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Factors that Influence Positive ROI in ERP Implementations in Mid-Market and Enterprise-Sized Firms

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Abstract

ERP systems are critical tools for mid-sized and enterprise firms to drive business productivity and efficiency of operations (Worster, Weirich, & Andera, 2012, pp. 19-20) Implementation of an ERP is expensive and difficult, and obtaining business returns (ROI) afterwards is often challenging (Staehr, 2012, p. 425; Galy & Sauceda, 2014, p. 311). Purposefully excluding implementations during the preparation for Y2K to reflect the changes in ERP implementation approach since the turn of the century, this study examines the factors that led to ERP project failures and successes in generating returns for the firms that have implemented these systems.

Keywords: erp, enterprise resource planning, roi, return on investment, business process engineering, y2k, erp failure, erp implementation, it system investment

Table of Contents

List of Tables and Figures

Introduction to the Annotated Bibliography

Problem

A key technology trend in mid-market and enterprise sized commercial organizations has been the advent and wide adoption of Enterprise Resource Planning (ERP) systems, replacing older technologies to drive efficiencies, streamline operations and lower costs (Wong & Wand, 2007). A number of factors have driven this activity, such as aggressive competition in the marketplace, shortened product life cycles, potential gains from more efficient use of resources, and the opportunities to drive increased customer satisfaction, reduce unnecessary spending, strengthen sales and forecasting abilities, reduce on-hand inventory and enhance employee productivity and satisfaction (Barker, 2003, p. 43). In addition, ERP systems are designed to act as central clearinghouses for transaction data that is updated in real time; the benefits of ERP systems are supposed to include increases in efficiency and decreases in overhead cost and order-to-cash time lag (Staehr, 2012, p. 425).

> According to Gartner (2013), enterprise resource planning is defined as:
>
> The ability to deliver an integrated suite of business applications. ERP tools share a common process and data model, covering broad and deep operational end-to-end processes, such as those found in finance, HR, distribution, manufacturing, service and the supply chain.
>
> ERP applications automate and support a range of administrative and operational business processes across multiple industries, including line of business, customer facing, administrative and the asset management aspects of an enterprise. (para. 1-2)

ERP implementations also have a history of significant costs and challenges in defining and communicating ensuing benefits (Gartner, 2013). Despite the potential for efficiency gains, ERP systems are unfortunately expensive and difficult to install (Greengard, 2004). A significant portion of ERP projects fail to produce desired results, some even being detrimental to the firm overall (Krigsman,2013 para 3; Staehr, 2012). Years afterward, many ERP implementations have failed to show a positive ROI for the firms that invested heavily in them (Worster, Weirich, & Andera, 2011).

ERP systems are not new, dating in their current form to 1990 (Portougal & Sundaram, 2006). The software tools and expertise are now prevalent in the industry to implement ERP systems successfully (Ram, Corkindale, & Wu, 2013 p. 157) and drive a meaningful return on investment (ROI); however, significant numbers of ERP projects still fail to be completed at all, meet basic expectations or generate a meaningful return on investment (Barker & Frolick, 2003). More strict and careful adherence to best practices is one likely key to success, but there may also be other, perhaps less well known, factors involved in demonstrating positive returns from an ERP implementation (Murphy, 2002; Worster, Weirich, & Andera, 2012).

There is a general lack of understanding in industry and academia as to why ERP system implementations are so fraught with the risk of failure (Hitt, Wu & Xiaoge, 2002;Staehr, 2012, p. 244). Even though billions of dollars are spent every year on purchasing and implementing ERP systems in mid-market and enterprise-sized companies, a widely varying set of business benefit outcomes has been observed (Staehr, 2012, p. 245). Although there is some evidence showing that firms who invest in ERP perform financially better in the long term than those who do not (Hitt, Wu, & Xiaoge,

2002), the problem with this broadly divergent set of outcomes is that there is little empirical knowledge available to aid in the analysis of the results (Galy & Sauceda, 2014). In particular, there is a lack of empirical knowledge that centers on how and why businesses benefit from the implementation of ERP systems post-installation (Staehr, 2012, p. 245). Worster, Weirich and Andera (2012) make the case that many IT departments are operated solely on the goal of spending as few dollars as possible, rather than making the necessary investments to utilize the ERP system as a tool to drive ongoing ROI. "Without a return for the investment, the organization operates on a budget that manages IT costs to the lowest level possible, rather than treating the ERP platform as one of the potentially highest-performing assets of the enterprise" (p. 111)

The concept that an IT organization should serve as a revenue generating department versus merely a cost center is not new, and Worster, Weirich and Andera (2012) and Murphy and Simon (2002) address this subject in different ways. The former propose that 'hard' ROI estimates should be created first (before the project) rather than after the fact (Worster, Weirich, & Andera, 2012), while Murphy and Simon (2002) state that not all ROI benefits from ERP systems are tangible. While these are not mutually exclusive ideas, both groups of researchers identify a significant problem that lies at the heart of this research effort. Although the trend is leaning towards estimating ROI before an implementation, still fully 12% of firms fail to perform any kind of estimate of ROI before undertaking such a project, and 24% never measure actual ROI after the implementation is in production (Jutras, 2009).

There are significantly differing viewpoints on what ROI benefits for ERP implementations even really are, tangible or not. According to Lech (2004), "The

'technical' success of an IT project, including ERP system implementation can be achieved by applying formal implementation methodology and complying with a few 'rules of thumb'…The way of achieving 'economic' success is not so well structured and thus not many organisations [sic] develop and apply a clear set of rules to achieve it" (p. 2)

Purpose

The purpose of this study is to examine what factors contribute to the ability of mid-market and enterprise-sized businesses to achieve benefit from and derive positive returns on investment (ROIs) from successful implementations of ERP systems. Worster, Weirich and Andera (2012) postulate that proving ROI on large IT projects like an ERP implementation has unfortunately become something of a well-worn self-deception and is considered of little value among some IT practitioners:

> The phrase "return on investment" has been used so often that it has nearly become a joke in some circles. For years, large capital investments were always justified based on a business model that demonstrated the length of time that it would take to make enough profit to repay the company for the investment. (p. 60)

Business leaders of large projects such as ERP implementations lead teams who begin these complex efforts with the best of intentions, but with the understanding that expectations may be missed, timelines and budgets will be exceeded, and returns on investment are likely to either not be realized or even not be correctly calculated from the outset.

> The source of the Return on Investment is often left ill defined, and the interaction between the new program and other activities is rarely defined. The base case is typically either not developed or developed but never accepted by business leaders. The most unbelievable factor in all of this is that failure is not only tolerated, but often anticipated, even before the program begins. The lack of understanding is rampant, regarding how to go through the process of developing and executing an IT project, with the expectation of successfully producing the Return on Investment from the business case. For this reason, many companies have just given up and anticipate that all IT applications projects are going to cost more than budgeted, take longer than planned, produce fewer tangible results than predicted, and often fail altogether. (Worster, Weirich, & Andera, 2012, p. 61)

The purpose of this annotated bibliography is to examine and identify the factors that will enable mid-market and enterprise-sized businesses to more predictably estimate, influence and achieve the comprehensive benefits that drive positive returns on investment (ROIs) from successful implementations of ERP systems.

Audience

Krigsman (2013) states, "software projects aren't just technical endeavors. They're also political, financial, emotional, structural, strategic, process and people-centric initiatives. Ignoring any one of these dimensions is done at the project manager's peril" (para. 18).

This concept supports the identification of the audience of this study. The audience members for this study include IT leaders of mid-market and enterprise-sized

companies considering a new ERP implementation, but also include business operations leaders from other areas of those same companies such as accounting, finance, supply chain, and purchasing. An ERP implementation project is not just an IT project (Krigsman, 2013). Each operational department has a role to play and is therefore a key stakeholder not only in an ERP *implementation* project, but also in using the updated toolset *post-installation* to as an opportunity to continue to generate ROI for the business (Worster, Weirich, & Andera, 2012).

According to Galy and Sauceda (2014), "once implemented or live, the ERP project does not end. Rather, it continues indefinitely. Thus, research into post-implementation success is relevant. The belief that an ERP project is complete when the system goes live is common but misleading" (p. 311). Staehr echoes this same finding,

" …there can be a temptation to think that the ERP project is complete when the system goes live. Ongoing resourcing of the post-implementation phase is necessary to further develop in-house knowledge and provide extra staff when resource requirements increase" (p.427). Davenport, Harris and Cantrell (2004) argue that the best results are obtained from an Enterprise System (ES) such as an ERP system when the company takes bold steps to integrate the new system with their entire company workflow, optimize their processes to fit existing system processes available in the standard ES software and act on the new sources of information to give leadership exactly the information they need to transform the work being done to the benefit of the firm (Davenport, Harris, & Cantrell, 2004 p. 19).

The audience members for this study will not only be involved in developing the ROI estimates for their ERP projects, but will also be responsible for the post-

implementation steps that will ensure the maximum benefits are achieved from the new system. Ideally, the audience members identified above could benefit from this study by replicating the factors that have been shown to drive positive ERP investment returns and avoiding those behaviors and practices that show little or no value, or even cause detrimental effects to the firm.

Research Question

Main question. What are the common factors that enable mid-market and enterprise-sized firms to derive positive returns on investment on ERP system implementations?

Sub-questions. ERP system implementations are expensive, high-risk undertakings. What factors contribute to the failure of an ERP implementation to achieve the goals set by the business? Is there a correlation between ERP implementation failures and lack of ROI estimation prior to the project? How does a successful ERP implementation affect a firm's financial performance?

Search Report

Search Strategy. Research is conducted using the UO Library Journal database search tools, searches for articles in commercial IT websites, including zdnet.com and cio.com, as well as some searches for lesser known works using Google Scholar. The databases that return the most useful information are Business Source Complete, Factivia, JSTOR, Academic Search Premiere, and EBSCO. Resources are identified in scholarly journals, commercial white papers, IT industry publications, and business books aimed at IT leaders.

Keywords used. The best sources are obtained using the following keywords and phrases. The keywords 'ERP' and 'ROI' used in varying combinations drive the most significant results. The primary focus is on trying to find both cases of ERP implementation failures (lack of ROI) and successes (positive ROI) and the factors that drove each type of outcome.

Y2K was a unique event in the history of Information Technology, and it generated a great deal of research and commercial thought. Huge sums of money were spent preparing for the event, estimated at some $500 billion worldwide (Quiggin, 2005 p. 46). 'Y2K' was included as a search key word because of the number of large ERP implementations that preceded the turn of the century; the researcher seeks primarily to eliminate these sources because of the differing nature of the research and commercial thought during that time period. Both primary and secondary keyword / phrase sets as noted in Table 1 are used per the focus of the research to derive sources that most closely match the research question.

Table 1

Table of Keywords Used in Research

Keyword / Phrase	Primary	Secondary
ERP ROI	**X**	
ERP Benefits	**X**	
ERP Value Measurement	**X**	
ERP System Implementation Failures	**X**	
ERP Implementation		**X**

Table 1

Table of Keywords Used in Research

Keyword / Phrase	Primary	Secondary
ERP Cost Overruns		**X**
Large IT system value		**X**
ERP Y2K		**X**

Documentation Approach

As this research is conducted entirely electronically using various University of Oregon Library resources, all documents, citations and abstracts are retrieved and reviewed via the Internet and the University of Oregon Library resources online. These sources are cataloged and referenced using Zotero (www.zotero.com), a freely available web browser add-on tool. Zotero allows the researcher to select and de-select resources, create bibliographic references, and sort and categorize resources in a flexible and efficient way. In this manner the researcher identifies and easily collates the final source candidates for use as references and citations.

Reference Evaluation Criteria

Collected references have been cataloged and selected for inclusion against the following criteria (Bell & Frantz, 2013):

Authority. Source is a peer-reviewed scholarly journal or an informational publication (white paper) from a thought leader in the commercial IT / ERP market space. In addition to the previous criteria, other researchers conducting scholarly research on related technology or business topics have cited the source in question.

Objectivity. Author's work is not designed to advance the sale of a particular product or solution, but approaches the ERP ROI question from a provider, solution and product agnostic viewpoint on best practices.

Quality. Source embodies logical structure, cleanly flowing text, clearly stated arguments, and is free from grammar and typographical errors.

Relevancy. Source is scholarly or a commercial white paper created by a reputable and unbiased leader in the market space, and directly addresses the question of increasing / improving ROI on ERP implementations or reducing or eliminating factors that cause negative ROI on ERP implementations.

Currency. A great deal of energy was expended and research conducted on ERP implementations during the 1990's in the run up to Y2K. Enormous sums of money were freely spent on ERP implementations pre-Y2K, largely without ROI justification, because firms had little choice but to either to fix their old systems at great expense, or procure new ones (Hebert, 2010).

> Since the early days of electronic computing, almost universally, only 2 digits have been used in computer systems to denote the year in date fields. …As a result, in many applications the Year 2000 could be interpreted as 1900 because the computer is unable to distinguish between these years which would be both be denoted as 00. …The standard conclusion was that, although the problem was huge in its scope, it could be addressed by a large-scale systematic program designed to ensure, by 1 January 2000, that all computer systems, including microprocessor-dependent equipment items, were compliant. This program could and did, involve the checking and rewriting of millions of lines of computer code

> and the scrapping and replacement of equipment worth billions of dollars. (Quiggen, 2004 p.47)

Research on ERP ROI that has been undertaken post-Y2K has taken a different focus. After the year 2000, commercial industry turned toward driving returns from the enormous investments that many firms had made (Hebert, 2010), and the nature of scholarly publications and commercial research published on ERP and ERP ROI reflects that change in interest (Wong, 2007 p. 270).

In his research, Wong (2007) found the following:

> The literature review identified a current theme in ERP literature that increasingly organizations are requiring justification for their investments in ERP systems. Another noteworthy finding in the literature identifies that value studies are becoming increasingly popular as tools to manage business accountability for IT and allocation of costs for ERP investments. (p. 270)

This approach is in direct contrast to the situation pre-Y2K where such stringent requirements generally did not exist (Hebert, 2010). In part because mid-market and enterprise firms have increasingly turned their focus towards driving returns after the implementation of an ERP System (Wong, 2007), and also due to concerns about the relevance of research in a quickly changing technical field, this research effort has been restricted to include only sources from scholarly journals and commercial publications published since the year 2000.

Annotated Bibliography

Category 1: ERP Implementation Approaches Post-Y2K

Hebert, M. (2010). Ten years after Y2K: The ERP legacy. *Siliconindia*, *13*(3), 32–33.

Abstract. The article focuses on enterprise resource planning (ERP), in which investments during the late 1990s resulted in a bubble that left a legacy on the information technology (IT) environment. It says that huge investments in ERP infrastructure without provable near term return on investment (ROI) are now generating large ROI. Furthermore, it mentions several data management software products which include data archiving, test data management, and data privacy.

Summary. This article details a brief history of the frenzied days of the 1990s in IT departments and in the ERP industry in general leading up to Y2K. During that time, ERP spending was fueled by both the promise of opportunity for future growth and by the very real fear of failure of legacy systems to account correctly for dates after December 31st 1999. The author notes that in the 10+ years since Y2K there has been a significant change in focus in the ERP industry, moving away from spectacularly expensive system implementations performed in a rush to more deliberate, ROI centric work that is more purposeful about clearly identifying potential business benefits prior to implementation and driving projects to realize those benefits afterwards.

Quiggin, J. (2005). The Y2K scare: Causes, costs and cures. *Australian Journal of Public Administration, 64*(3), 46–55. doi:10.1111/j.1467-8500.2005.00451.x

Abstract. The worldwide scare over the 'Y2K bug' resulted in the expenditure of hundreds of billions of dollars on Y2K compliance and conversion policies. Most of this

expenditure can be seen, in retrospect, to have been unproductive or, at least, misdirected. In this article, the technological and institutional factors leading to the adoption of these policies are considered, along with suggestions as to how such policy failures could be avoided in future.

Summary. This article discusses the nature of the Y2K vulnerability and how it has been interpreted in different ways ranging from an expensive over-reaction to a programming shortcut that may have had little impact, to a successful solution to an enormous problem, and even as a widely perpetrated scam by consultants and software manufacturers looking for additional revenue. The author purports that because the United States government declared the Y2K vulnerability to be a serious issue needing remediation immediately, very few parties challenged the conventional wisdom, even when in retrospect the costs of implementing Y2K remediation and software updates appear to have outweighed the benefits. The author calls for innovations in organizational skepticism to balance costs and benefits in situations similar to this in the future.

Category 2: Best practices in driving positive ERP ROI

Barker, T., & Frolick, M. (2003). ERP Implementation failure: A case study. *Information Systems Management*, *20*(4), 43–49.

Abstract. While it is true that successful implementation of an enterprise resource planning (ERP) system is a task of Herculean proportions, it is not impossible. If your organization is to reap the benefits of ERP, it must first develop a plan for success. But "prepare to see your organization reengineered, your staff disrupted, and your productivity drop before the payoff is realized." (n1) Implementing ERP must be viewed

and undertaken as a new business endeavor and a team mission, not just a software installation. Companies must involve all employees, and unconditionally and completely sell them on the concept of ERP for it to be a success. (n2) A successful implementation means involving, supervising, recognizing, and retaining those who have worked or will work closely with the system. Without a team attitude and total backing by everyone involved, an ERP implementation will end in less than an ideal situation. (n3) This was the situation for a soft drink bottler that tried to cut corners and did not recognize the importance of the people so heavily involved and depended on.

Summary. This journal article presents the potential for significant benefits to be gained when implementing an ERP solution, but paints a realistic picture of what can (and often) happens when the implementation project is handled poorly. More than a study of factors that influence positive ROI on ERP implementations, it paints a stark picture of the factors that can make an ERP implementation go terribly wrong. Key factors of ERP implementation failure noted in the study include poor project management, failure to find / use external expertise, lack of adequate internal IT resources, poor communication, failure to dedicate staff to the project, and failure to incentivize the project team members to achieve goals. Framed in a case study of a soft drink manufacturer's poorly planned and executed attempt to implement ERP, the study points out the factors that led to a disastrous result, and then makes recommendations to avoid these outcomes.

Davenport, T. H., Harris, J. G., & Cantrell, S. (2004). Enterprise systems and ongoing process change. *Business Process Management Journal*, *10*(1), 16–26. doi:10.1108/14637150410518301

Abstract. Enterprise systems packages have long been associated with process change. However, it was assumed that most organizations would simultaneously design and implement process change while implementing the systems. A survey of 163 organizations and detailed interviews with 28 more suggests that enterprise systems were still being implemented even among early adopters of the technology, and that process change was being undertaken on an ongoing basis. After the prerequisites of time, critical mass of functionality, and significant expenditures were taken care of, the factors most associated with achieving value from enterprise systems were integration, process optimization, and use of enterprise-systems data in decision-making.

Summary. This article makes the argument that too many firms fail to take the promise of a new Enterprise System (ES) such as an ERP far enough. Just implementing the software technically and making the business run using new applications without addressing the requisite process changes is far from optimal. Substantial benefits come from the creativity to take the base application set and new work procedures and immerse the company's processes in the system fully, including all areas covered by a module of the new ERP, as well as integrating it to the systems that remain outside of the new functionality (e.g., an organization's human resources information system (HRIS). In addition, the company must use the standard business practices that are built into the ERP software, rather than trying to customize the ERP to fit the unique ways a firm (particularly one that has grown organically over time) has always operated. Lastly, the authors call for the company to "informate" [sic], or use the new information available in the ERP to transform the work being done and drive beneficial ROI.

Galy, E., & Sauceda, M. J. (2014). Post-implementation practices of ERP systems and their relationship to financial performance. *Information & Management, 51*(3), 310–319. doi:10.1016/j.im.2014.02.002

Abstract. Using econometric analysis, this study provides empirical evidence to support a cause-and-effect relationship of managerial actions to financial performance in a post-ERP implementation stage. Senior information systems managers reveal the state of affairs, providing a snapshot reference during that time period. Financial figures were collected for firms who were matched to our survey instrument. Regression analysis establishes that increased technological competence affects net sales, relationships with outside experts affect earnings, return-on-assets and return-on-investment, top management support affects net sales and net income, long-range planning negatively affects earnings, and the sharing of information between departments affects net income, return-on-assets and return-on-investments.

Summary. This article discusses some common problems with measuring ROI of ERP systems post installation. One of the key issues is the question of when exactly to measure success. This study provides empirical evidence of the predictability of the financial performance of companies that exercise recommended actions that have been identified as key determinants for the successful implementation of ERP software. The researchers compared a sample of reported financial data from 55 companies that implemented ERP prior to 2003 with a larger sample of 264 companies that responded to a questionnaire, which asked about what the company had learned as a result of implementing their ERP. Data from Standard & Poor's was matched for the year prior to the company's ERP implementation and for four years following. The study of financial

data found a significant increase in Return on Assets and a demonstrable ROI for implementing ERP vs. firms that did not, also illuminating, among other findings, that it takes an average of four years of operations post-installation to determine if an ERP investment has yielded a positive ROI.

Greengard, S. (2004). The changing ERP landscape. *Business Finance*, *10*(7), 28–30.

Abstract. Optimizing resource management has emerged as a primary objective--some might say an overriding obsession--of the 21st-century corporation. And for most organizations, enterprise resource planning (ERP) software is critical to achieving that goal. Any major software investment is something of a gamble, even for companies that perform thorough due diligence and an exhaustive ROI analysis. But ERP systems ratchet up the stakes in a big way. It's not unusual for an implementation to take 12 to 18 months, cost tens of millions of dollars, and leave a trail of headaches and challenges in its wake. Organizations that are considering an ERP software initiative should conduct thorough due diligence before selecting a provider. Eliminating all risk is impossible, but a careful investigation of the vendor's references helps companies maximize their chances of a successful purchase.

Summary. This article deals primarily with the consolidation of ERP vendors in the marketplace and how this development can affect ROI for three different groups of users:

- Those who have already implemented ERP
- Those currently implementing ERP
- Those considering an ERP project

The article gives broad-based advice on vendor selection and retention that affect ROI based on the customer's current situation. Some users are faced with an already implemented ERP (like PeopleSoft), and are faced with the situation where another company purchases their vendor. This situation presents unique challenges in maintaining the value of the investment that has already been made. One of the ways ERP ROI can be obtained is by making a smart vendor choice, and making the right decision of whether to pursue a direct in house approach, an outsourced solution, or Software as a Service (SaaS) as examples. The article suggests that selecting the wrong vendor can be an expensive choice, and that exhaustive due diligence when considering a vendor is key to having the opportunity to reap the potential rewards of ERP systems.

Krigsman, M. (2013, February 23). 2013 ERP research: Compelling advice for the CFO. ZDNet. Retrieved April 12, 2014, from http://www.zdnet.com/2013-erp-research-compelling-advice-for-the-cfo-7000011619/

Abstract. New research on the success of ERP implementations reveals mixed results. Although respondents are satisfied with their choice of software, the survey shows most ERP projects run over budget and buyers are do [sic] not fully receive expected benefits. Nonetheless, few respondents characterized their ERP project as a failure.

For chief financial officers, the survey offers compelling insights and is worth reading carefully.

Summary. This 2013 article speaks to the difficulty of implementing an ERP system and deriving positive financial results in a timely manner. Based on a research study conducted by Panorama Consulting Services and published by ZDNet, the researcher

surveyed 172 companies with total revenues up to $300 million. The results were not promising. Most ERP projects were shown to run over budget and deliver less than expected results. Over 50 percent of projects experienced cost overruns, over 60 percent experienced schedule overruns. Fully 60 percent of respondents received less than half of the expected benefit from their ERP implementations. However, very few (10%) of respondents to the survey called their ERP implementation an outright failure. The author suggests that overt collaboration and cooperation between the CIO, CFO and CEO is one of the key factors to improving success in these projects.

Lech, P. (2004). 80/20 Rule in ERP system implementation - A case study on maximizing ROI. In *Proceedings of the 11th European Conference on Information Technology Evaluation - 2004*. Academic Conferences Limited. Retrieved from http://books.google.com/books?id=STivofryTysC&lpg=PA221&vq=erp%20roi&pg=PA221#v=onepage&q=erp%20roi&f=true

Abstract. It is possible to observe the following rule in ERP implementations: 80% of effort goes into developing functionality supplying 20% of business value. One of the possible ways of achieving positive ROI ERP implementation is to reverse this rule by concentrating on those areas where business value is high and minimizing work in other areas by using standard functionality. This paper describes a practical approach to the ERP implementation process that leads to significant business effects. It is followed by a case study.

Summary. This journal article uses a practical set of recommendations to drive business benefit (ROI) from the implementation of ERP. Lech uses a case study from an

implementation of ERP (where he was project leader) for the J.J. Darboven coffee company of Hamburg, Germany. Using his own 80/20 strategy for only introducing customization of the ERP software where it clearly produced value for the customer (20%), and using standard off the shelf functionality for all other business areas (80%), he was able to successfully implement ERP for Darboven and derived the following beneficial results:

- Decreased on-hand inventory by 15%
- 10% decrease in accounts receivable balances
- Reduction in sales force by 6 full time employees
- Project payback in 24 months

Focusing only on value-add processes from the customer's perspective, Lech was able to drive a low cost, high benefit implementation for Darboven. This article provides a targeted list of factors to consider in order to achieve positive ROI on ERP implementation projects. One promising area of research into identifying factors that drive economically successful ERP project implementations is the concept of using out-of-the-box functionality rather than tailoring the applications to meet specific business processes (Lech, 2004). Because of lessons learned in large scale ERP implementations in the recent past, commercial industry is increasingly turning towards using out of the box ERP solutions (and business processes) and turning away from the heavily customized and expensive solutions implemented in the 1990's (Lech, 2004). Lessons on what drives successful large scale ERP projects have been derived from overall best practices that have been identified for large scale IT projects in general:

1. Benefits are high in those business areas where IT changes the way work is done. Automation of currently performed business processes does not create substantial benefits, but if IT enables critical process change the benefits within this process are likely to be substantial.

2. The overall impact of a certain IT enabled process change on the whole enterprise performance is related to the importance of this process in value creation for the customer. The benefit will thus be substantial if IT changes **key processes** for value creation (Lech, 2004 p. 2).

[For ERP projects], 80% of effort was put into obtaining functionality that supplied 20% of business value. This was mostly due to the fact that many adjustments were made in accounting and controlling areas that do not contribute much to the value added. By reversing the above-mentioned sentence one can reach the conclusion that 20% of effort necessary to fully adjust the ERP suite to the enterprise's requirements gives 80% of the business value. (Lech, 2004 p. 3)

Portougal, V., & Sundaram, D. (2006). Preface. In *Business Processes* (p. xi). London: Idea Group Inc. (IGI). Retrieved from http://books.google.com/books?id=ISG9AQAAQBAJ

Abstract. Business Processes: Operational Solutions for SAP Implementation deals with enterprise resource planning (ERP) systems implementation, and also business operations/processes and information systems to support business operations/processes. There are a large number of books treating ERP implementation, operations management and information systems separately, but books dedicated to all three topics applied to practical issues of ERP implementation are scarce. However, teaching ERP merely as software does not work. Uniting these three topics in one book allows the reader to avoid

the problems of teaching separate fields and then connecting them in one complex solution, providing the opportunity to better educate students.

Summary. In this textbook, Portougal and Sundaram initially address the lack of ability of business school (MBA) programs to prepare students for working effectively with ERP as a concept or on a project for a future employer. The key value of this source is the author's description of disparity between three groups of key individuals in driving a successful ERP implementation that have the opportunity to derive positive ROI. The first group is comprised of business school graduates who understand the theory of ERP, but neither practical business operations nor the discipline of IT. The second group is comprised of the internal IT resources of a company considering ERP. They have clear motives to rid themselves of legacy systems, but lack the knowledge of the latest ERP innovations and the strategic business background to help drive anything other than a technical transition, with assistance. The third group is comprised of the business leaders in the company considering change. They understand how the company operates in it's "as-is" state, but lack IT acumen to explain how current systems work, nor do they have the experience with the new technology offered by ERP. The two latter groups are important to this study. In addressing the shortcomings of these groups, the authors lay out an ideal implementation process that begins with a methodical process of defining improved business processes, and driving out waste and errors while doing so. In this respect, the very implementation of ERP (if done correctly) can set up the company for beneficial ROI from their new system because the company is re-engineered during the implementation process to run more effectively. The ERP software is a framework to

which the new processes can be applied, rather than making old processes fit into the new software.

Ram, J., Corkindale, D., & Wu, M.-L. (2013). Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance? *International Journal of Production Economics, 144*(1), 157–174. doi:10.1016/j.ijpe.2013.01.032

Abstract. Frequent commentaries in the literature have stated that certain critical success factors (CSFs) have to be accomplished in an organisation [sic] for an enterprise resource planning (ERP) system project to be successful. In this study we argue and demonstrate empirically that success in implementing an ERP system and in gaining performance improvement should be conceptualised as two separate dependent variables. The distinction is made because the former aspect is based upon project delivery outcomes, while the latter assesses post-ERP project performance. We question whether some factors labelled as 'critical' success factors for ERP projects are in practice actually critical for achieving success in implementation and improving output performance. To examine this we report an empirical study that has investigated whether four major CSFs are in practice critical for achieving organisational performance improvements, and the role that successful implementation may play in influencing the relationship between CSFs and improvements in organisational performance. A conceptual model was devised and then analysed using structural equation modelling based on data collected from 217 organisations. We found that some CSFs were not critical to achieve success in ERP implementation but were critical to help an organisational achieve performance

improvement from an ERP system. Additionally, we also found that achieving successful ERP system implementation mediates the degree to which a CSF affects output performance improvement. The managerial and research implications of these findings are discussed and the limitations of the study noted.

Summary. The authors propose four critical success factors for ERP implementation projects and post implementation operational performance:

1. Professional Project Management
2. Training and Education
3. Business Process Re-engineering (BPI)
4. System Integration

Each of these factors is key to success, but in fact they are distinct in their effect on the overall process. The authors make the case that Project Management and Training and Education are only positive influencers for a successful implementation; while business process re-engineering and system integration contribute to positive growth in operational performance of the firm after the project is complete. One of the limits of the study was admitted to be that it was not possible to accurately gauge user satisfaction as an intervening variable influencing the four critical success factors, although the authors did cite user satisfaction as a factor that could have affected the results of their study.

Staehr, L. (2012). An explanatory framework for achieving business benefits from ERP systems. *Journal of the Association for Information Systems, 13*(6), 424–465.

Abstract. ERP systems are large integrated packaged software systems used by thousands of major organizations around the world. Yet outcomes from ERP use can be

very different, and there is still not an adequate understanding of how and why organizations have such varying outcomes. Using a case study approach, we retrospectively examined the post-implementation periods in four manufacturing companies as processes within context over time. Analysis of the cases identified nine themes that explain "how" and "why" and form the components of a framework for understanding the achievement of business benefits in the post-implementation period. The new framework extends knowledge in two ways. It identifies new themes and the underlying relationships between them that explain and increase our understanding of how and why organizations have or have not achieved business benefits from ERP systems.

Summary. This article seeks to convey how ERP ROI evolves in relation to original goals after the system has been implemented. Using a case study of four manufacturing firms, the author identifies six common themes that had a significant influence across all the firms in the case study:

- Effective technology change management
- Education, training and support
- Adequate people resources
- Efficient and effective use of the ERP system
- Commitment to Business Process Improvement
- New profit driving projects that leverage of the ERP platform

Each of the firms studied in the article had some new unplanned benefit post-implementation that was not accounted for during the beginning of the project. This

supports the concept that an ERP implementation is never truly finished; rather it just continues to be used to drive further ROI based on business needs.

Worster, A., Weirich, T. R., & Andera, F. (2011). Organizational change management is a two-way street. *Journal of Corporate Accounting & Finance (Wiley), 22*(6), 69–77. doi:10.1002/jcaf.20724

Abstract. Business is filled with horror stories about cost overruns and lack of business benefits from implementations of enterprise software, including SAP. The rapid proliferation of enterprise resource planning (ERP) systems like SAP began two decades ago. Since then, a number of tools and literature have been developed to help identify, address, and resolve the challenges inherent in these systems. Yet, in many cases, we still have the same problems. We seem unable to prevent disappointments, if not financial disasters. And for many companies that installed SAP years ago, the expected benefits have not appeared. What can we do to correct these problems?

Summary. This article addresses one of the primary causes of ERP failures: senior leadership failing to adequately address the need for change management and preparation ahead of time to redesign business processes to gain significant ROI. The article discusses the elements of deriving ROI from an ERP implementation by following a prescribed set of preparatory steps including:

- Redesign of the business processes
- Understanding the cultural and power structure organization of the company
- IT's approach to the initiative (necessary evil vs. opportunity)
- Workforce education (training on new processes and tools)

- Governance and organizational change management

One of the most important keys to a successful ERP implementation is finding the right consulting company to complete, plan and implement the system. The authors summarize the article by stating:

> …The problem, however, is to find consultants who know how business operates, understand the political processes that are a necessary part of any organization of humans, recognize the need to adhere religiously to structural tools like scope documents and critical paths, have the personal skills to work within the cultural and political environment of an enterprise to ensure that decisions are made as wisely as possible, that the critical path is maintained, and that ROI is both expected and realized. This is not a technical process; it is a very human one. (Worster, Weirich, & Andera, 2011)

Category 3: Best practices in estimating ERP ROI

Hitt, L. M., Wu, D. J., & Xiaoge, Z. (2002). Investment in enterprise resource planning: business impact and productivity measures. *Journal of Management Information Systems*, *19*(1), 71–98.

Abstract. Enterprise Resource Planning (ERP) software systems integrate key business and management processes within and beyond a firm's boundary. Although the business value of ERP implementations has been extensively debated in trade periodicals in the form of qualitative discussion or detailed case studies, there is little large-sample statistical evidence on whether the benefits of ERP implementation exceed the costs and risks. With multiyear multi-firm ERP implementation and financial data, we find that

firms that invest in ERP tend to show higher performance across a wide variety of financial metrics. Even though there is a slowdown in business performance and productivity shortly after the implementation, financial markets consistently reward the adopters with higher market valuation (as measured by Tobin's q). Due to the lack of mid- and long-term post-implementation data, future research on the long-run impact of ERP is proposed.

Summary. This article proposes that the financial markets reward firms that adopt an ERP system successfully. In addition, firms that implement and successfully use ERP systems enjoy improvements in sales per employee, profit margins, returns on assets, inventory turnover, asset utilization and more favorable accounts receivable results. The authors compare SAP ERP license purchasing data against the Fortune 1000's financial performance as recorded by Standard & Poor's Compustat II database to show that firms that have adopted ERP outperform those who do not. The study's data is limited to SAP licensed customers, which at the time comprised some 70% of the ERP market, but it is assumed that ERP packages manufactured by other vendors would perform similarly.

The work of the authors is ambitious and uses and extremely large data set to derive their results. Measures compared across the various firms included: value added, capital stock, labor input, industry, total stock market valuation, size, debt-equity ratios, and a number, return on equity, return on assets, and other accounting ratios such as inventory turnover.

Jutras, C. (2009, March). Measuring the ROI of ERP in SMB. Retrieved April 16, 2014, from http://www.growthbusiness.co.uk/article_assets/articledir_2505/1252923/BYD_Aberdeen%20-%20ERP%20in%20SMB-Exploring%20Growth%20Strategies.pdf

Abstract. Enterprise Resource Planning (ERP) is more than a necessary infrastructure that forms the transactional system of record upon which a business is based. ERP is the potential source of cost savings and operational improvements. It is also a serious undertaking. This report serves as a roadmap to Small to Midsize Businesses (SMBs) for realizing the maximum Return on Investment (ROI) from ERP implementations.

Summary. This commercial white paper from 2009 seeks to serve as a roadmap for deriving and then measuring ROI on an ERP implementation. The study surveyed 920 firms with revenues of up to $250 million and looked for common practices that the most successful firms followed when implementing ERP. The top 20% of performers in the sample of firms surveyed were able to display the following results:

- 22% reduction in inventory levels
- 19% reduction in operational costs
- 22% reduction in administrative costs
- 93% inventory accuracy

The author also found that in the two years since the survey was last conducted (2007 – 2009) the number of firms who failed to ever calculate an ROI estimate prior to an ERP project dropped from 33% to 12% and the number of firms who failed to perform an ROI analysis after the ERP implementation dropped from 33% to 24% respectively.

Murphy, K. E., & Simon, S. J. (2002). Intangible benefits valuation in ERP projects. *Information Systems Journal, 12*(4), 301–320. doi:10.1046/j.1365-2575.2002.00131.x

Abstract. The development, implementation and ownership of information systems, especially large-scale systems such as enterprise resource planning (ERP) has become

progressively longer in duration and more cost intensive. As a result, IS managers are being required to justify projects financially based on their return. Historically, information systems have been difficult to quantify in monetary terms because of the intangible nature of many of the derived benefits, e.g. improved customer service. Using the case study methodology, this paper examines an attempt by a large computer manufacturer to incorporate intangibles into traditional cost–benefit analysis in an ERP project. The paper reviews the importance of intangibles, lists intangible benefits that are important in ERP projects and demonstrates the use of a scheme through which they can be incorporated into traditional evaluation techniques.

Summary. This article proposes that not all of the benefits of an ERP implantation are tangible and thus the ROI for such projects is calculated lower than it should be. The authors note that the distinction between tangible and intangible benefits goes as far back as Adam Smith defining goods and services (e.g., because services are transitory they cannot be counted as an asset. Over history intangible benefits have been largely ignored because they cannot be counted or stored and thus the intangible benefits of ERP are largely ignored.

As an example, the tangible benefits of ERP systems implementation such as reduced headcount are easy to calculate and thus garner attention. Alternatively, an improved Business Intelligence capability is hard to quantify in financial terms, and thus this benefit garners less attention in an ROI calculation.

Wong, B., & Wand, M. (2007). Measuring returns on investments in ERP systems. Retrieved from http://epress.lib.uts.edu.au/research/handle/10453/2757

Abstract. The research described in this paper identifies the returns received on investments made by organisations [sic] attempting to utilise ERP technology. A hypothesis formed from the literature review was investigated using a survey questionnaire distributed to IT professionals involved with the implementation of ERP systems. Based on these investigations, conclusions were drawn about current industry practice in measuring the returns on investment on ERP systems.

Summary. The author discusses the well known phenomenon of ERP complexity and the enormous breadth of applications involved in the typical implementation that have the effect of sometimes masking the value of the ERP system to the firm. The author purports that most organizations do not effectively measure returns on their ERP investment, and when they do attempt to do so, the calculations are often based on anecdotal evidence as opposed to metrics and facts. The author conducted a survey of IT professionals who actively implement ERP systems and captured standardized information on factors that affected their ERP ROI and their methodologies to calculate it and yields a set of recommendations to be used when calculating ROI on ERP implementations post install in the future.

Worster, A. J., Weirich, T. R., & Andera, F. J. (2012). Chapter 7. In Maximizing return on investment using ERP applications (pp. 110-116). Hoboken, NJ: J. Wiley & Sons. Retrieved from http://orbis.eblib.com/patron/FullRecord.aspx?p=947666

Abstract. With the rapid implementation of ERP systems worldwide, business executives often have difficulty in determining the return on investment from such systems. Along with a companion website featuring exercises, reference materials, and case studies,

Maximizing Return on Investment Using ERP Applications offers straightforward and hands-on guidance to lead your organization through the change process and ensure that the intended benefits can be achieved. This work provides accountants, IT executives, and finance professionals with a new way of looking at enterprise resource planning (ERP)-driven business improvement programs. This timely book explores how leadership can view its organization as an integrated enterprise and what this change in perception might suggest.

Summary. The author uses this text as a guidebook for deriving positive ROI from ERP (in particular SAP) implementations. He gives a brief history of the advent of ERP as it evolved from other types of business control systems and then spends several chapters working through examples of common failures in identifying the value of returns on investment in ERP systems. The rest of the text acts as a guidebook to beginning the process of defining a meaningful ROI by starting with the reengineering of business processes using principles similar to Lean / Six Sigma. The author's contention is that when designing an implementation, only in addressing the meaningful automation improvements that can be enacted in the functioning of an organization (for the better) are the goals worth pursuing. In effect, Worster, Weirich, and Andera escort the reader through what should be a familiar set of ideas for a serious operations / IT executive; including beginning with the end in mind from a business process improvement standpoint.

Conclusion

This research identifies critical factors for ERP implementation success and positive returns on investment (ROI) post-implementation. The researcher identified recent sources of information on important factors for ERP success in scholarly journal articles and commercial publications for inclusion in this annotated bibliography. Several broad categories of scholarly inquiry are isolated that relate to the overall topic of critical success factors for an ERP implementation. These categories are:

ERP Implementation Approaches Post-Y2K

Sources in this category explore the nature of ERP projects in the transition away from the Y2K vulnerability remediation event.

Best practices in driving positive ERP ROI

Sources include material from case studies and best practices as cited by ERP implementation experts in the field in driving positive ROI results post-implementation.

Best practices in estimating ERP ROI

References provide best practices cited by expert ERP thought leaders in providing a firm with a pre-implementation ROI estimate and financial baseline prior to embarking on an ERP project.

After an analysis of these sources, the following key success factors have been identified as having a positive correlation to a successful ERP implementation as well as driving meaningful ROI after the initial project is complete:

Adequate ROI estimation prior to project initiation. The pre-implementation ROI estimate serves two purposes: (a) Ensures thought and careful analysis are given to what can be reasonably accomplished using automation. (b) Sets a baseline of current performance, because

in discovering the firm's ERP goals, the firm's leaders also discover the current standard. This baseline is useful after the project is completed to determine what growth / change has occurred as a result of the ERP implementation. It is important to remember what the actual drivers of the project really are and who the critical project stakeholders are. Many ERP projects lose focus and ultimately fail because senior leaders are not cohesive about what they are trying to achieve. Some common drivers of ERP projects are inventory reduction, direct labor reduction, and overall cost reduction. For each of these metrics, a baseline and post-implementation measurement should be taken to enable calculation of the ROI. The most common mistake made in ERP projects is to fail to perform a pre-implementation ROI estimate, thus failing to provide a baseline, and preventing the calculation of the ROI after the fact without great difficulty. Another significant mistake is to fail to conduct business process improvement analysis and account for those changes in the ROI estimate. Implementation of an ERP assumes that business processes will change and ultimately improve; without significant improvements taking on such a complex and difficult project is not justifiable (Staehr, 2012 p. 428; Worster, Weirich, & Andera, 2012 p. 60).

Professional project management. As in any large IT project, professional project management on an ERP project is key to achieving a successful implementation, on time and on budget. Project managers are responsible for initiating, planning, controlling, and closing of the project, as well as controlling project scope, schedule, budget, risk and communication. Project managers are ultimately responsible for the success of the endeavor ("What Is Project Management" n.d., para. 7). The lack of effective project management is a key contributor to overall failure in an ERP implementation projects due to the rigor required for success in a

highly complex software implementation, but also because an ERP implementation project affect the operations of the firm so broadly (Ram, Corkindale, & Wu, 2013 p. 161).

Acquiring ERP specific consulting expertise. Unless the firm in question is in the business of implementing ERP solutions for others, companies typically do not maintain a staff of resources capable of implementing an ERP system; even Microsoft relies on outside consulting firms like Accenture when they require a new instance of or an upgrade to one of their ERP systems. Definitive metrics on the prevalence of firms acquiring appropriate ERP implementation resources or how well firms cooperate with outside ERP consultants in these projects is not explicitly present in the literature examined for this study, however there are recommendations in the literature for the use of outside expertise. Additionally, the literature presents examples of the negative consequences associated with failure to obtain sufficient ERP expertise, or to heed their advice. The literature reviewed for this study shows that failure to obtain or use expert ERP implementation resources has been associated with negative outcomes ranging from poor system performance to outright project failures (Barker, 2003 pp. 46,49; Lech, 2004 p. 2; Ram, Corkindale, & Wu, 2013, p.159; Staehr, 2012, p. 428; Wailgum, 2012, para. 13).

Widest possible use of standard ERP software functionality. In ERP implementations, 80% of effort often goes into developing functionality supplying 20% of business value (Lech, 2004). One of the possible ways of achieving positive on an ROI ERP implementation is to reverse this rule by concentrating on those areas where business value is high and minimizing work in other areas by using the standard functionality of the software (Worster, Weirich, & Andera, 2012, p. 90). Lech (2004) describes an 80/20 strategy for only introducing customization of the ERP software where it clearly produced value for the customer (20%), and using standard off the shelf functionality for all other business areas (80%). By using

the 80/20 approach Lech (2004) was able to successfully implement an ERP system for a German coffee company (Darboven) and derived the following beneficial results:

- Decreased on-hand inventory by 15%
- Decreased accounts receivable balances by 10%
- Reduced sales force by 6 full time employees
- Project payback in 24 months

By focusing only on value-add processes from the customer's perspective, Lech was able to drive a low cost, high benefit implementation for his customer. Because of lessons learned in large scale ERP implementations in the recent past, commercial industry is increasingly turning towards using out-of-the-box ERP solutions (and business processes) and turning away from the heavily customized (and expensive) solutions implemented in the 1990's (Lech, 2004).

Sufficient IT strength to implement and later support the software. The case study literature provides many examples of ERP implementations that failed due to a lack of skilled IT staff. Experts cite the failure to have sufficient IT strength on staff to support or understand components of the system in multiple cases of disastrous ERP failures in these high profile companies: Hershey in 1999, Nike in 2000, HP in 2004, University of Massachusetts in 2004, Waste Management in 2005, and Select Comfort in 2007 (Barker, 2003, p.46; Galy & Sauceda, 2014, p. 311; Staehr, 2012, p. 428; Wailgum, 2009). Ensuring that a knowledgeable and trained team is available to support the ERP system after implementation is as important as providing a skilled team during the implementation project (Barker & Frolick, 2003, p. 49; Wailgum, 2012, para. 13;).

Staff dedicated to the ERP project exclusively. ERP project staff must be relieved from at least some of their normal duties so that they are able to concentrate on the very real

work of process re-engineering, functional design, testing and training on the new system (Barker & Frolick, 2003, p. 47). If the internal employees assigned to the project are still required to perform their normal duties, the research has shown that they will quickly become exhausted and the project and their work will suffer (Barker & Frolick, 2003, p. 47, para 3). Non-dedicated ERP implementation teams are cited as a contributing cause of failed ERP projects (Barker & Frolick, 2003, pp. 47-49; Lech, 2004 p. 2).

Employee education and training. Lack of employee education and training was specifically called out in the ERP failure at Hershey in 1999. Among the many problems the SAP implementation project experienced, the users did not receive adequate training to use the system when it went live. The result was a three-fold increase in order fulfillment times, a 25% increase in inventory, and huge losses for the company during their peak season (Halloween). Employees from sales, purchasing, operations, and supply chain must be competent on the system before it is put into production. One successful way to ensure that the ERP users are adequately trained is to create a cadre of 'super users' from each functional area to interface with IT and the ERP implementation team very early in the project process development and testing phases, so they can not only perform their own departmental job functions, but troubleshoot with others if something goes awry (Staehr, 2012 p. 428; Wailgum, 2009).

Business process re-engineering. Gartner defines business process re-engineering (BPR) as:

> An integrated set of management policies, project management procedures, and modeling, analysis, design and testing techniques for analyzing existing business processes and systems; designing new processes and systems; testing, simulating

> and prototyping new designs prior to implementation; and managing the implementation process. (2013, para. 1)

This practice is key to ERP implementation success and to realizing returns after implementation. ERP implementation is about change, chiefly about change of processes that garner efficiencies in the conduct of business. The 80 percent of existing non-value added business processes are prime candidates for BPR and alignment to standard practices supported within the standard off-the-shelf ERP software. Only 20% of business processes make a key differentiator from a customer perspective and are thus candidates for custom ERP functionality development (Lech, 2004). Above all else, an ERP project is a key opportunity to break down the business and evaluate the value proposition that each component provides. Large and well-known ERP solutions are built on standard practices that have worked well for a multitude of firms, and to ignore these examples of best practices is wasteful and risky (Davenport, Harris, & Cantrell, 2004; Ram, Corkindale, & Wu, 2013).

Successful change management. Change management in this sense refers to the process changes that occur in a firm when an ERP system is implemented rather than referring to a specific project management process of triaging project change requests. Implementation of an ERP system is fundamentally about changing the way a business operates; the impacted employees will need time and assistance to absorb the significant changes in business processes and work procedures. To the extent that this potential obstacle can be ameliorated by early and persistent communication, meaningful training, documentation, and go-live support, the implementation will be much more likely to be successful and less frustrating to the firms' staff (Staehr, 2012 p.428).

Complete system integration. The largest benefit of an ERP implementation is realized when business processes change (Lech, 2004). Ram, Corkindale, and Wu (2012) state that fully integrating the firms' systems with the new ERP system will provide the greatest likelihood of success and suggest that organizations use every possible module of the ERP that is applicable to the business operations and integrate any legacy applications with the ERP (p. 162). Full use of the maximum number of ERP modules allows for the entire system to work together more easily, and integration of the remaining systems allows for a common core of business intelligence tools for the entire company to use, increasing visibility and results (Ram, Corkindale, & Wu, 2013, p. 162). Implications for post implementation are twofold. First, an ERP suite of applications from a single vendor is easier to upgrade than one where modules from other vendors are integrated with the ERP. Second, with an ERP implementation that combines multiple vendor applications the firm must maintain expertise in the interfaces (middleware) between the applications so that future upgrades will not require complete rework of these interfaces / exports (Davenport, Harris, & Cantrell, 2004; Ram, Corkindale, & Wu, 2013, p. 162).

These suggested best practices are not new concepts in business in general nor in the effective practice of leveraging information technology tools and talents, yet many firms still fail to identify the significant risk to the success of their ERP implementation project and their business by failing to adhere to one or more of these best practices. Even though the body of knowledge around best practices has grown significantly over the last decade (Ram, Corkindale, & Wu, 2013), as many as 60% of ERP implementations fail outright due to a strategic blunder in failing to adopt one or more of the best practices mentioned above (Lech, 2004 p. 1). ERP systems still hold enormous potential to drive returns for mid-sized and enterprise firms, but these projects must be undertaken with due care and respect for the significant undertakings they

represent. ERP systems form a foundation for accretive growth for the future of organizations and are shown to be key drivers for firms to obtain a variety of positive financial results (Hitt, Wu, & Xiaoge, 2002). In reality, firms must understand and top leadership must communicate that the path to these returns is neither easy nor inexpensive. ERP system implementations often require significant business process re-engineering (BPR) and adherence to now commonly used best practices identified in the literature. Those organizations that put forth the time and resources required and adhere to recommended best practices can obtain substantial returns on investment from their ERP implementations.

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