

***“Managing For Return on Investment – Attributes for Enterprise Resource
Planning Success and Failure”***

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Abstract

Enterprise Resource Planning (commonly known as ERP) is a system that integrates key business and management processes to provide a top level view of what is going on in an organization. Aiming to serve as a backbone for an entire business, ERP tracks company financials, human resources data and (where applicable) the manufacturing information such as where inventory is located and where it needs to be taken from for order completion. This could be from the parts warehouse to the shop floor or from one global warehouse to a regional warehouse in another country depending on the depth of ERP used as well as the size of the organization.

Software has existed for decades to manage the aforementioned (and other) business tasks. These individual software packages are typically provided by a different software vendors and usually do not interface to one another. For example, the accounting system did not exchange data with the manufacturing system; the manufacturing system did not interface with the human resource system, and so forth. While interface can be accomplished, it usually does not happen without a great deal of rewriting from expensive software technicians in information systems. Even when interfaced, the newly developed custom code was not easily upgraded upon new software releases. The idea behind ERP is that the software needs to communicate across functions and operate from one single database. With an ERP system, the financial software can cut an accounts payable check as soon as the loading dock clerk confirms that the goods have been received in inventory and an automatic match process takes place between purchase order, invoice, and receiver. Similarly the accounts receivable module can generate an invoice as soon as the shipping clerk says the finished goods are on the truck to the customer. ERP aims to replicate business processes (how do we record a sale, how do we verify hourly workers' paychecks) in software, guide the employees responsible for those processes through them step by step and automate as many procedures as desired.

While ERP sounds great there is considerable downside. ERP systems are expensive (often multimillion-dollar projects), have a high degree of complexity, and huge risk for failure. The promise of ERP is great but so is the expense in terms of time, effort and money. Implementing the software in a company usually involves changing business processes and the way people do their jobs. With careful planning and an extensive properly managed work effort, ERP can provide huge returns on investment and make organizations function more effectively and efficiently.

This paper examines ERP's complexity and high price for failure in an effort to identify common risk characteristics, failure attributes, and success attributes. By identifying commonalities in these three areas managers can learn, expect, and plan accordingly to maximize return on investment of their ERP implementations.

Approach and Methods

The approach used in this paper combines a study of scholarly peer reviewed journals and other resources pertinent to ERP implementation. Initially, an effort is made to justify the expense and describe the complex nature of ERP systems. This is followed by identification of associated risks and attributes for failure as well as success. Case studies, results of surveys, and other independent studies are examined in an effort to identify common failure and success attributes, as well as risks associated with ERP implementations.

Literature Review

The Use of Enterprise Resource Planning Systems in Today's Business World

Enterprise Resource Planning (ERP) has been the most popular means of overall business process improvement since the North American adoption of the Japanese led concept of Just-in-time management. The majority of Fortune 500 companies have adopted ERP systems. Most major corporations have transformed their operations to ERP system led organizations since the mid 1990's. As a result, as the high end of the market has become saturated, ERP systems have gained popular reception and are now filtering down to medium-sized organizations throughout Europe and North America (Oliver & Romm, 2002).

What's so special about ERP? "ERP Systems represent the implementation of the old managerial dream of unifying and centralizing all the information systems required by the firm in one single system..." (Rowe, 1999). This single database system potentially places all elements of the organization in a position to work from one source of interrelated data – not multiple departments driven by islands of information.

When used appropriately, ERP software integrates information used by the major (if not all) areas of an organization – accounting, manufacturing, distribution, and human resources –

into a seamless computing system. This provides a more effective and efficient environment working from one database of information instead of relying on islands of information originated previously from each independent area of the organization. Successful ERP systems can be the backbone of business intelligence for an organization. This gives management a unified view of its processes and better enables control over those processes. ERP systems have a reputation for being very costly and often providing scanty results (Gale, 2002).

Contemporary thinking today is that ERP is the foundation of today's business management and strategic positioning (Stevens, 1999).

Reports of many reasons why ERP systems have been adopted exist. Many of the reasons are based on informed opinion rather than extracted by research study. A significant portion of the justification for adopting ERP systems is founded upon technology issues such as integration, and dissatisfaction with existing administrative systems, procedural issues such as information access, process improvement, and standardization, organizational issues such as business vision, service and quality, and people issues (Oliver & Romm, 2002). Regardless of the reason, the issue of cost versus benefits is ever-present mandating management to justify the high cost of ERP with theoretical justification promising increased productivity and market share, while reducing costs.

Moving to ERP is often justified more by political reasons than by sound managerial reasoning. (Adam & O'Doherty, 2000). While popular, political reasons are often costly and least understood. Many organizations feel unjust pressure to implement ERP to provide upper management a standard framework by which to operate multiple business instances. While justifiable from the upper management standpoint, this is often not understood from the instance or individual business subsidiary standpoint.

To generate return on investment, companies are adding strategic applications on top of ERP to find value. These value-added applications, or bolt-ons, include solutions in customer-relationship management (CRM), supply-chain management (SCM), advanced planning and

scheduling, strategic procurement, e-Commerce, and business intelligence (Stevens, 1999).

Business integration in dealing with organization wide ERP is the ultimate proof for companies as they move into the post-implementation phases of their ERP initiatives ("Enterprise Resource", 2001).

Value Through Transformation via ERP

The most difficult tasks for ERP implementation environments is the incorporation of business work process changes, software upgrades, support of gap solutions, and the addition of functionality. Seventy percent of the companies that add e-Commerce capability are looking to multiple strategic approaches (i.e. ERP solutions as well as other non-automated manual solutions) and 20 percent are relying exclusively on ERP vendor offerings. Each of these approaches takes on their own set of related consequences in relation to risk, implementation time, and ongoing issues ("Enterprise Resource", 2001).

Many organizations have found merit in expanding ERP efforts throughout their organizations. Demonstrated results of ERP implementations include:

- 1) Reduction of planning cycle (95%)
- 2) Reduction of delivery times (10 – 40%)
- 3) Reduction of production times (10 – 50%)
- 4) Lower stock levels (10 – 25%)
- 5) Reduction of later deliveries (25 – 50%)
- 6) Increase in productivity (2 – 5%)

The above results exemplify the effects of synergy in including (and / or combining) the supply chain management function within the ERP environment (Adam & O'Doherty, 2000). These improvements show the significant potential of ERP implementation when properly planned, and orchestrated.

The inability for many top organizations to document measured benefits (such as the ones listed above) from an ERP implementation appears to discourage organizations from

undertaking future upgrades or migrations (Markus et al., 2000) or adding additional bolt-on modules to existing ERP software. Considering the vast difference from ERP and existing management practices, the cost versus benefits of an ERP implementation project are often hard to project much less prove; thus, supporting the theory that ongoing measurement of attributes is an important part of the ERP implementation process.

The ERP Metamorphosis

Implementing ERP involves automating standard transactions and thus developing new business processes. When a company optimizes operations, account management, or management information, they are creating new business processes (Stevens, 1999). Recognizing such when launching an ERP project is important due to the necessary communication required to alert system users of new processes and procedures that will arise. Even the slightest failure to acknowledge user responsibility could result in one required element of the single database to not be updated thus creating corrupt data and resultant disaster for other users and decision makers.

In association with required new processes, reengineering of the organization is often both a desirable and necessary step of ERP projects. Because ERP represents a new way of managing an organization, employees are often required to do additional functions or functions outside their previous scope of performance. Thus, an evaluation of whether business re-engineering is necessary or not is a major first step in the ERP implementation process. It is rare that some kind of re-engineering is not required (O'Leary, 2002).

Business re-engineering requires observance and documentation of current processes and procedures in an effort to map future ERP required processes and procedures. Consultants are often used to perform such studies as organizations do not typically have existing resources to conduct such.

The Required Culture Change of ERP

ERP is more than just a new software system; it's a cultural change (Gale, 2002). A culture change of this type involves many aspects. One, for example, is helping employees understand that ERP systems usually require them to do more work or different administrative tasks that do not add obvious value to their individual jobs. Given a lack of understanding as to why it is important to adhere to ERP system input requirements, and therefore why the information they are inputting is important, employees will typically find a way to work around performing the necessary tasks in the ERP environment ultimately leading to ERP implementation disaster (Gale, 2002).

Managing change requires consideration for the inter-relationship between knowledge, networks of organizational leaders, and power at the various management levels. The development and use of both networks and knowledge during an ERP implementation process cannot be separated from issues of power and politics (Hislop et al., 2000).

In addition to change, patience and analysis is required of ERP implementations. Anticipated results can be slow and take longer than projected to achieve. According to the "ERP Trends" survey, while 24 percent of survey participants reported no decrease in productivity following implementation, 75 percent experienced a moderate to severe productivity dip. One-fourth of the companies surveyed had dips lasting up to one year while the majority of the participants reported dips lasting less than six months ("Enterprise Resource", 2001).

Additional studies have discovered that 45 percent of firms perceived no improvement from ERP implementation while 43 percent claimed no cycle reduction had been experienced (Adam & O'Doherty, 2000).

Risk and Implementation of ERP – The Price of ERP

Cost of ERP is a concern for many companies. Implementation costs, on average, are 25 percent over budget. Considering the high price tag for ERP implementations, this overrun is of significant concern and can (has) put large organizations in a going concern questionable

state. In addition to implementation cost, support costs are often underestimated by 20 percent for the year following implementation. A comparison of previous system costs to post ERP implementation system costs finds most companies with an increase in support cost as a whole on an ongoing basis ("Enterprise Resource", 2001). Efficiency, productivity, market share, and other gains, as a result of ERP, are expected to offset this increase in support cost.

The financial impact of ERP to both the software provider and knowledge consultant industry is significant. By 2000 the ERP revolution generated over \$20 billion in revenues annually for suppliers and an additional \$20 billion for consulting firms (Willcocks & Sykes, 2000).

Risk and Implementation of ERP – Risk Factors

In a search for common factors associated with risk and implementation of ERP projects, Mary Sumner studied seven ERP project implementations representing seven diverse industries implementing implementations of three major ERP providers: SAP, Peoplesoft, and Oracle. Her findings represent the most common risk factors mentioned in the seven implementations and are illustrated in Table 1 below.

<u>Table 1 – ERP Common Risk Factors</u>	<u>Category of Risk Factor</u>
1 Failure to redesign business processes to fit the software	Management
2 Lack of senior management support	Management
3 Insufficient training and reskilling	People Skills
4 Lack of ability to recruit and retain qualified ERP system developers	Technical
5 Insufficient training of end-users	People Skills
6 Inability to obtain full-time commitment of 'customers' to project management and project activities	Customer
7 Lack of integration	Technical
8 Lack of a proper management structure	Management
9 Insufficient internal expertise	People Skills
10 Lack of a champion	People Skills
11 Lack of "business" analysts	People Skills
12 Failure to mix internal and external personnel	Management
13 Failure to emphasize reporting, including custom report development	Management
14 Insufficient discipline and standardization	People Skills
15 Ineffective communications	Management
16 Avoid technological bottlenecks	Technical

Data extracted from Sumner, 2000.

Risk and Implementation of ERP – The Price for Failure

The high level of risk associated with such projects correlates to the beneficial effects of implementing ERP. Enterprise resource planning projects are complex. Re-engineering of key business processes prior to their implementation, and the required culture change create a need for change management within the organization. In addition, ERP projects require reliance on many different types of expertise outside the firm's traditional internal means. Consultants, software vendors, and trainers are often an integral part of the ERP project team. The complexity of ERP, vast amount of radical change and introduction of new players to the environment all add to the dangers inherent in such vast projects. Some large organizations have incurred bankruptcy after years of unsuccessful implementation efforts of ERP systems. In the case of Foxmeyer, who incurred bankruptcy in 1996 after years of unsuccessful ERP implementation, software vendor SAP and the consulting branch of Arthur Anderson were sued as a result of problems associated with Foxmeyer's attempts at implementing ERP. Failure of large companies and legal action against implementation support players is illustrative of what can happen when implementations go wrong (Adam & O'Doherty, 2000).

Attributes for Failure

"ERP Trends," a survey conducted by The Conference Board (an independent research organization), reported 40 percent of study ERP study participants failed to achieve their business case one year after implementation of their enterprise resource planning. When benefits of the ERP project were achieved, it took six months longer than expected or planned. The lag in achieving benefits, as documented by the study, was primarily due to pressure to "go live" before the organization was ready to cutover to their new system. This resulted in substantial post-implementation efforts to identify and measure shortcomings and deficiencies associated with problems in the cutover ("Enterprise Resource", 2001).

Problems relating to ERP implementation are vast, sudden, and expensive. The most frequent and devastating problems include: 1) approaching ERP implementations from an excessively functional perspective, 2) inappropriately cutting project scope, 3) cutting end-user training, 4) inadequate testing, particularly of interfaces, modifications integrations and exceptions, 5) not first improving business processes where this needs to be done, 6) underestimating data quality problems and reporting needs, 7) unknown business results, 8) disappointing business results, 9) fragile human capital, and 10) migration problems (Markus et al., 2000).

Another study conducted by O'Leary analyzes problems by identifying ERP stages and associated problems within each stage. The ERP life cycle includes six stages: 1) deciding to go ERP (business case state), 2) choosing an ERP system, 3) designing an ERP system, 4) implementing an ERP system, 5) after going live, and 6) training. According to a study conducted by Daniel O'Leary, 27.3 percent of the time, the main problem with ERP implementations is a lack of participation by the users. However, this measure is questionable due to the question as to whether users were adequately trained or not. Other problems could possibly underlie training and user involvement such as insufficient buy-in regarding personnel as well as insufficient support of management (O'Leary, 2002).

Other studies have revealed factors that affect risk inherent in major information system projects to include organizational fit, personnel skill mix, management strategy and structure, software systems design, user involvement and training, technology planning, project management, and social commitment (Sumner, 2000).

Middle management within production departments is often the source for most resistance to ERP projects. Their main objections to changes of ERP nature are typically that they are fundamentally unnecessary and that the organization can remain competitive through focus on development and production of technically innovative products (Hislop, Newell, Scarbrough, & Swan, 2000).

In addition to personnel issues, the change in adopting new technology has been noted to play a role. "Faulty technology is often blamed, but eight out of nine times, ERP problems are performance-related..." according to Pat Begley, senior vice president of educational services at SAP, a major ERP software provider (Gale, 2002).

One of the biggest mistakes that companies make when they launch new ERP applications is assuming that they are going to be like any other piece of software... Microsoft Word is a productivity tool – whether you use it doesn't impact anyone else in the company. But ERP is a totally new environment. Everything you do in an ERP environment affects the success of the company (Gale, 2002).

One area where many companies implementing ERP all too often first look to cut expense due to project overruns in training of ERP users. This is a very dangerous expense to minimize. Training is often last minute and weak. It typically covers, on a minimal basis, how to do specific job-related tasks, with no explanation of the effects of those actions (or lack thereof) within the business cycle. Training should cover why each task is important and how every transaction is part of a larger process. If this is not done properly, end-users are less likely to use the application correctly or consistently. ERP training should not be limited to teach end-users how to fill in fields and click buttons. End-users should know how their actions impact their colleagues as well as the entire new ERP management environment (Gale, 2002).

According to another study conducted by Daniel O'Leary, when companies discuss problems with ERP system implementations, it generally involves one of the following problems: 1) budget over-run, 2) time over-run, 3) lack of benefit, 4) meets or does not meet business plan criteria (O'Leary, 2002). The O'Leary study was the only one to exclude specifically people issues from its recognition of problem areas.

Attributes for Success

How does an organization determine if it is successful in its ERP implementation efforts? A quantified business need is a prerequisite for a high level of satisfaction with enterprise

resource planning initiatives ("Enterprise Resource", 2001). "... Companies that differ substantially in how they defined success in the project phase because they differed in their definitions of the project itself... The larger organizations tended to define the ERP experience in much more expansive terms than smaller ones. They often demanded business results from "IT" projects. In many cases, these organizations were planning for multiple of ERP installations and realized the importance of learning how to implement and upgrade ERP systems better each time. They were more likely than smaller organizations to start planning for the onward and upward phase during the project phase" (Markus et al., 2000).

Developing a cross-functional project team representing all departments impacted by the ERP project is an important step to successfully managing change and implementing ERP. Allowing individual groups to accept or resist ERP can result in problems for the implementation. For example, Pharm-Co, a UK based provider of nuclear medicines, underwent resistance to ERP from their production middle management. This group felt the existing system fit their company goals and no alteration was necessary for increased productivity, improved efficiencies, or increased competitive strategy to capture additional market share. Anticipating this reaction, Pharm-Co organized their ERP project team around the production middle managers including members of all other affected departments. The production middle managers held their ground firmly throughout the entire ERP implementation, but succumbed to political pressure as well as their inability to influence other middle managers in outlying support departments. Their inability to form a cross-functional resistance (especially to include the senior management level) led to their loss of power in affecting the issue (Hislop et al., 2000).

While the Pharm-Co case worked, it is not the preferred form of building cross-functional ERP implementation team. Meeting the potential resistance head on gaining buy-in to the project early on in the ERP pre-implementation phase, could have resulted in a much more efficient and productive implementation.

The design of ERP program management can contribute to the success of ERP's complex software implementation. In their study of 15 ERP cases, Pieter M. Ribbers, PhD, and Klaus-Clemens Schoo identified five implications for practice of complex ERP program management. The first of these implications for practice deals with coordination. Deemed to be of critical importance, coordination with suppliers and employees across individual projects is necessary to achieve process efficiency. The second implication was a strict adherence to a "no change policy" during the rollout phase of enterprise-wide ERP implementations. The third implication deals with ERP implementations with high integration complexity. The need for complete alignment mechanisms (such as steering committees, reviews, and release controls) is of critical importance. In particular, steering committees should be primarily focused for adherence to planned changes (those involving integration complexity) and place less emphasis on unplanned disruptions (i.e. "fire fighting"). The fourth implication cited by Ribbers and Schoo involves implementation approaches. According to Ribbers and Schoo, "Successful programs (ERP implementations) differentiate their implementation approaches according to the extent of the different complexities they encounter..." These changes involve decisions such as the number of parallel rollout activities and the changes during the parallel activities. In environments of high integration complexity, organizational changes may also be required to be implemented together with technical changes. The final implication deals with attention from management to complex ERP implementations. As cited by Ribbers and Schoo, complexity further complicated with high variety (i.e. multiple locations) demands greater general management attention. Greater general management attention requires communication and sponsorship in order to be effective (Ribbers & Schoo, 2002).

In another study of success achieved from adopters' experiences with ERP, Markus, Axline, Petrie, and Tanis study ERP implementation experiences through the sponsorship of an ERP vendor interested in helping customers be more successful in ERP implementation. Markus et al. identify three distinct phases in the "ERP experience cycle" to group successes

attributes within: 1) the project phase (where ERP software is configured and rolled out to the organization), 2) the "shakedown phase" (where the organization makes the transition from "go live" to "normal operations), and 3) the "onward and upward" phase (where the organization experiences the majority of business benefits from ERP and plans their next steps for business improvement) (Markus, Axline, Petrie, & Tanis, 2000).

Success in the project phase, according to Markus et al., is characterized by: 1) project cost relative to budget as controlled by people, 2) project completion time relative to schedule as controlled by people, and 3) completed and installed system functionality relative to original project scope as controlled by people.

Success in the "shakedown phase" is characterized by: 1) short-term changes occurring after system "go-live" in key business performance indicators such as operating labor costs, 2) length of time before key performance indicators achieve "normal" or expected levels, and 3) short-term impacts on the organization's adopters, suppliers and customers such as average time on hold when placing a telephone order all of which are controlled by people.

Success in the "onward and upward phase" is characterized by: 1) achievement of business results expected for the ERP project, such as reduced IT operating costs and reduced inventory carrying costs, 2) ongoing improvements in business results after the expected results have been achieved, and 3) ease in adopting new ERP releases, other net Its, improved business practices, improved decision making, etc., after the ERP system has achieved stable operations (Markus et al., 2000). Once again, these are all controlled by people.

As stated earlier, measurables in the ERP process are important. In general, companies that do not deliberately set out to achieve measurable business results do not obtain them. These same companies never realize that they have obtained the optimal levels not measured as well (Markus et al., 2000).

ERP implementations are socially complex activities. Up to 12 or more external parties (including the ERP vendor, vendors of ERP product bolt-ons, vendors of hardware, software

consultants, telecommunications specialists, implementation consultants, etc.) may be involved in different aspects of an organization's ERP implementation. Dealing with numerous parties can be difficult to manage. (Markus et al., 2000)

Because of its vastness, complexity, high risk for failure, and significant price tag, the ERP project manager has a huge responsibility. Few (if any) information technology products and services firms are willing to take end-to-end responsibility for coordinating all parties. While true they also generally seem to take exception to accepting secondary roles to other such firms as well. In addition, product and service firms demonstrate widespread lack of knowledge about the details of ERP products in the sales cycle especially when integration and interface questions are posed (Markus et al., 2000).

One of the greatest challenges in effectively implementing ERP environments is recruiting and retaining highly sought information technology professionals with the specialized technical and application-specific skills (Sumner, 2000).

"At the start of an ERP project the organization is really not aware of the scope of the implementation, the impact it will have. Due to fixed deadlines there is no time to train the end users, or they only have a couple of days... what you see then is a lot of end users struggling to use the system making all kinds of errors. Companies want to do more with less. They are not going to cut designing a business process, if an organization is going to cut something it will be security and controls, and that all hinges on the control philosophy..." (Wright & Wright, 2002).

Training should include information about their new roles and responsibilities, the business objectives of the ERP initiative, and the projected benefit to the company and to users. People will embrace a new system if you give them the skills and support (training and other tools) to use it (Gale, 2002).

Discussion

The previous literature review identifies the beneficial aspects of ERP implementation while also identifying the related complexity and high risk of such a business approach change and related investment. ERP's integrated approach to business problems, incorporating the use of one common database, provides the crux of the value added. A requirement of ERP implementations is the standardization of business transactions which often require re-engineering of business processes in order to feed the necessary input to the ERP environment. Measurement of the results of these business processes (accompanied with comparison to historical data and world class benchmarks) is required to track ERP progress and improvement.

ERP's added degree of complexity and change to the organization requires a culture change on behalf of the organization. This culture change should incorporate communication of the new expected re-engineered roles of personnel, the responsibility of personnel to the new ERP environment, and how each individual's role is important to the new ERP environment. The practice of change management from all levels of management is required.

Problematic attributes associated with ERP implementations are vast and diverse and include an excessive functional approach (without training personnel to know the impact of their role in the grand scheme of the ERP environment), inappropriate scope, lack of testing and non-proven processes, data quality issues, and unknown business results. In addition, participation of users, fragile human capital, lack of upper management support, and participation of users in ERP implementation decision making add to the quandary of problems. Upper management often hastily makes the decision to cut training budgets and user involvement creating a negative impact on ERP success as well. ERP implementation risk includes issues summarized in management, people skills, customer, and technical categories.

Attributes for success include having measurable business processes and goals which can be used relative to benchmarks and past data for improvement identification, organization

of a cross-functional ERP implementation team, the employ of a strong project / program manager to lead the ERP implementation, and practicing change management within all levels of the organization.

Conclusion

What can be said for the commonalities that exist for managing ERP return on investment? Are their common links for failure and success attributes, as well as risk factors?

One common element revealed in the study of these areas is the management of people. In virtually every aspect of ERP failure and success attributes, as well as risk factors, people play a significant role in determining whether success or failure will be achieved in the ERP implementation. For example, the culture change that is required is required of people, the training of people, the communication to people, the task required of people, the business processes performed by people, the measurement process of people, the cross-functional team made up of people ... all of the major areas and virtually every attribute is composed of or heavily contingent upon people. This raises a common misconception of ERP systems. ERP systems and implementation is not about implementing new software programs. Rather, it is about a new way to manage our businesses through different people processes. Software and hardware are merely tools. The management of people is the key to return on investment of ERP.

References

- Adam, F., & O'Doherty, P. (2000). Lessons from enterprise resource planning implementations in Ireland – towards smaller and shorter ERP projects. *Journal of Information Technology*, 15, 305 – 316.
- Enterprise Resource Implementation Still Tough. (2001, August). *IIE Solutions*, 33, p. 19.
- Gale, S. (2002, September). For ERP Success, Create a Culture Change. *Workforce*, 81, 88 – 91.
- Hislog, D., Newel, S., Scarbrough, H., & Swan, J. (2000, September). Networks, Knowledge and Power: Decision Making, Politics and the Process of Innovation. *Technology Analysis & Strategic Management*, 12, 399 – 412.
- Markus, M., Axline, S., Petrie, D., & Tanis, C. (2000). Learning from adopters' experiences with ERP: problems encountered and success achieved. *Journal of Information Technology*, 15, 245 – 265.
- O'Leary, D. (2002, Spring Supplement). Discussion of Information System Assurance for Enterprise Resource Planning Systems: Unique Risk Considerations, *Journal of Information Systems*, 16, 115 – 126.
- Oliver, D., & Romm, C. (2002). Justifying enterprise resource planning adoption. *Journal of Information Technology*, 17, 199 – 213.
- Ribbers, P., Schoo, K.C. (2002). Program Management and Complexity of ERP Implementations. *Engineering Management Journal*, 14, 45 – 52.
- Rowe, F. (1999). Coherence, integration informationnelle et chagement: esquisse d'un programme de recherché a partir des Progiciels Integres de Gestion. *Systemes d'Information et Management*, 4, 3 – 20.
- Stevens, T. (1999, August). Consulting's New Era. *Industry Week*, 248, 24 - 27.
- Sumner, M. (2000), Risk factors in enterprise-wide/ERP projects. *Journal of Information Technology*, 15, 317 – 327.

Willcocks, L.P., & Sykes, R. (2000). The role of the CIO and IT function in ERP.

Communications of the ACM, 43, 32 – 38.

Wright, S., Wright, A. (2002, Spring Supplement). Reply to Discussion of Information System

Assurance for Enterprise Resource Planning Systems: Unique Risk Considerations.

Journal of Information Systems, 16, 127 – 130.