FACTORS AFFECTING ENTERPRISE RESOURCE PLANNING SYSTEMS IMPLEMENTATION IN A HIGHER EDUCATION INSTITUTION

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ABSTRACT

This paper attempts to investigate critical success factors affecting enterprise resource planning systems implementation in a university. This research hypothesizes that each job type (administrators, technical staff, and end-users) has a different perspective in the systems implementation in a university. The ANOVA model is employed for the hypothesis testing. Statistical results show the university sampled has experienced implementation difficulties due to lack of end-user involvement, inadequate funding for the project, lack of business process reengineering, insufficient planning time, insufficient research on vendors, improper technical support, and insufficient training.

Keywords: Enterprise Resource Planning Systems, Critical Success Factors, ERP Systems Implementation, PeopleSoft

INTRODUCTION

To respond to today's dynamic business nature, many firms have implemented the enterprise resource planning (ERP) systems. ERP is a large-scale information system that integrates all business functions into one unified function. Such an integration of different information systems is expected to generate substantial benefits that will exceed costs involved with the system implementation. However, it has been widely documented that the ERP implementation is not an easy task. Many companies have reported system implementation difficulties such as enormous cost overruns. A higher education institution is not an exception. Universities greatly suffer from this new information system implementation in terms of cost and time. PeopleSoft, an ERP system, presently enjoys the largest market share in the higher education institution sector, but it is not immune to the criticism of ERP system implementation.

There have been few studies on ERP system implementations in higher-education institutions. This lack of investigation drives the present study. Therefore, the purpose of this paper is to investigate factors affecting ERP system implementation in a university.

This study collects data from a mid-sized university in the northwest region of the United States, which experiences tremendous cost-overrun and delay of project completion time in PeopleSoft systems implementation. ANOVA model performs to conduct hypothesis testing for this research. The ANOVA model is employed for the hypothesis testing. Statistical results show the university sampled has experienced implementation difficulties due lack of end-user involvement, inadequate funding for the project, lack of business process reengineering, insufficient planning time, insufficient research on vendors, improper technical support, and insufficient training.

In the next section, a literature survey is given, followed by research hypotheses in Section 3. Sample data description and methodology sections follow. In Section 5, statistical results are analyzed. Finally, Section 6 concludes this paper.

LITERARTURE SURVEY

User Involvement

According to Foster & Franz (1999), analyst perceptions of user involvement showed no correlation with the users' perceptions of system acceptance. Zeffane, Cheek, and Meredith (1999) explain the degree of end-user involvement was found to have a significant effect upon the manager's perception of data quality. Correlation of specific types of user involvement against aspects of data quality such as accuracy, timeliness and completeness revealed that these effects are not uniform. Hwang & Thorn (1999) describe the overall findings indicated that both user involvement and user participation are beneficial, but the magnitude of these benefits depends on how involvement, and its effects, are defined. Lin & Shao (2000) report that empirical results corroborate the positive link between user participation and user satisfaction and provide evidence on the interplay between user attitude and user involvement. In summary, the literatures recommends involving end-users at an early stage of information systems implementation, which leads to less organizational resistance to the new systems implementation later, and, of course, enhanced user satisfaction.

Budget & Resource Allocation

Lewis (1998) argues that the first good way to set priorities is to form an IS steering committee to meet in order to agree on the company's IS project priorities and resource allocation. If there is any problem in funding the project while in progress, it is highly unlikely the project will be finished as planned (Edwards 1998). In short, literatures suggest successful implementation of large-scale information systems requires enough funding for the project from the beginning to the end.

Business Process Redesign

Teng, Fiedler, and Grover (1998) come up with three potential sources of influencing BPR: (1) innovative capacity of the organization, (2) IS maturity, and (3) strategy-IS interface. Dey (1999) states, "project process re-engineering is carried out by eliminating non-value added activities, taking up activities concurrently by applying information systems rigorously and applying risk management techniques throughout the project life cycle." As stated in Hammer and Champy (1993), BPR and IT are inseparable. Therefore, it is hypothesized that BPR makes a significant contribution to implementing large-scale systems such as ERP systems.

Planning

Clark, Clark, Gambill & Fielder (2000) argue that research on the strategic information systems planning (SISP) practices in 82 hospitals, identified as the best hospitals in North America, suggests some disagreement with the traditional view of the objectives of planning. Literature

supports the conclusion that a good planning is mandatory to make large-scale systems implementation successful. Good planning requires allocation of enough time prior to the systems implementation.

Vendor Research

Hutchins (1999) argues a firm should conduct research on software vendors prior to making a decision. It is hypothesized that if a firm finds out more about a software vendor, it can make a better decision regarding the selection of ERP systems.

Technical Support

Stedman (1998b) states that installing new software affects the workplace, customer service, and slows down productivity. According to Shaffer (1998), most companies' ability to provide end-user services -- with quality, reliability, and cost-effectiveness -- has not kept pace. Stedman (1998a) reports that to help prod IS employees to put the needs of users ahead of technology for its own sake, a corporation is looking at melding its technical functions, such as application development and technical support, into a more unified and service-based organization. Therefore, good technical support is highly expected to make ERP systems implementation successful.

Training & Education

Stedman (1998b) discusses the pros and cons of using an outside trainer for end-users. Kim & Kim (1999) conduct a survey of IS academicians and practitioners to identify key IS issues: (1) reengineering and maintenance, (2) client/server computing, (3) IS education and training, (4) the Internet, and (5) IS ethics and legal issues." The literatures agree that sufficient training should be given to employees prior to new information systems implementation.

RESEARCH HYPOTHESES

The information system literature suggests that some possible reasons for large-scale information system implementation difficulties are lack of end-user involvement, inadequate funding for the project, lack of business process reengineering, insufficient planning time, insufficient research on vendors, improper technical support, and insufficient training. Based on the literature survey results, this paper proposes the following research hypotheses:

H1: Lack of end-user involvement is significantly related to ERP systems implementation failure (User involvement factor).
H2: Inadequate funding based on budget and resource allocation negatively affects ERP systems implementation (Funding factor).
H3: Lack of business process redesign causes significant negative impacts on ERP systems implementation (BPR factor).
H4: Insufficient planning time is significantly related to ERP systems implementation difficulty (Planning factor).

H5: Insufficient research on vendors at the vendor selection stage causes significant problems for ERP systems implementation later on (Vendor research factor).

H6: Improper technical support makes ERP systems implementation significantly more difficult (Technical support factor).

H7: Insufficient training causes significant negative impact on ERP systems implementation (Training and education factor).

METHODOLOGY

This paper attempts to develop a questionnaire based on the prior studies conducted on system implementation. Survey instruments developed by Taylor and Todd (1995) and Bailey and Pearson (1983) serve as a framework for designing the questionnaire of this study. To test each hypotheses, this study attempts to conduct the hypothesis testing on whether there is a statistically significant difference in the job-type perspectives of ERP systems implementation among job types. If the statistical significance is found on each hypothesis, it leads one to conclude that a factor from which each hypothesis is derived is considered a significant determinant affecting ERP systems implementation. To do so, this study employs the ANOVA model as follows:

$$X_{ijk} = m + a_1 + b_j + (ab)_{ij} + e_{ijk}$$

where m is the overall mean,
a_i is the row effect (i = clerical, technical, managerial),
b_j is the column effect (j = other pertinent factors),
$(ab)_{ij}$ is the interaction effect, and
e_{ijk} is the error associated with the kth data point from level i of row factor and level j of column factor.

SAMPLE DATA

The state university sampled has about 8,000 FTE students and has recently attempted to implement PeopleSoft systems. This paper hypothesizes that each job type has different perspectives in the systems implementation. Three job categories are used in the sample: managerial, technical, and clerical jobs. The managerial job group indicates high-ranking university administrators. The technical group refers to PeopleSoft and Oracle database support staff members at the university. End-users such as civil service employees who currently use PeopleSoft belong to the clerical group. A personal survey method was used to collect data. About 100 people responded to the survey. After initial screening, a sample of 85 subjects was completed for this study.

ANALYSIS OF STATISTICAL RESULTS

Question 23 in the survey questionnaire is used to test Hypothesis 1. Questions 9, 19, 8, 13, 10 and 14 are used to test Hypothesis 2, 3, 4, 5, 6 and 7, respectively. As shown in Figure 1, ANOVA tests reveal that there exists a marginal statistical significance in H1, H2, and H6 ($p<0.05$). ANOVA tests also report a strong statistical significance in H3 and H7 ($p<0.01$),

while hypothesis testing on H4 and H5 shows no significance. Therefore, it is found that administrators at the upper echelon, technical staffs, and end-users have different perspectives on the ERP systems implementation in their organization, in terms of user involvement, funding, BPR, technical support, and training.   For instance, top management thinks they provided enough training, while other people think differently. It is concluded that such frictions among job types cause the difficulty or failure of ERP systems implementation in a university.

Figure 1
Statistical Results from ANOVA Tests

Hypothesis (Factor)	Survey Question	F Value
H1: User Involvement	#23. You have been informed of the goals and progress of the PeopleSoft implementation	4.147*
H2: Funding	#9. Enough funding was allocated to the implementation of PeopleSoft	3.292*
H3: BPR	#19. The redesigning of business processes was completed effectively prior to the implementation of PeopleSoft	7.817**
H4: Planning	#8. Enough time was allocated to the planning (vendor research, etc.) of the implementation	1.088
H5: Vendor Research	#13. Sufficient research was conducted on PeopleSoft/ERP systems prior to implementation	0.693
H6: Technical Support	#10. There are enough people in your workplace who are technically knowledgeable of computer programming	3.282*
H7: Training and Education	#14. You have gained a complete understanding of the features, functions, and abilities of PeopleSoft	8.137**

$* \ p < 0.05 \quad ** \ p < 0.01$

Interesting findings are the outcome of Hypothesis 3 (BPR factor). Prior to the survey, BPR was not considered seriously because not everyone understands what BPR is. It turns out that survey interviewers understand the concept of BPR. It is discovered that all three job-type groups have responded in the same way for Question 8 (Planning factor), and Question 13 (Vendor research factor), which results in no statistical significance in ANOVA models. This research shows that administrators, technical staffs and end-users all agree that there was not enough planning time and not sufficient research on the vendor (PeopleSoft).

SUMMARY AND CONCLUSIONS

Statistical results provide supporting evidence on the research hypotheses. An analysis of different perspectives leads to discovering the causes of PeopleSoft implementation difficulty in a university: lack of end-user involvement, inadequate funding for the project, lack of business process reengineering, improper technical support, and insufficient training. Data analysis also provides sufficient evidence that insufficient planning time, and insufficient research on vendors are significant determinants of ERP systems implementation in a university.

Future studies can expand the sample with more universities, to enhance the empirical study. In addition, it will be interesting to compare the factors affecting ERP systems implementation at a university with similar factors in the industry. A comparative study on different vendors such as SAP can be implemented for a further study. Other factors such as ease of use, a vendor's

consulting support, and support by independent consultants can be also investigated in the future. An agent theory may apply to this kind of a large-scale systems implementation study because certainly agency cost can incur. A project manager may have a different agenda from the organizational objective. Knowing that the systems implementation will cause tremendous financial distress to his firm, the project manager and CIO may make a decision to go for the ERP systems implementation because it can help the manager's career development. Facing enormous cost overrun and project time delay, a manager should think twice regarding ERP systems implementation. Whether the firm indeed has such compelling reason may be an interesting subject for a further study.

In conclusion, this research makes a significant contribution to the ERP system implementation literature by providing empirical study results on a higher-education institution case. The findings from this research will provide a good managerial direction for prospective administrators at universities who consider ERP systems implementation in the future.

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