Enterprise Resource Planning:
An Empirical Study of Its Impact on Job Performance

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ABSTRACT

One of the most significant technological advances to emerge during the last
decade is Enterprise Resource Planning (ERP) systems – also called simply
Enterprise Systems (ES). Both ERP and ES are industry terms for a broad set of
activities supported by multi-module application software that integrates all
business processes and data into a single system and thus helps a business to
better manage the important parts of its daily operations. The problems that
frequently appear in job performance when an ERP system is implemented
indicate that organizations often find it difficult to master this industry tool. The
purpose of this empirical study is to identify and assess the impact of ERP system
implementation on job performance, based on the results of a questionnaire
designed to measure five critical factors – task productivity and innovation,
customer satisfaction, management control, interdepartmental communication
and cooperation, and data analysis and conversion. The Likert scale was applied
to 89 usable responses, and the analytical results show that there is a highly
significant relationship among all five identified factors of the independent
variables and the job performance.

Keywords: Enterprise resource planning systems, job performance, system
implementation
1. INTRODUCTION

In today’s global economy, organizations face a number of challenges, such as fiercer competition, greater market intensity, and more demanding customer expectations. These challenges often lead organizations to implement a number of precautionary policies or practices designed to lower total costs, shorten throughput times, increase and diversify product choice, ensure more dependable delivery dates and superior customer service, enhance quality, and professionally organize global demand, supply, and production [Umble, 2003]. Rapid changes in social, economic, and political forces – coupled with daily advances in technology – are making business markets even more intensely competitive, which fact is having a profound influence on the way businesses are managed. In this environment, it becomes increasingly imperative that managers create new and different strategies to maintain market position and meet customer needs.

In light of these challenges, more and more organizations are seeking technologies that have the ability, essentially, to manage every aspect of their business and, at the same time, make their internal processes more efficient and professional. One of the most significant of the technological advances to emerge during the last decade is Enterprise Resource Planning (ERP) systems [Chung et al., 2008]. ERP systems – also called simply Enterprise Systems (ES) – provide organizations with a set of incorporated application modules that cover most business functions [Scapens and Jazayeri, 2003] During the last decade, the adoption of ERP systems was clearly one of the most significant factors in organizational evolution, these days accounting for about 30% of all major evolution activities in organizations [Davenport, 2000; Herold et al., 2007].

Olson [2004] defined ERP as an industry term for a broad set of activities supported by multi-module application software that helps a manufacturer or other business manage the important parts of its daily operations, including product planning, purchasing parts, maintaining inventories, interacting with suppliers, providing customer service, and tracking orders. Waxer [2006] defined ERP as a broad term for any software application that integrates all business processes and data into a single system. As ERPs evolved, they have become more sophisticated in terms integrating a series of modules in different business functions such as finance and accounting, human resource management, IT, sales and marketing, manufacturing, and logistics [Shanks et al., 2003; Dery et al., 2005].
The implementation of ERP has been credited, among other things, with reducing procurement charges, creating highly efficient sales strategies, lowering administration rates, and decreasing direct and indirect labor expenses [Hunton et al., 2003; Gefen and Ragowsky, 2004; Yen and Sheu, 2004; Bergström and Stehn, 2005]. A review of the literature reveals that ERPs produce effective and efficient decision-making because of their facility of providing ‘real time’ information in report formats that enable organizations to enhance specific management functions and procedures [Laughlin, 1999; Koch, 2001].

Initially, ERP system implementation implied a massive re-engineering of business processes and the use of innovative software to maintain those new processes [Robey et al., 2002; Ross and Vitale, 2000]. In the 1990s, ERPs were commonly implemented by only very large organizations as an alternative for ‘legacy’ information systems [Esteves and Pastor, 2001; Madapusi and D’Souza, 2005]. By 2003, however, an estimated 30,000 organizations worldwide planned to implement the system [Mabert et al., 2003]. By then, it was noted that many medium-sized companies and even some small-sized ones had begun to embrace the concept [Jacobs and Bendoly, 2003].

Research shows that ERP systems trigger changes that have an extensive effect on an organization and its employees, often changing the types of business tasks performed and consequently the nature and quality of job performance itself [Davenport et al., 1996; Liang et al., 2007]. ERP system implementation, therefore, can have a significant impact on job performance [Devadoss and Pan, 2007]. Other studies show that ERP implementation has a massive effect on organizational performance [Hall, 2002]. There is no clear indication, however, that researchers or practitioners have so far introduced an approach to scientifically consider the effect of ERP system integration on work organization and job performance. Work organization can be expressed in terms of time constraints (job demands) and job autonomy (job control) [Dhont, Kraan, and van Sloten, 2002].

The concept that ordinary job uniqueness has a significant and direct impact on outstanding job performance is efficiently dealt with by a number of studies, such as Thatcher et al. [2002], Ang and Slaughter [2001], and Wong et al. [1998]. Crowston and Malone’s [1994] survey of the literature recognizes four perspectives on organizations (rationalist, information processing, motivational, and political). Hall’s [2002] survey of the literature on ERP with regard to job performance and the modification of work in the organization has also identified four main organizational effects during the implementation of an ERP system:
(1) Automation of a number of managerial jobs
(2) Downsizing
(3) Strengthening the work and enlarging the range and depth of required skills
(4) Greater centralization of control of the organization and more decentralization of responsibility

The exploitation of advanced technology to enhance cognitive and organizational competencies is one of the most essential organizational improvement procedures nowadays [Herold et al., 2007]. This research expands the concept of the use of ERP systems within the various corporate sectors, both public and private, extends the knowledge base regarding ERP implementation, and contributes to the literature on the subject.

Using the empirical research method, this paper seeks to prove the benefits of ERP by measuring the influential factors of job uniqueness (such as task productivity and innovation [Judge et al., 1997], customer satisfaction [Gattiker, 2000], management control and decision making [Ross, 1999], high interdepartmental communication and cooperation [Kraemmerand et al., 2003; Peppard and Ward, 2005], and data analysis and conversion [Devadoss and Pan, 2007]. Research shows that these five factors can be enhanced by implementing an ERP system to produce an outstanding job performance [Thatcher et al., 2002]. The study thus underpins the factors that influence job uniqueness, which have been developed by reviewing a number of relevant studies such as Thatcher et al. [2002], Ang and Slaughter [2001], and Wong et al. [1998], Herold et al. [2007], Devadoss and Pan [2007], Hall [2002], and Torkzadeh and Doll [1999].

The current paper is organized in the following manner. Following this Introduction, Section 2 presents the proposed conceptual research model and hypothesis. Section 3 describes the research methodology, which is then followed by data analysis and a discussion of results (Section 4). Section 5 presents the concluding remarks.

2. RESEARCH MODEL AND HYPOTHESIS

Based on a review of the extensive literature relating to the indicators affecting job performance, the current study developed a conceptual research model (Figure 1). This model was empirically tested to measure the five factors (considered independent variables) that affect outstanding job performance (considered the dependent variable).
2.1. Research Question

To achieve the purpose of the current study, the author formulated the following two research questions:

1. To what extent does ERP implementation lead to a managed and organized job performance?

2. To what extent do the selected factors influence improvement in work performance and organizational achievement?
2.2. Hypotheses

The research questions posited require empirical clarification if this study is to produce a superior theoretical perceptive of ERP. The literature review reveals that the curve has increased in the number of empirical studies of ERPs, but that more is still required. To answer the two questions, the current study focuses on the following five hypotheses developed from previous studies:

**Hypothesis 1**: There is a significant relationship between task productivity and innovation (via adapting ERP systems) and outstanding job performance.

**Hypothesis 2**: There is a significant relationship between excellent customer satisfaction (via adapting ERP systems) and outstanding job performance.

**Hypothesis 3**: There is a significant relationship between management control and decision making (via adapting ERP systems) and outstanding job performance.

**Hypothesis 4**: There is a significant relationship between interdepartmental communication and cooperation (via adapting ERP systems) and outstanding job performance.

**Hypothesis 5**: There is a significant relationship between data analysis and conversion (via adapting ERP systems) and outstanding job performance.

3. RESEARCH METHODOLOGY

This section describes the survey instrument, the sample and data collection techniques, and reliability of the data.

3.1. Survey Instrument

The questionnaire developed for this study was divided into two sections. The first section concentrates on the general profile of the respondent, including his/her age group, education level, and profession and income group. The second
section was designed to identify the factors affecting job performance. The respondents were provided with a list of 12 questions – two questions on each of the five independent variables identified in Figure 1 (in all, 10 questions), plus two questions on the dependent variable (i.e., job performance). Participants were asked to indicate their perception regarding each question, using a Likert scale (1-5), with responses ranging from “strongly disagree” to “strongly agree.” The collected data were analyzed based on correlation and regression analyses using the Statistical Package for Social Sciences (SPSS) version 17 computer program.

3.2. Sample and Data Collection

To assess the factors influencing job satisfaction, the primary data collection method was used in the form of a consumer survey that was designed and distributed to 92 employees in different age groups and of different education levels working at different organization in three countries. The chosen participants worked in companies that use an ERP system. The survey was printed in the English language. Prior to distribution, the questionnaire was pre-tested on four individuals working in different sectors, to ensure consistency, clarity, and relevance to the case. Minor changes requested by the test group relating to question content, wording, or sequence were incorporated into the questionnaire before the final copy was produced. The instrument was then tested to determine how long it would take a respondent to complete the form. It was found that it would take from 5 to 8 minutes.

A digital online form was created using "Google Documents" in the same questionnaire style; then, the link was shared and publicized through e-mail and was posted on discussion forums. Once a participant completed the questionnaire, the raw data was logged on a spreadsheet that could be accessed and downloaded only by the researcher.

Of the 92 questionnaires distributed, only 89 were usable. Of those, 31.2% were completed by females, and 67.1% were completed by respondents between the age of 20 and 45 years.

3.3. Reliability

To find out whether the questionnaire was reliable, we measured its internal reliability, which is the most popular method of determining reliability. Cronbach's alpha test was used [Nunnaly and Bernstein, 1994]. A minimum alpha of 0.6 is said to suffice for the early stage of research.
As shown in Table 1, the Cronbach’s alphas in this study were all much higher than 0.6. The constructs were therefore deemed to have adequate reliability.

4. RESULTS AND DISCUSSION

This section describes the factor analysis test, discusses the results of the correlation and regression analysis of the five variables, and then presents the results, in accordance to the research objectives and hypotheses of the study.

4.1. Correlation Tests

Correlation analysis was incorporated to describe the strength and direction of the linear relationship between the independent variables and the dependent variable [Pallant, 2001]. Previous studies emphasized the importance of conducting correlation tests before the regression testing [Coakes and Steed, 2007]. The results of the correlations are presented in Table 2.
### Table 2
**Correlation Test Results**

<table>
<thead>
<tr>
<th></th>
<th>TP</th>
<th>CS</th>
<th>MC</th>
<th>IDC</th>
<th>DAC</th>
<th>OJP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Productivity (TP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>0.050</td>
<td>0.224*</td>
<td>-0.105</td>
<td>-0.007</td>
<td>0.030</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.640</td>
<td>0.035</td>
<td>0.325</td>
<td>0.946</td>
<td>0.781</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Customer Satisfaction (CS)</td>
<td>0.050</td>
<td>1</td>
<td>0.334**</td>
<td>0.513**</td>
<td>0.370**</td>
<td>0.547**</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.640</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Management Control &amp; Decision Making (MCDM)</td>
<td>0.224*</td>
<td>0.334**</td>
<td>1</td>
<td>0.360**</td>
<td>0.363**</td>
<td>0.209*</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.035</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.049</td>
<td></td>
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<tr>
<td>Sig. (2-tailed)</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Inter-departmental Communication (IDC)</td>
<td>-0.105</td>
<td>0.513**</td>
<td>0.360**</td>
<td>1</td>
<td>0.537**</td>
<td>0.609**</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.325</td>
<td>0.000</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Data Analysis and Conversion (DAC)</td>
<td>-0.007</td>
<td>0.370**</td>
<td>0.363**</td>
<td>0.537**</td>
<td>1</td>
<td>0.569**</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.946</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Outstanding Job Performance (OJP)</td>
<td>0.030</td>
<td>0.547**</td>
<td>0.209*</td>
<td>0.609**</td>
<td>0.569**</td>
<td>1</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.781</td>
<td>0.000</td>
<td>0.049</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>89</td>
<td>89</td>
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<td>89</td>
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<td>89</td>
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<tr>
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<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
<td>89</td>
</tr>
</tbody>
</table>

*. Correlation is significant at 0.05 level (2-tailed).

** Correlation is significant at 0.01 level (2-tailed).
The results reveal that Customer Satisfaction ($r=0.547$, $p < 0.01$), Management Control and Decision Making ($r=0.209$, $p < 0.05$), Interdepartmental Communication ($r=0.609$, $p < 0.01$), and Data Analysis and Conversion ($r=.569$, $p < 0.01$) are all correlated with Outstanding Job Performance. However, surprisingly, the analysis showed that Task Productivity was not strongly correlated ($r=0.030$, $p > 0.05$).

### 4.2. Regression Analysis

Linear regression analysis was conducted to examine the extent to which the independent variables (task productivity and innovation, customer satisfaction, management control, interdepartmental communication and cooperation, and data analysis and conversion) influence outstanding job satisfaction (dependent variable). The independent variables were regressed across organizational outcomes. Table 3 summarizes the results of the linear regression analysis, which indicate that the model is highly significant ($p < 0.01$).

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLE</th>
<th>INDEPENDENT VARIABLES</th>
<th>BETA VALUE</th>
<th>T VALUE</th>
<th>SIG</th>
<th>HYPOTHESIS TESTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding Job Performance</td>
<td>Task Productivity</td>
<td>0.088</td>
<td>1.115</td>
<td>0.268</td>
<td>Rejected</td>
</tr>
<tr>
<td>Outstanding Job Performance</td>
<td>Customer Satisfaction</td>
<td>0.294</td>
<td>3.276</td>
<td>0.002</td>
<td>Accepted</td>
</tr>
<tr>
<td>Outstanding Job Performance</td>
<td>Management Control and Decision Making</td>
<td>-0.153</td>
<td>-1.768</td>
<td>0.081</td>
<td>Accepted</td>
</tr>
<tr>
<td>Outstanding Job Performance</td>
<td>Interdepartmental Communication</td>
<td>0.345</td>
<td>3.441</td>
<td>0.001</td>
<td>Accepted</td>
</tr>
<tr>
<td>Outstanding Job Performance</td>
<td>Data Analysis and Conversion</td>
<td>0.332</td>
<td>3.617</td>
<td>0.001</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
The results of the regression analysis shown in Table 3 indicate that Customer Satisfaction ($\beta=0.294$, $p < 0.05$), Management Control and Decision Making ($\beta=-0.153$, $p < 0.05$), Interdepartmental Communication ($\beta=0.345$, $p < 0.01$), and Data Analysis and Conversion ($\beta=0.332$, $p < 0.01$) significantly affect Outstanding Job Performance. This result corresponds with the view of Gattiker [2000], Devadoss and Pan [2007], Kraemmerand et al. [2003], Peppard and Ward, [2005], Ross [1999], Thatcher et al. [2002], Ang and Slaughter [2001], Wong et al. [1998], Herold et al. [2007], Devadoss and Pan [2007], Hall [2002], and Torkzadeh and Doll [1999]. The results show, surprisingly, that Task Productivity ($\beta=0.088$, $p >0.05$) does not seriously affect Outstanding Job Performance.

Thus, based on the above correlation and regression analysis results, this study rejects the null hypothesis ($H_0$) and accepts the alternative hypothesis ($H_1$) of all measured independent variables ($H2$, $H3$, $H4$ and $H5$) except $H1$. It seems that there is a highly significant relationship between the previously named independent variables and outstanding job performance (the dependent variable).

5. CONCLUSION

Developing new ERP systems is a very complex process. This paper examines the literature on ERPs and found that, although the number of studies in this area is increasing, research on job and business-related ERP is considerably under-represented. This finding implies that there is a need to develop a more extensive plan for ERP research, specifically:

(1) Studies that provide a clear introduction or overview of how ERPs influence both jobs and workers in an organization and the responses of workers to this significant type of technology

(2) Studies that explore all possibilities in seeking to explain the reasons for the success of RP at one organization and its failure at another

(3) Studies that consider job significance and workers in an organization as the main convergence of their research

These types of studies will draw attention to the importance of ERP systems and to the re-engineering of work management after an ERP is used. They will also provide deeper insight into the various factors involved in ERP system implementation and provide greater knowledge of how it affects worker and organizational performance.

The current study demonstrates and measures a dependent relationship between the implementation of an ERP systems and the perfection of job performance, which covers only a fraction of what was mentioned earlier. After
reviewing the number of relevant research papers and analyzing the questionnaire completed by those with experience in ERP systems, the author strongly recommends that administrators consider ERP systems as a key solution for achieving outstanding job performance.

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