions to link with the ES. Various system-tailoring techniques including SAP's ABAP/4 programming and interface programming techniques were applied. In addition, using more mature system-modification techniques, Firm D adopted more application modules in order to gradually achieve wide-scope process integration; Firm C expanded system use with six more newly-acquired gas, water and communication companies.

Conclusion

ES are a new form of information system where the software itself has the potential to exert strong influences on business processes. This paper has discussed six sources of influence: configurability, in-built processes, multiple options, data and process integration, streamlined processes, and standard processes. Its key finding is that implementation of ES is risky not only because of the strengths and weaknesses of factors such as top management support, user involvement, clearly-defined goals and scope, adequate resources, effective leadership, clear communications, etc. but also because each of these six software-specific factors has the potential to bring either benefits or problems to the adopting organization.

Key lessons learned include:

- Configurable ES can be used to support and enable process changes towards much improved processes. But they can also be used to perpetuate existing process inefficiency if process-change opportunities are ignored.
- If default processes are adapted without regard to end-user and management needs, inappropriate processes may be imposed on the organization, causing immediate conflicts in operation.
- ES can help streamline processes and remove redundant processes. However, unless changes in roles are facilitated by redefining new job responsibilities, changing reward systems, and offering educational programs to assist users as they transition to their new roles, users and managers are likely to resist change.
- Shared information may lead to greater coordination of activities across the organization but bureaucratic processes with excessive crosschecks may be imposed on the operational level and cause high user resistance.

As more and more organizations adopt ES it is important to recognize the potential benefits and deficiencies associated with such software. The software itself is inherently neither good nor bad. With sound management, i.e. with thorough analysis and matching of software capabilities and organizational needs, and care in introducing change and motivating employees, the potentially good outcomes of software adoption can be reinforced and potentially bad consequences minimized. Although the data for this study were collected from organizations using ERP systems, the key idea presented in this paper, i.e. that packaged software has the potential to bring both benefits and deficiencies to the adopting organization, should be widely applicable in developing ongoing benefits with other software packages that integrate processes within and between organizations.

References

Barki, H., Rivard, S. and Talbot, J. (1993), "Toward an assessment of software development risk", *Journal of Management Information Systems*, Vol. 10 No. 2, p. 203.

Boehm, B. (1991), "Software risk management: principles and practices", *IEEE Software*, Vol. 8 No. 1, pp. 32-41.

Boersma, K. and Kingma, S. (2005), "Developing a cultural perspective on ERP", *Business Process Management Journal*, Vol. 11 No. 2, pp. 185-97.

Conti, T. (1989), "Process management and quality function deployment", *Quality Progress*, Vol. 22 No. 12, p. 45.

Davenport, T.H. (1998), "Putting the enterprise into enterprise systems", *Harvard Business Review*, July/August, pp. 121-31.

Eisenhardt, K.M. (1989), "Building theories from firm study research", *Academy of Management Review*, Vol. 14 No. 4, pp. 532-50.

Gartner Group (1998), *ERP and FMIS Study – Executive Summary*, Gartner Group, Stamford, CT.

Gasaway, M. (1985), "What you sacrifice with integrated systems", *ICP Administrative & Accounting Software*, Vol. 10 No. 3, p. 16.

Gattiker, T.F. and Goodhue, D.L. (2002), "Software-driven changes to business processes: an empirical study of impacts of enterprise resource planning (ERP), systems at the local level", *International Journal of Production Research*, Vol. 40 No. 18, pp. 4799-814.

Goodhue, D.L., Wybo, M.D. and Kirsch, L.J. (1992), "The impact of data integration on the costs and benefits of", *MIS Quarterly*, Vol. 16 No. 3, p. 293.

Gupta, A.K. and Govindarajan, V. (1986), "Resource sharing among SBUs: strategic antecedents and administrative implications", *Academy of Management Journal*, Vol. 29 No. 4, p. 695.

Holland, B., Light, B. and Gibson, N. (1999), "A critical success factors model for ERP implementation", paper presented at European Conference on Information Systems, pp. 273-87.

Jasinski, F. (1959), "Adapting organization to new technology", *Harvard Business Review*, Vol. 37 No. 1, p. 79.

Johnson, B.M. and Rice, R. (1987), *Managing Organizational Innovation: The Evolution from Word Processing to Office Systems*, Columbia University Press, New York, NY.

Kirchmer, M. (1998), *Business Process Oriented Implementation of Standard Software: How to Achieve Competitive Advantage Quickly and Efficiently*, Springer-Verlag, New York, NY.

KPMG (2000), *SAP Benchmarking Report 2000*, KPMG Consulting and Nolan Norton Institute, Melbourne.

Lassila, K.S. and Brancheau, J. (1999), "Adoption and utilization of commercial software packages: exploring utilization equilibria, transitions, triggers, and tracks", *Journal of Management Information Systems*, Vol. 16 No. 2, pp. 63-90.

Lyytinen, K., Mathiassen, L. and Ropponen, J. (1998), "Attention shaping and software risk – a categorical analysis of four classical risk management approaches", *Information Systems Research*, Vol. 9 No. 3, p. 233.

Manners, W. (1998), "Integrated benefits offer opportunities", *National Underwriter*, Vol. 102 No. 34, pp. 21-4.

Markus, L.M., Axline, S., Petrie, D. and Tanis, C. (2000), "Learning from adopters' experience with ERP: problems encountered and success achieved", *Journal of Information Technology*, Vol. 15 No. 4, pp. 245-66.

O'Leary, D.E. (2000), *Enterprise Resource Planning Systems: Systems Life Cycle, Electronic Commerce, and Risk*, Cambridge University Press, Cambridge.

Parr, A.N., Shanks, G. and Darke, P. (1999), "Identification of necessary factors for successful implementation of ERP systems", in Ngwenyama, O., Introna, L.D., Myers, M. and DeGross, J.I. (Eds), *New Information Technologies in Organizational Processes: Field Studies and Theoretical Reflections on the Future of Work*, Kluwer Academic Publishers, Boston, MA.

Ratliff, H.D. (1995), "Integrate your way to an improved bottom line", *IIE Solutions*, Vol. 27 No. 10, p. 31.

Ross, J.W. and Vitale, M. (2000), "The ERP revolution: surviving versus thriving", *Information Systems Frontiers*, Vol. 2 No. 2, pp. 233-41.

Schroeder, K. (2001), "Process control holds the key", *Electronic News*, Vol. 47 No. 29, pp. 24-32.

Shang, S. and Seddon, P.B. (2002), "Assessing and managing the benefits of enterprise systems: the business manager's perspective", *Information Systems Journal*, Vol. 12, pp. 271-99.

Sumner, M. (2000), "Risk factors in enterprise-wide/ERP projects", *Journal of Information Technology*, Vol. 15 No. 4, pp. 317-27.

Further reading

Bancroft, N.H., Seip, H. and Spregel, A. (1998), *Implementing SAP R/3*, Manning Publications Inc., Greenwich, CT.

Brehm, L., Heinzl, A. and Markus, M.L. (2001), "Tailoring ERP systems: a spectrum of choices and their implications", *Proceedings of the 34th Annual Hawaii International Conference on Information Systems, Hawaii, January*.

Johnson, B.M. and Rice, R. (1984), "Reinvention in the innovation process: the firm of word processing", in Rice, R. (Ed.), *The New Media: Communication, Research and Technology*, Sage Publications, Beverly Hills, CA, pp. 157-84.

Pereira, R.E. (1999), "Resource view theory analysis of SAP as a source of competitive advantage", *Database for Advances in Information Systems*, Vol. 30 No. 1, pp. 38-46.

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