

A Study on the Effect of Enterprise Resource Planning (ERP) on People of an Organization

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Abstract

The ultimate objective of any organizational initiative to install ERP system is to reveal some advantage, whether it is associated with cost savings, improved efficiencies, or better decision-making. These systems can in the long run save millions of dollars, improve quality of information, and increase workers' productivity by reducing the amount of time to do a job. ERP systems can virtually eliminate the redundancies that occur from outdated and disparate systems that may be present in each department of an organization. This paper highlights the effect of ERP systems on the people of an organization. The results indicated that employees, customers and suppliers were benefitted due to installation of ERP systems while external agencies were not affected due to ERP systems.

Keywords: *Employees, Customers, Suppliers, External Agencies etc.*

INTRODUCTION

ERP systems are considered a solution to the growing information requirements within organizations to achieve accuracy in management information systems (Singla, 2008), improve competitiveness (Allen *et al.*, 2002; Raymond *et al.*, 2005), boost scale efficiencies of business operations (Harris and Katz, 1991; Mitra and Chaya, 1996). Leary (2004) defines ERP as, "ERP systems are computer-based systems designed to process an organization's transactions and facilitate integrated and real-time planning, production, and customer response". According to Burton (1999), enterprise systems can integrate the key business processes of an entire firm into a single software system that allows information to flow seamlessly throughout the organization. ERP system is a standardized off-the-shelf information technology (IT) package providing the first real opportunity for modern organizations to integrate their business processes and functions (Klaus *et al.*, 2000; Davenport, 2000). With an ERP environment, transactions are treated as part of the inter-linked business processes (Gupta, 2000). Kumar and Hillegersberg (2000) defined ERP as "Configurable information system packages that integrate information and information-based processes within and across functional areas in an organization". ERP is a driver of comprehensive change, business process improvements, and process orientation (Akkermans *et al.*, 2003).

Boudreau (2003), Ragowsky and Gefen (2008) and Yeh (2006) defines

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ERP system as, “A single integrated and packaged business information system. The aim of an ERP system is to seamlessly integrate and manage the different business processes and information flows within an enterprise”. Hsu and Chen (2004) discussed the importance of ERP into an integrated, process-oriented, information-driven and real time organization. Since ERP is new software, its implementation methodologies are in the developing stage. ERP implementation involves amendments in business process and software configuration for better compatibility (Davenport, 2000; Holland and Light, 1999; Gibson et al., 1999). Yen et al. (2002) prefer to define ERP as “software that can be used to integrate information across all functions of an organization to automate corporate business processes a business management system that integrates all facets of the business”.

Wylie (1991) defined ERP as a set of applications designed to bring business functions into balance. According to Markus and Tanis (1999), from a base in manufacturing and financial systems, ERP systems may eventually allow for integration of inter organizational supply chains. Paradoxically, ERP projects are often considered to be strategic imperatives, but are usually justified using operational factors (Murphy and Simon, 2002). Scapens and Jazayeri (2003) define the characteristics of ERP systems as integration, standardization, routinization and centralization; which facilitate and reinforce processes of management accounting change (Rom and Rohde, 2006). Markus et al. (2000) asserted that ERP integrates inventory data with financial, sales, and human resources data, enabling organizations to price their products, produce financial statements, and manage people, materials, and money better.

LITERATURE REVIEW

From a business process manager’s perspective, the effects of business process outcomes due to ERP system will be reduced cost and cycle time, and improved productivity, quality, and customer service benefits (Shang and Seddon, 2002). Automation effects result in process efficiency by reducing inventory costs, increasing throughput, reducing labor costs, and increasing reliability (Banker and Kauffman, 1988). Informational effects result in process effectiveness by increasing resource utilization, reducing waste, increasing responsiveness, and improving quality (Porter and Millar, 1985). Transformational effects result in process flexibility by enabling product and service innovation, reducing cycle times, and improving customer relationships (Karimi *et al.*, 2001; Mukhopadhyay *et al.*, 1995).

ERP improves efficiencies through computerization, enhancing decision making by giving correct and timely information (Wah, 2000), processes business transactions effectively (Malone *et al.*, 1987; Johnston and Lawrence,

1988), increase effectiveness and cost control (Blick *et al.*, 2000), increase throughput and delivery speed by reducing order cycle time and customer response time (Cotteleer and Bendoly, 2006; McAfee, 2002), monitors and records employee performance effectively (Zmud and Apple, 1992), maintains records of business functions within the organization with lower cost (Cash and Konsynski, 1985), provide products and services of higher value to their customers, that is, to improve their competitive capabilities (Roth and Jackson, 1995), replace legacy systems based on outdated information technology (Chaterji, 1999), improve organizational decision making (Holsapple and Sena, 1999), allow organizations to re-engineer their business processes (Koch, 2001; Singla, 2008), better communication among organizational units (Miranda and Kavanagh, 2005), Moreover, ERP systems can provide high levels of process integration across interdependent organizational units (Park and Kusiak, 2005), provide growth options and enhance firm's agility and innovativeness (Fichman, 2004; Sambamurthy *et al.*, 2003), integrate business processes (Brakely, 1999), reduces costs and inefficient processes (Harris, 2005).

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. This has resulted in ERP systems possessing user interfaces (UIs) which suffer from poor usability (Singh and Wesson, 2009). Usability problems can hamper the extent to which a system can be used by its users to achieve a set of goals within a specified context of use (ISO, 1998). ERP system in an organization is related to customers, suppliers, external agencies and employees. Hence, this study was undertaken to study the effect of ERP on People of an organization.

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 12 manufacturing organizations that fulfilled the above criteria's and the sample of the study constituted of 202 individuals working in these manufacturing companies. Using non-probabilistic sampling, a total of 237 surveys were collected, after several follow-up e-mails and phone calls. The reliability control has shown that 13.8 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 202 respondents was finalized with respect to the following classifications:

Table 1: Classification of Respondents Demographics Profile

| | | |
|----------------------------------|---------------|-----|
| Gender | Male | 181 |
| | Female | 21 |
| Age | 20-35 | 96 |
| | 36-50 | 91 |
| | 51-65 | 15 |
| Educational Qualification | Graduate | 61 |
| | Post Graduate | 127 |
| | Diploma | 14 |
| Position in company | Junior level | 38 |
| | Middle level | 109 |
| | Senior level | 55 |

Paired t-test checks the confidence intervals for the difference between a pair of means (Armitage and Berry, 1994; Altman, 1991). This test compares the means of two variables by calculating the difference between the two variables and tests to see if the average difference is significantly different from zero. A paired t-test measures whether means from a within-subjects test group vary over 2 test conditions. The paired t-test is commonly used to compare a sample group's scores before and after an intervention. First, the paired t-test is applicable when measuring how a static group measuring organizational performance performs in two conditions and this requirement is met. Second, the paired t-test is appropriate when the independent variable is dichotomous. In our experiment, the two test conditions, (presence of a ERP system or lack thereof) fulfil the requirement. Testing of matched pair permits us to

control for confounding macroeconomic or industry influences. Since, 202 employees participate in the experiment, so the study is marginally safe in assuming the dependent variable followed a normal distribution (the central limit theorem proves distribution is normal with a sample size of 30 or more). Thus, we can say that paired t-test is valid in our analysis.

Our study was targeted on the effect of ERP on the people resources. Four main groups related to people were involved in the organization : employee, customers and suppliers and external agencies. Hence, the following hypothesis were formulated:

H₀₁: There is no significant difference in Employee’s Job Performance in an organization due to ERP installation.

H₀₂: There is no significant difference in Employee’s Job Satisfaction in an organization due to ERP installation.

H₀₃: There is no significant difference in Adaptability and Growth in an organization due to ERP installation.

H₀₄: There is no significant difference in association with Customers and Suppliers of an organization due to ERP installation.

H₀₅: There is no significant difference in association with External Agencies of an organization due to ERP installation.

RESULTS AND DISCUSSION

Table 1a - Paired Samples Statistics for People involved in the organization

| | Mean | N | Std. Deviation | Std. Error Mean |
|-----------------------------|-------|-----|----------------|-----------------|
| PreEmployeeJobPerformance | 10.87 | 202 | 2.604 | 0.183 |
| PostEmployeeJobPerformance | 14.15 | 202 | 2.949 | 0.208 |
| PreEmployeeJobSatisfaction | 7.23 | 202 | 2.637 | 0.186 |
| PostEmployeeJobSatisfaction | 10.33 | 202 | 2.785 | 0.196 |
| PreAdaptabilityGrowth | 14.5 | 202 | 4.124 | 0.29 |
| PostAdaptabilityGrowth | 20.16 | 202 | 4.717 | 0.332 |
| PreCustomersSuppliers | 13.94 | 202 | 4.492 | 0.316 |
| PostCustomersSuppliers | 20.82 | 202 | 5.043 | 0.355 |
| PreExternalAgencies | 13.05 | 202 | 3.785 | 0.266 |
| PostExternalAgencies | 13.83 | 202 | 4.024 | 0.283 |

| | Mean | Std. De- viation | Std. Error Mean | T | df | Sig. (2-tailed) |
|--|-------|---------------------|-----------------------|--------|-----|--------------------|
| PreEmployeeJobPerfor- mance - PostEmployee- JobPerformance | -3.28 | 4.469 | 0.314 | -10.4 | 201 | 0 |
| PreEmployeeJobSatisfac- tion - PostEmployeeJob- Satisfaction | -3.09 | 4.031 | 0.284 | -10.9 | 201 | 0 |
| PreAdaptabilityGrowth – PostAdaptabilityGrowth | -5.65 | 6.676 | 0.47 | -12.0 | 201 | 0 |
| PreCustomersSuppliers - PostCustomersSuppliers | -6.88 | 7.161 | 0.504 | -13.66 | 201 | 0 |
| PreExternalAgencies – PostExternalAgencies | -0.77 | 6.103 | 0.429 | -1.81 | 201 | 0.072 |

H₀₁ stands rejected

The significance value p was found less than 0.01, hence the hypothesis stands rejected at 1% level of significance. Thus, it can be inferred that, employee job performance in an organization was significantly affected due to ERP installation. Also, the total mean before ERP installation was 10.87 and after ERP installation was 14.15. This shows that there has been an improvement in the organizational productivity related to employee's job performance in an organization.

H₀₂ stands rejected

The hypothesis stands rejected at 1% level of significance because the significance value p was found less than 0.01. Thus, employee's job satisfaction in an organization was significantly affected due to ERP installation. Also, the total mean before ERP installation was 7.23 and after ERP installation was 10.33. Hence, due to ERP installation, there has been an improvement in the organizational productivity related to employee's job satisfaction in an organization.

H₀₃ stands rejected

Since, the significance value (p) was found less than 0.01, the hypothesis stands rejected at 1% level of significance. This means that, adaptability and growth in an organization was significantly affected due to ERP installation. Also, the

total mean before ERP installation was 14.50 and after ERP installation was 20.16. Hence, there has been an improvement in the organizational productivity related to adaptability and growth in an organization due to ERP installation.

H₀₄ stands rejected

The hypothesis stands rejected at 1% level of significance because the significance value p was found less than 0.01. Thus, customers and suppliers in an organization were significantly affected due to ERP installation. Also, the total mean before ERP installation was 13.94 and after ERP installation was 20.82. Hence, due to ERP installation, there has been an improvement in the organizational productivity related to customers and suppliers in an organization.

H₀₅ stands accepted

The hypothesis stands accepted at 1% level of significance because the significance value p was found more than 0.01. Thus, external agencies in an organization were not significantly affected due to ERP installation. Also, the total mean before ERP installation was 13.05 and after ERP installation was 13.83. Hence, due to ERP installation, there has not been a significant improvement in the organizational productivity related to external agencies in an organization.

Our study found that ERP systems contribute highly in innovation, learning and growth of the employees. Karen *et al.* (2007) suggested that ERP facilitates the job s run, and raises the efficiency of employees, and giving more reliability, flexibility, saving time and effort of all the people and managers who work in the organization. Matolcsy *et al.* (2005) compared indicators of ERP users and found that the performance of ERP users has improved. Past research further suggests that, over time, operational performance improves as employees use the ERP system in different and sometimes unique ways to enhance organizational tasks and processes (Chou and Chang, 2008; Gattiker and Goodhue, 2005; McAfee, 2002; Poston and Grabski, 2001).

Contrary to our study, Strassmann (1997) and Butler and Gray (2006) found technology is associated with decrease in worker productivity. This may seem to be true in some cases since, from the perspective of the individual user of an ERP system, ERP demands a broader set of information systems and business knowledge (Sein *et al.*, 1999), changes job role definitions, increases task interdependencies (Kang and Santhanam, 2003), restricts flexibility in job tasks (Park and Kusiak, 2005). However, according to Esteves *et al.* (2002), ERP implementation usually represents a threat to users' perception of control over their work and a period of transition during which users must cope with

differences between old and new work systems. On the other hand, Hunton *et al.* (2003) found that the performance of ERP users has not been declined after introducing ERP, but not been improved, neither.

The results of our study indicated that productivity related to customers and suppliers was improved after ERP system installation. These results are important for the organization, since, they need to pay attention to their internal customers to avoid the difficulties associated with this change. Customer benefits come from meeting current needs of customers more efficiently, from identifying the customer needs proactively, and from meeting new customer needs (Chand *et al.*, 2005). Tsai (2008) also reported that, ERP adopters are found to reduce their turnover days of account receivables or inventories, and prolong turnover days of unpaid accounts permitted by their suppliers, thus causing a substantial efficiency elevation after ERP implementation. In accordance with our study, Stratman and Roth (2002), Bradford and Florin (2003), Nah *et al.* (2003), Huang *et al.* (2004), Zhang *et al.* (2005), Nah and Delgado (2006) and Bradley (2008) also showed that ERP implementation improves customer service and satisfaction.

Goodpasture (1995) showed that ERP has also been credited with reducing manufacturing lead times, drastic declines in inventory; breakthrough reductions in working capital; abundant information about customer wants and needs; and the ability to view and manage the extended enterprise of suppliers, alliances, and customers as an integrated whole. Duff and Jain (1998) and Gupta (2000) also showed that, higher effectiveness and efficiency in operations and improved customer satisfaction are the ultimate benefits derived from ERP systems. In accordance with our study, Rantala and Hilmola (2005) and Barua *et al.* (1995) showed that ERP enhances the rate of inventory turnover. Contrary to our study, Rabinovich *et al.* (2003) found that ERP had no positive effects and actually unfavourably affected inventory speculation.

Our study indicated that, ERP systems did not contribute to External Agencies. Though, many companies are implementing ERP packages as a means to enhance competitive services (Martin, 1998; Mirani and Lederer, 1998; Pliskin and Zarotski, 2000), but, there is increasing support in the literature that IT cannot generate an enduring competitive advantage (Hopper, 1990; Mata *et al.*, 1995). An examination of ERP systems using criteria established in research on resource-based views of the firm and chaos/complexity theory indicates that, although ERP is necessary to coordinate complicated, multifaceted operations, it is far from sufficient to promote a strong competitive position over a long term (Lengnick-Hall *et al.*, 2004). Contrary to our study, Sarkis and Gunasekaran (2003) found that ERP systems are effective in rise and fall of organizations in an increasingly competitive market where globalization has been localized.

SUGGESTIONS AND CONCLUSIONS

The study showed that people involved in the organization were satisfied after the installation of ERP system. Hence, companies should rejuvenate the legacy systems they use and upgrade their systems from time to time as the development of the IT technology accelerates constantly. Our study provided managers, a clear view of the relative performance of employees, which can be used to identify needed improvements and take advantage accordingly. Managers could periodically evaluate the performance indicators in the study, benchmark the results with the expected satisfaction levels and diagnose which factors are problematic and need further consideration. Organizations that have future designs will form a clear understanding of business requirements, gain more vision and acquire ability to expand knowledge and skills to better assimilate and utilize ERP system, and therefore minimize the risks associated with this particular investment. This study shows that the difference in means for some factors of employees is not high after adopting ERP system. Ultimately, the results can help managers in their decision to redirect less affected performance indicators in ERP.

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