

Impact of Resources in Enterprise Resource Planning(ERP) Implementation Process on Internal Process of an Organization

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In the previous information systems, processes cannot communicate effectively with each other, owing to many databases and conversion of data from one system to another was expensive. ERP systems was found to be a solution to these problems as they are configurable information system packages that integrate several business functions into a single system with a shared database. But proper implementation of ERP systems is always a major issue because it affects the organizational performance. This research paper focuses on understanding the effect of different resources during ERP implementation on Organizational process. Structural Equation Modeling through PLS software was used for the analysis. The study found that all the resources namely project management resources, software resources, hardware resources and database resources during ERP implementation affects the internal process of an organization.

Keywords: Internal Process, ERP, Hardware, Software

INTRODUCTION

According to Colmenares (2008), “Enterprise-wide system has become a format for producing full organization integration by inclusion of all functional areas”. Palaniswamy and Frank (2002) based on an exploratory study also stated that, prior to implementation of ERP, many firms faced problems in using the available information because of the incompatibility among the various computer hardware and software systems. Davenport (2000) also asserts that advances in IT and the plethora of mergers and acquisitions in the 1980s and 1990s created a global economy and since in the previous systems, processes cannot communicate effectively with each other, owing to many databases and conversion of data from one system to another was expensive, companies increasingly started investing in ERP systems.

Robey et al. (2002) says, “ERP systems are integrated cross-functional systems containing selectable software modules that address a wide range of operational activities in the firm, such as accounting and finance, human resources, manufacturing, sales, and distribution”. “ERP systems consist of a software package that uses database technology to control and integrate all the information related to a company's business including customers, suppliers,

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products, employees, and financial data” defines Falk (2005).

Three elements defining ERP are identified in Akkermans et al. (2003), namely, a technical, a functional, or a business perspective. From the technical and functional perspectives, material requirements planning (MRP), manufacturing resource planning (MRP II), and ERP represent the development of methods and software tools for the planning and controlling of resources for manufacturing companies (Bergstroöm and Stehn, 2005). MRP systems could initially be used for calculating material requirements and handling orders, but were expanded to handle capacity planning and scheduling (Umble et al., 2003). In the business perspective, ERP can be viewed as a business approach integrating strategic and operational functions through the entire organization.

According to Boykin and Martz (2004), ERP systems forced the organization from a task-oriented approach to the newer process view. Davenport and Brooks (2004) emphasized that enterprise systems are main drivers to apply a cross-functional process management. According to Miller (2003), the important elements of ERP are: one comprehensive real-time database for reducing data redundancy and better accuracy; integrated business process and seamless transitions between business transactions.

According to Ushasri (1999), “ERP solutions use technology to address business issues, at the same time striving to keep technology transparent for the users. Users do not need to learn more about bits and bytes but they need to know how operational and long-term business issues could be effectively addressed with technology, with a user-friendly interface”. ERP systems are configurable information system packages that integrate several business functions into a single system with a shared database. In the manufacturing industry, the supply chain concept has been one model for improvements

in efficiency. Supported by IT-based software systems, holistic production philosophies such as lean production and comprehensive planning methods such as enterprise resource planning (ERP) are used to manage parts of or the entire supply chain (Crowley, 1998).

ERP is defined as asset of combination of software programs based on business organization's need and tying all the separate systems in one system, one screen, so it ties the systems of human resources, accountant, finance, inventory, production, marketing, all in one system; facilitates the job's run, raises the efficiency of employees, giving more reliability, flexibility, saving time and effort of all the people and managers who work in the organization. It will be really a better way to run job in the turbulence environment, also being ready for receiving and development of the coming future, in parallel with the development of information technology which is also changing from time to time (Karen, 2007).

RATIONALE

ERP projects always contain a high level of risk and uncertainty. The purchase of ERP software is a high-expenditure activity that consumes a significant portion of their capital budgets (Verville, Bernadas and Halington, 2005) and since ERP system are profoundly complex pieces of software and costly systems (Al-Mashari et al., 2003; Luo and Strong, 2004, King and Burgess, 2006; Kumar et al., 2003, Somers and Nelson, 2003, Hsu and Chen, 2004), installing them requires large investments of time and expertise (King and Burgess, 2006). Hedman and Borell (2004) explained that evaluating ERP systems is an important tool for improving selection, development, implementation and usage. According to Uwizeyemungu and Raymond (2010) also, the ex-post evaluation of ERP systems is necessary not only to justify the investments made in these systems, but also and above all to better manage the benefits sought by organizations from these systems.

Besides, Reviews by Esteves and Pastor (2001), Jacobs and Bendoly (2003), Møller(2005), Brynjolfsson and Yang (1996), Bharadwaj et al.(2000), Poston and Grabski (2001), Esteves and Bohorquez (2007) and Moon (2007) indicate that a majority of ERP research focuses on ERP selection, success factors, and the implementation phase, but seldom on post- implementation impacts. This highlights a critical research gap, as there is a great need for continued improvement and assessment as ERP use evolves over time. Laudon and Laudon (2000) stressed on viewing ERP system from a comprehensive perspective. Brynjolfsson and Hitt (1998) observe that the IT payoffs are contingent; therefore they encourage the research of factors that leverage the impact of IT on firm performance.

An ERP project failure may threaten the existence of an organization. A wrong ERP project selection would either fail the project or weaken the system to an adverse impact on company performance (Wei and Wang, 2005). Therefore, it is critical for organizations to have as much information as possible prior to embarking on an ERP project and require an evaluation of ERP. Thus, an extensive study of research done with respect to ERP, points at the scarcity of studies on ERP and its effect on organizational performance in the post-implementation stage. In India, the empirical studies on the ERP are almost negligible and very few have focused mainly on pre-implementation. To fill this void, the present study is undertaken with an aim to reassess possible benefits, which could further clarify the myriad of factors affecting the ERP and firm performance relationship.

LITERATURE REVIEW

Davenport (2000) proposed that implementing the ERP systems bring many benefits for the organization including reduction of cycle time, promotion the flowing efficiency of information, generating the financial information fast, proceeding the e-business, and assistance in

development of new strategies. Brown (1997), Gilbert (2000), Glover et al. (1999), Knorr (1999), Rizzi and Zamboni (1999), Wah (2000), Davenport (1998), Krumwiede and Jordan (2000), Kang et al. (2008), Pan and Jang (2008) suggested that implementing ERP systems provides many benefits to organizations like integrating organizational processes , reduce costs, procurement leverage, provide accurate and timely globally integrated information across the business partners, conversion to year 20002 compliant software, managing e-business, adaptability to re-configure the business and improve effectiveness, firm performance, decision support and customer's satisfaction.

Most companies expect ERP to reduce their operating costs, increase process efficiency, improve customer responsiveness and provide integrated decision information. They also want to standardize processes and learn the best practices embedded in ERP systems to ensure quality and predictability in their global business interests by reducing cycle times from order to delivery (Ross, 1999). ERP systems are perceived to be a tool to tackle today's increasing complexity, as they provide two major benefits: a comprehensive and unified view of the organization and a common database in which all business transactions are recorded and stored (Umble et al., 2003). Accordingly, some ERP vendors used to boast the ability of their ERP to both improve the operations of the company and to give it a competitive edge (Bailey, 1999). Benefits of ERP include ease of saving and receiving of data, integration of processes, visibility of data, and increase in overall enterprise operational activities quality (Olhager and Selldin, 2003). Nicolaou and Bhattacharya (2006) also opinioned that the factors of the post-implementation review were important and discussed that, using post-implementation review resulted in improved differential performance.

According to Shang (2000), companies expect significant benefits, namely increased operational

efficiency and competitiveness otherwise known as defensive and offensive benefits (Nolan and McFarlan, 2005). Gattiker and Goodhue (2002) suggested four major categories of ERP benefits including: better information flow across subunits through standardization and integration of activities, centralization of administrative activities, lower maintenance costs of information systems and greater ability to deploy new IS functionality, and transformation from inefficient business processes toward an accepted best of practice processes.

But, Adam and O'Doherty (2000) stated that though ERP systems have beneficial effects, these benefits are matched with high level of risk because of complexities of ERP systems. Some companies even abandon implementation of ERP projects or achieve only some of the benefits they aim (Martin and Cheung, 2005; Sammon and Adam, 2004; Al-Mashari et al., 2003). King and Burgess (2006) reported that many implementations of ERP have been criticized regarding the time; cost and disruption caused by the implementation and sometimes limited benefits once the systems become operational. Sammon and Adam (2005) also reported that planning phase of an ERP implementation project, the complexities of the ERP market and complex implementation caused high rates of failure in ERP project implementation.

Karimi et al. (2007) has the opinion that ERP implementation remains however one of the most significant challenges for IS practitioners in the past decade. Implementation related publications account for about one third of the articles reviewed and is the more developed research as far as the researchers related to ERP are concerned. Tsai et al.(2005) and Lui and Chan(2008) also expressed that though ERP system are used around the world since many years, still there are many recent reports saying about the complexity and the difficulties in ERP implementation. This complexity arises mainly because these systems integrate and process large amounts of data.

RESEARCH METHODOLOGY

The study is directed to companies that had already implemented an ERP system. Specifically, the survey was administered to employee of the manufacturing companies who were involved in implementation process and are now the end-users. Three criteria guided the selection of the cases: (a) the firm should be in manufacturing, (b) it must have been using an ERP system for at least 1 year, and (c) it must have been using the system in at least two core business processes.

Data was collected from 67 manufacturing organizations that fulfilled the above criteria's and the sample of the study constituted of 750 individuals working in these manufacturing companies. Using non-probabilistic judgemental sampling, a total of 900 surveys were collected, after several follow-up e-mails and phone calls. The reliability control has shown that 16.7 percent of respondents were unreliable, as some questions were left unattended. Moreover, in some cases, the observed responses were artificially inflated as a result of respondents' tendencies to respond in a consistent manner. The sample of 750 respondents was finalized with respect to the following classifications:

Gender	Male	547
	Female	203
Age	20-35	198
	36-50	422
	51-65	130
Educational Qualification	Graduate	221
	Post Graduate	467
	Diploma	62
Position in company	Junior level	160
	Middle level	485
	Senior level	105

Also, given that the phenomenon under study, effects of ERP, is complex and that one requires a deeper understanding of it in its actual context, a qualitative methodology is more appropriate (Bourlakis and Bourlakis, 2006). Hence, the focus of this paper will be on the operational and intangible gains resulting from ERP implementation (which will be operationalised by many variables tested in this study). The performance indicators chosen were actually taken by the managers and ERP vendors through the interviews, together with the literature review.

PLS-Graph was used to test the hypothesized relationships among the study variables. The choice was motivated by several considerations. PLS is a non-parametric estimation procedure (Wold, 1982). Its conceptual core is an iterative combination of principal components analysis relating measures to constructs, and path analysis capturing the structural model of constructs. The structural model represents the direct and indirect causal relationships among constructs. It can be used to estimate models that use both reflective and formative indicators, is more appropriate for analyzing moderating effects because traditional techniques cannot account for measurement error in exogenous constructs (Fornell and Bookstein, 1982) allows for modeling latent constructs under conditions of non-normality, and is appropriate for small to medium sample sizes (Chin, 1998a,1998b ; Chin and Newsted, 1999).

RESULTS AND DISCUSSION

The model was designed to study the effect of different components of ERP during implementation phase on the changes caused by ERP on organizational performance and productivity. To assess the psychometric properties of measurement model, individual item loadings, internal consistency, convergent validity, and discriminant validity were examined of the reflective first-order factors (database, project management, software and hardware resources).

The loadings of the measurement items on their respective factors were examined. Finally, the model included the items whose loading were above the threshold value on their respective factor and were statistically significant at the 0.001 level, which provides support for convergent validity (Figure 1). Two items (1 database resource and 1 project management resource) were deleted which include There was a difficulty in transferring data from previous software and Task assignments were well-defined during the ERP implementation.

The study assessed convergent validity by examining composite reliability and average variance extracted from the measures. Although many studies have used 0.5 as the threshold reliability of the measures, 0.7 is a recommended value for a reliable construct (Chin, 1998a, 1998b). For the reflective measures, rather than using Cronbach's alpha, which represents a lower bound estimate of internal consistency due to its assumption of equal weightings of items, a better estimate can be gained by using the composite reliability measure (Chin and Gopal, 1995). As shown in Table 1, the internal consistency of all reflective constructs clearly exceeded 0.70, suggesting strong reliability. For the average variance extracted by a measure, a score of 0.4 indicates acceptability (Fornell and Larcker, 1981). From the table it is clear that AVE by all reflective measures (except Internal Process) is more than 0.4, which is above the acceptability value.

Table 1: Verification of Convergent Validity			
	AVE	Composite Reliability	Cronbachs Alpha
Internal	0.297326	0.940943	0.935009
database	0.574053	0.728417	0.261031
hardware	0.683388	0.811902	0.536898
project mgmt	0.400127	0.868842	0.831775
software	0.45025	0.70868	0.402665

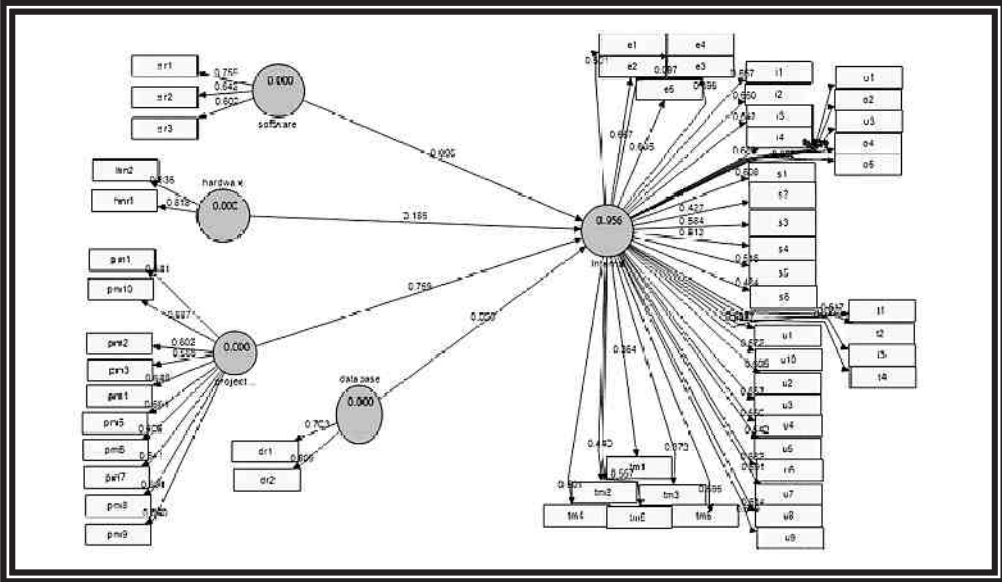


Figure 1: Model Displaying Relationship Between Components of Implementation Phase and Change Caused by ERP on Internal Processes after Removal of Some Items.

Finally, the study verified the discriminant validity of the instrument by comparing the average variance extracted (AVE) (Fornell and Larcker, 1981). It is clear from the table 2 that the square root of the average variance extracted for each construct is greater than the levels of correlations with other constructs. The results of the inter-construct correlations also show that each construct shares larger variance with its own measures than with other measures.

Discriminant validity is also confirmed, when items related to a particular factor have the highest load on that factor and is higher than a difference of 0.2 on the other factor in the cross loadings table. When we look at the cross loadings table-3, we find that these conditions holds good (some cases difference is nearly equal to 0.2, which is acceptable).

The PLS modeling approach involved two steps - validating the measurement model and then fitting the structural model. The former is accomplished primarily by reliability and validity tests of the measurement model, followed by a test of the explanatory power of the overall model by assessing

its explained variance, and the testing of the individual hypotheses (structural model). The model shows that the explanatory power is 96.1 % which is considered excellent for the studies of this nature. For testing the individual hypotheses, a bootstrap re-sampling procedure was conducted and coefficients were estimated.

H₀₁: Project Management Resources during implementation phase of ERP system does not have

Table 2 : Verification of Discriminant Validity				
	database resources	hardware resources	project mgmt resources	software resources
database resources	0.7549834			
hardware resources	0.247158	0.8246211		
project mgmt resources	0.501847	0.648164	0.6324555	
software resources	0.497841	0.339519	0.573341	0.6708204

an association with change caused by ERP system on internal process.

H₀₂: Hardware and Networking Resources during implementation phase of ERP system does not have an association with change caused by ERP system on internal process.

H₀₃: Software Resources during implementation phase of ERP system does not have an association with change caused by ERP system on internal process.

H₀₄: Database Resources during implementation phase of ERP system does not have an association with change caused by ERP system in post implementation phase on internal process.

All the hypothesis are rejected since the tabulated value is more than 1.645, hence there is arelationship between ERP implementation phase and internal process of an organization. However, past research overwhelmingly reports that the immediate after-effects of ERP implementations are fraught with productivity and profitability problems (Davenport, 1998; Poston and Grabski, 2000, 2001; Hitt et al., 2002; Hunton et al., 2003; Nicolaou, 2004a, 2004b). These are thought to be due to possibly severe systems integration problems, misalignment between people, processes and technology, and overall change management issues during and shortly after

Table 3: Cross Loadings Table				
	database resources	hardware resources	project mgmt resources	software resources
dr1	0.702563	0.116263	0.332984	0.354314
dr2	0.809018	0.24735	0.422188	0.399005
hn2	0.211708	0.835494	0.515268	0.268148
hnr1	0.196658	0.817756	0.557555	0.293898
pm1	0.370604	0.39294	0.680922	0.363602
pm10	0.285621	0.386529	0.687419	0.386836
pm2	0.336293	0.295305	0.601755	0.36342
pm3	0.183396	0.348745	0.564799	0.291131
pm4	0.175288	0.482165	0.688254	0.329858
pm5	0.229991	0.394278	0.601416	0.291154
pm6	0.297823	0.48378	0.606284	0.370857
pm7	0.312853	0.341128	0.541241	0.34159
pm8	0.423584	0.536886	0.691404	0.487812
pm9	0.5355234	0.401487	0.640318	0.388097
sr1	0.356938	0.324116	0.483097	0.759222
sr2	0.34042	0.199394	0.340157	0.642198
sr3	0.309002	0.124475	0.303021	0.601592

Table 4: Correlation between Different Components of ERP in Implementation Phase and Internal Process of an Organization

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)
Database resources -> Internal	0.058542	0.056996	0.027723	0.027723	2.111683
Hardware resources -> Internal	0.185226	0.185044	0.038694	0.038694	4.786939
project mgmt resources -> Internal	0.758551	0.755281	0.041244	0.041244	18.39191
software resources-> Internal	0.096245	0.097623	0.031682	0.031682	3.037817

the implementation process (Nicolaou, 2004a; Murray and Coffin, 2001; Ross and Vitale, 2000; Scott and Vessey, 2000; Soh et al., 2000).

Having clarity about ERP adoption vis-a` -vis business vision positively impacts the overall success of the software (Davenport, 2000; Deloitte Consulting, 2000; Stefanou, 2001). According to Oesterle et al. (2000), success or failure hinges on the effective collaboration among the project teams, the business knowledge of internal business experts and the technical skills of outside IT consultants. On the other hand, Sammon and Adam (2005) argue that unsatisfactory success rates of ERP implementations to date is not an indication of the failure of ERP as a concept, it is the result of inadequate analysis of business requirements in preparation for ERP projects.

Our study found association between project management resources and change in performance. In accordance to our study, managers have reported that one of the problems associated with implementing packaged software is the incompatibility of features with the organization's information needs and business processes. To achieve the greatest benefits provided by an ERP system, it is imperative that the business processes are aligned with the ERP system. For mid-sized organizations, the risks associated with implementing ERP may be greater than those for larger enterprises, not only because they lack the critical human and technical capabilities of larger organizations, but also because they have fewer resources to rely on in case of disaster. However, Sammon and Adam (2004) noted that high rates of failure also exist in ERP project implementation due to combined effect of inadequate organizational analysis at the beginning of the project, the complexities of ERP market and complex implementation. Ferratt et al. (2006) investigated more than 70 enterprise-resource-planning (ERP) projects and found that greater success in

implementation is related to greater adoption of the best practices.

Bergstorm and Stehn (2005) survey results show a general lack of real drivers for ERP implementation and low awareness of the potential benefits and strategic importance, indicating that ERP is not yet regarded as a way of supporting and improving core business strategies. Hence, it is not the implementation of a software system that will yield the major benefits. Rather, it is the change processes aiming for organisation-wide improvements and the ERP approach adoption that will contribute to increased competitiveness.

The study indicated association between database resources and effect of ERP on internal process of an organization. However, in this context, it has often been argued that the quality of data/information is a major determinant of ERP success (Yusuf et al., 2004; Huang et al., 2004; Zhang et al., 2005; Gattiker and Goodhue, 2005). Hence, companies should pay more emphasis on the quality of data.

The study indicated that Software Resources contribute to ERP system success. However, Umble and Umble (2002) advocated the importance of software capabilities. They found that if the software capabilities and needs are mismatched with a company's business processes, this can lead the ERP implementation to failure.

The results indicated that hardware and networking resource were associated with changes caused by ERP system on internal performance of the organization. Hence, the vendors should make sure that adequate infrastructure is planned for in a way that it becomes reliably available well in time (both for the pre-implementation and the post-implementation stages). They should ensure network support, deploying of adequate server/ network, even during the training/modelling phase and introducing new PCs with latest configuration.

CONCLUSIONS AND LIMITATIONS

Vendors are the individuals who are responsible for the implementation of the software, and it is also their responsibility to make sure that all the resources are properly given complete focus. Since, project management involves, clear outlining of the milestones and critical paths along with the training and human resource plan and creation of a steering committee which includes top level management from diversified business functions. There should be an active monitoring of the status of milestones and targets in order to check the progress of an ERP project. Focus on building a teamwork environment where team size spans across the entire organization. ERP education should be carried out across the organization about ERP success and failure practices. Taking into account the most important needs of the implementation; the overall ERP architecture should be established well before the deployment. To ease the process; rigorous and sophisticated software testing should be performed. Variety of test cases should be executed in order to perform a rigorous system testing before the system goes live. This includes performing simulation and executing test cases to check the robustness of the system. The ERP team should consist of “best and brightest brains” in the organization. It should include cross-functional expertise and a blend of internal staff and the external consultants. The amount of interaction between them makes the contributing factor for the success of the project. Communication among various functions/levels and specifically between business and IT personnel is another identified critical area. This requires a communication plan to ensure that open communication occurs within the entire organization, including the shop-floor employees as well as with suppliers and customers.

As this study was based on a self-administered exploratory survey, where only closed ended questions were used in the response sheet. This restricted the ability of researcher to ask open-ended

questions, which may have assisted in offering a better understanding of effect of ERP on organizational performance and productivity. Managers may want an in-depth evaluation of ERP system in their organization. A case-study method might also have been adopted for an evaluation of effect of ERP system on single organization. Similar studies can also be carried on cross cultural domains to explore cultural dissimilarities and to explore whether effect of ERP system is consistent across cultures or not and there by conducting study in these areas, one can compare the results and look the gap in order to further investigate the effect of ERP system.

REFERENCES

- Adam, F. and 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.
- Akkermans, H.A., Bogerd, P., Yucesan, E. and Wassenhove Van, L.N. (2003). The Impact of ERP on Supply Chain Management: Exploratory Findings from a European Delphi Study. *European Journal of Operational Research*, 146(2), 284-301.
- Al-Mashari, M., Al-Mudimigh, A. and Zairi, M. (2003). Enterprise Resource Planning: Taxonomy of Critical Factors. *European Journal of Operational Research*, 146(2), 352-64.
- Bailey, J. (1999). Trash Haulers are Taking Fancy Software to the Dump. *Wall Street Journal*.
- BergstroˆM, M. and Stehn, L. (2005). Benefits and Disadvantages of ERP in Industrialized Timber Frame Housing in Sweden. *Construction Management and Economics*, 23, 831-838.
- Bharadwaj, A. (2000). A Resource-Based Perspective on Information Technology Capability and Firm Performance: an Empirical Investigation. *MIS Quarterly*, 24, 169-196.
- Bourlakis, M. and Bourlakis, C. (2006). Integrating Logistics and Information Technology Strategies for Sustainable Competitive Advantage. *Journal of Enterprise Information Management*, 19(4), 389–402.
- Boykin, R.F. and Martz, B. (2004). The Integration of ERP into a Logistics Curriculum: Applying a Systems Approach. *The Journal of Enterprise Information Management*, 17, 1, 45-55.
- Brown, E. (1997). The Best Software Business Bill Gates Doesn't Own. *Fortune*, 242-250.
- Brynjolfsson, E. and Yang, S. (1996). Information Technology and Productivity: A Review of the Literature. *Advances in Computers*, 179-214.

- Brynjolfsson, E. and Hitt, L. (1998). Computing Productivity: are Computers Pulling Their Weight? Mimeo, MIT and Wharton.
- Chin, W. W. (1998a). Issues and Opinion on Structural Equation Modelling. *MIS Quarterly*, 22(1), 7-16.
- Chin, W. W. (1998b). The Partial Least Squares Approach to Structural Equation Modelling. *Modern Methods for Business Research*, 295–336.
- Chin, W. W. and Newsted, P. R. (1999). Structural Equation Modelling Analysis with Small Samples Using Partial Least Squares. *Statistical Strategies for Small Sample Research*, Thousand Oaks, CA: Sage, 307–341.
- Chin, W.W. and Gopal, A. (1995). Adoption intention in GSS: Relative importance of beliefs. *Database Advances*, 26(2–3), 42–64.
- Colmenares, L. (2008). Assessing Critical Success Factors of ERP Implementation. *Encyclopedia of Information Science and Technology*, 2nd.Edition. Information Science Reference, 1,248-255.
- Crowley, A. (1998) Construction as a Manufacturing Process: Lessons from the Automotive Industry. *Computers and Structures*, 67(5), 389–400.
- Davenport, T. H. (1998). Putting the Enterprise into the Enterprise System. *Harvard Business Review*, 121-131.
- Davenport, T. H. (2000). Mission Critical: Realizing the Promise of Enterprise Systems. *Harvard Business School Press*.
- Davenport, T.H. and Brooks, J.D. (2004). Enterprise Systems and the Supply Chain. *Journal of Enterprise Information Management*, 17, 8-19(12).
- Deloitte Consulting (2000). Success File.
- Esteves, J. and Pastor, J. (2001). Enterprise Resources Planning Research: an Annotated Bibliography. *Communications of the Association for Information Systems*, 7(8), 1–52.
- Esteves, J., and Bohorquez. V. (2007). An Updated ERP System Annotated Bibliography: 2001–2005. *Communications of the Association for Information Systems*, 19, 386–446.
- Falk, M. (2005). ICT-Linked Firm Re-Organisation and Productivity Gains. *Technovation*, 25, 1229-1250.
- Ferratt, T. W., Ahire, S., and De, P. (2006). Achieving Success in Large Projects: Implications From a Study of ERP Implementations. *Interfaces, Informs*, 36(5), 458-469.
- Fornell, C. and Bookstein, F. L. (1982). Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory. *Journal of Marketing Research*, 19, 440–452.
- Fornell, C. and Larcker, D.F. (1981). Evaluating structural equations models with unobservable variables and measurement error. *Journal of Marketing Research*, 8(1), 39-50.
- Gattiker, T. F., and Goodhue, D. L. (2005). What Happens After ERP Implementation: Understanding The Impact of Inter-Dependence and Differentiation on Plant-Level Outcomes. *MIS Quarterly*, 29(3), 559-585.

- Gattiker, T.F. and Goodhue, D.L. (2002). Software-Driven Changes to Business Processes: an Empirical Study of Impacts of Enterprise Resource Planning (ERP) Systems at the Local Level. *International Journal of Production Research*, 40(18), 4799-814.
- Gilbert, A. (2000). ERP Vendors Look for Rebound after Slowdown. *Information Week*, 773, 98–99.
- Glover, S. M., Prawitt, D. F., and Romney, M. B. (1999). Implementing ERP. *Internal Auditor*, 40-47.
- Hedman, J. and Borell, A. (2004). Narratives in ERP Systems Evaluation. *The Journal of Enterprise Information Management*, 17(4), 283-90.
- Hitt, L. M., Wu, D. J. and Zhou, X. (2002). Investments in Enterprise Resource Planning: Business Impact and Productivity Measures. *Journal of Management Information Systems*, 19(1), 71-98.
- Hsu, L.L. and Chen, M. (2004). Impacts of ERP Systems on the Integrated-Interaction Performance of Manufacturing and Marketing. *Industrial Management, Data Systems*, 104(1), 42-55.
- Huang, S.M., Chang, I.C., Li, S.H. and Lin, M.T. (2004). Assessing Risk in ERP Projects: Identify and Prioritize the Factors. *Industrial Management, Data Systems*, 104 (8), 681-8.
- Hunton, J.E., Lippincott, B. and Reck, J.L. (2003). Enterprise Resource Planning Systems: Comparing Firm Performance of Adopters and Non-Adopters. *International Journal of Accounting Information Systems*, 4, 165–184.
- Jacobs, F.R. and Bendoly, E. (2003). Enterprise Resource Planning: Developments and Directions for Operations Management Research. *European Journal of Operational Research*, 146, 233–240.
- Kang, S., Park, J.H. and Yang, H.D. (2008). ERP Alignment for Positive Business Performance: Evidence from Korea's ERP Market. *Journal of Computer Information Systems*, 48(4), 25-38.
- Karen, A. (2007). Implementing Enterprise Resource Planning (ERP) for Strategic Competitive Advantage. *Issues in Information Systems*, 8(2).
- Karimi, J., Somers, T.M. and Bhattacharjee, A. (2007). The Impact of ERP Implementation on Business Process Outcomes: A Factor-Based Study. *Journal of Management Information Systems*, 24(1), 101-134.
- King, S.F. and Burgess, T.H. (2006). Beyond Critical Success Factors: A Dynamic Model of Enterprise System Innovation. *International Journal of Information Management*. 26(1), 59-69.
- Knorr, E. (1999). ERP's Rough Waters. *Upside*, 11 (12), 209-13.
- Krumwiede, K.R. and Jordan, W.G. (2000). Reaping the Promise of Enterprise Resource Systems. *Strategic Finance*, 82(4), 48-52.
- Kumar, V., Maheshwari, B. and Kumar, U. (2003). An Investigation of Critical Management Issues in ERP Implementation: Empirical Evidence from Canadian Organizations. *Technovation*, 23(10), 793–807.

Impact of Resources in Enterprise Resource Planning(ERP)
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Laudon, K.C. and Laudon, J.P. (2000).Management Information Systems: Organization and Technology in the Networked Enterprise, Upper Saddle River, NJ, Prentice Hall.

Lui, K. M. and Chan, K.C.C. (2008). Rescuing Troubled Software Projects by Team Transformation: A Case Study with an ERP Project. IEEE Transactions on Engineering Management, 55(1), 171-184.

Luo, W. and Strong, D.M. (2004). A Framework for Evaluating ERP Implementation Choices. IEEE Transactions on Engineering Management, 51.

Martin, I. and Cheung, Y. (2005).Business Process Re-Engineering Pays after Enterprise Resource Planning.Business Process Management Journal, 11(2), 185-97.

Miller, B. (2003). What Is ERP? CIO.Accessed on 12th Dec'2012 from www.cio.com/aialyst/report2003.html.

Moller, C. (2005). ERP II: A Conceptual Framework for Next-Generation Enterprise Systems. The Journal of Enterprise Information Management, 18(4), 483-97.

Moon, Y. B. (2007). Enterprise Resource Planning: A Review of the Literature. International Journal of Management and Enterprise Development, 4(3), 235-264.

Murray, M. and Coffin, G. (2001). A Case Study Analysis of Factors for Success in ERP System Implementations.AMCIS Proceedings, 196.

Nicolaou, A. I. (2004a). Quality of Post-Implementation Review in ERP Systems. International Journal of Accounting Information Systems, 5(1), 25-49.

Nicolaou, A.I. (2004b). Firm performance effects in relation to the implementation and use of enterprise resource planning systems. Journal of Information Systems, 18 (2), 79-105.

Nicolaou, A. I. and Bhattacharya, S. (2006). Organizational Performance Effects of ERP Systems Usage: The Impact of Post-Implementation Changes. International Journal of Accounting Information Systems, 7(1), 18-35.

Nolan, R. and Mcfarlan, F.W. (2005).Information Technology and the Board of Directors.Harvard Business Review, 83(10), 96-106.

Olhager, J. and Selldin, E. (2003).Enterprise Resource Planning Survey of Swedish Manufacturing Firms.European Journal of Operational Research, 146, 65-373.

Osterle, H., Feisch, E. and Alt, R. (2000).Business Networking: Shaping Enterprise Relationships on the Internet.Springer, New York, NY.

Palaniswamy, R. and Frank, T. (2002). Oracle ERP and network computing architecture: implementation and performance. Information Systems Management, 19, 53.

Pan, M.J. and Jang, W.Y. (2008). Determinants of the Adoption of Enterprise Resource Planning within the Technology-Organization-Environment Framework: Taiwan's Communications. Journal of Computer Information Systems,

49(3), 48-53.

Poston, R. and Grabski, S. (2000). The Impact of Enterprise Resource Planning Systems on Firm Performance. Proceedings of the 21st International Conference on Information Systems, 479 - 493.

Poston, R. and Grabski, S. (2001). Financial Impacts of Enterprise Resource Planning Implementations. International Journal of Accounting Information Systems, 2, 271-294.

Rizzi, A. and Zamboni, R. (1999). Efficiency Improvement in Manual Warehouses Through ERP Systems Implementation and Redesign of the Logistics Processes. Logistics Information Management, 12(5), 367-377.

Robey, D., Ross, J.W. and Boudreau, M.C. (2002). Learning to Implement Enterprise Systems: an Exploratory Study of the Dialectics of Change. Journal of Management Information Systems, 19(1), 17-46.

Ross and Vital (2000). The ERP's Revolution: Surviving Versus Thriving. Information Systems Frontiers, 233-241.

Ross, J. (1999). Surprising Facts about Implementing ERP. IT Pro, 65-68.

Sammon, D. and Adam, F. (2004). ERP Software Selection - Widening the Debate. The Enterprise Resource-Planning Decade: Lessons Learned and Issues for the Future, Idea Publishing Group, Hershey, PA.

Sammon, D. and Adam, F. (2005). Towards a model of organisational prerequisites for enterprise-wide systems integration examining ERP and data warehousing. The Journal of Enterprise Information Management, 18(4), 458-70.

Scott, J.E and Vessey, I. (2000).Implementing Enterprise Resource Planning Systems: The Role of Learning from Failure.Information Systems Frontiers, 2.

Shang, S. (2000). A Comprehensive Framework for Classifying the Benefits of ERP Systems.Decision Science, Annual Meeting, Orlando, FL.

Soh, C., Kien, S.S. and Tay-Yap, J. (2000). Cultural Fits and Misfits: Is ERP A Universal Solution? Communications of the ACM, 43.

Somers, T. and Nelson, K. (2003). The Impact of Strategy and Integration Mechanisms on Enterprise System Value: Empirical Evidence from Manufacturing. European Journal of Operational Research, 146, 315-38.

Stefanou, C.J. (2001). Organizational Key Success Factors for Implementing SCM/ERP Systems to Support Decision Making.Journal of Decision Systems, 10(1), 49-64.

Tsai, W-H., Chien, S-W, Hsu, P-Y.and Leu, J-D. (2005). Identification of Critical Failure Factors in the Implementation of Enterprise Resource Planning (ERP) System in Taiwan's Industries.International Journal of Management and Enterprise Development, 2 (2), 219-39.

Umble, E.J., Haft, R.R. and Umble, M.M. (2003). Enterprise

Impact of Resources in Enterprise Resource Planning(ERP)
Implementation Process on Internal Process of an Organization

Resource Planning: Implementation Procedures and Critical Success Factors. European Journal of Operational Research, 146, 241-257.

Umble, E. and Umble, M. (2002). Avoiding ERP Implementation Failure, Industrial Management, 44(1), 25-34.

Ushasri, T. S. (1999). ERP: Bridging Business and Technology. In Sadagopan, S. (Ed.), ERP:A Managerial Perspective, TataMcgraw-Hill, India.

Uwizeyemungu, S. and Raymond, L. (2010). Linking the Effects of ERP to Organizational Performance: Development and Initial Validation of an Evaluation Method.Information Systems Management, 27, 25-41.

Verville, J., Bernadas, C. and Halingten, A. (2005). So You're Thinking of Buying an ERP? Ten Critical Success Factors for Successful Acquisitions.The Journal of Enterprise Information Management, 18(6), 665-77.

Wah, L. (2000). Give ERP A Chance. Management Review, 89(3), 20-24.

Wei, C.C., Chien, C.F. and Wang, M.J.J. (2005).An AHP-Based Approach to ERP System Selection.International Journal of Production Economics, 96, 47-62.

Wold, H. (1982). Soft Modeling: The Basic Design and Some Extensions. in Jo' Reskog, K.G. and Wold, H.E. (Eds), Systems Under Indirect Observation: Causality, Structure, Prediction, North-Holland Publishing Company, Amsterdam.

Yusuf, Y., Gunasekaran, A., and Abthorpec, M.S. (2004). Enterprise Information Systems Project Implementation: A Case Study of ERP in Rolls-Royce. International Journal of Production Economics, 87, 251-266.

Zhang, Z., Lee, M.K.O., Huang, P., Zhang, L. and Huang, X.

(2005). A Framework of ERP Systems Implementation Success in China: an Empirical Study. International Journal of Production Economics, 98(1), 56-80.

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