A CASE ANALYSIS OF ERP POST-IMPLEMENTATION ISSUES VIS-À-VIS MUSCATELLO AND PARENTE'S PROPOSITIONS

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ABSTRACT

Successful enterprise resource planning projects are rare; many of them end in frustration and wasted time, money and energy. Thus, when a project has a successful outcome, it is important to learn from it as much as possible. This paper presents the case of a successful ERP implementation in a small US manufacturing company. It analyzes the post-implementation issues in terms of eight hypotheses advanced by Muscatello and Parente [5] based on a cross-case analysis. The results confirm seven of the eight hypotheses, grouping them into three areas: human factors, operations and the technology itself.

INTRODUCTION

The purpose of this paper is to identify and discuss ERP post-implementation issues in a small manufacturing company in the northwestern United States. The first section of the paper reviews some of the literature related to the study, while the second section describes the company used for this case study. The third section of the paper relates the company's post-implementation issues to a set of propositions generated through prior exploratory research by Muscatello and Parente.

LITERATURE REVIEW

This section of the paper contextualizes the study by examining: critical implementation factors for ERP systems and propositions related to post-implementation.

Critical implementation factors

Several authors have examined the "prerequisites" for a successful ERP project [9] [1] [8] [7]. Muscatello and Chen [6, p. 64] completed an extensive review of both scholarly and practitioner literature which yielded nine such factors:

- **Strategic initiatives**: Managers need to articulate clearly how an ERP system will assist in implementing organizational strategy.
- **Executive commitment**: Executives not only need to show clear, strong, unequivocal support for the project; they also must "fully understand the degree of the changes. . .needed for the new project and be comfortable with the fact that the decisions their planners make will have a profound impact on the entire supply chain." (p. 65) This theme is consistent throughout many organizational endeavors, including internal controls [2], enterprise risk management [3], and balanced scorecard initiatives [4].

- **Human resources**: Employees who will use the ERP system often must acquire new skills; in addition, they must "unlearn" old ways of doing business. Employees unequipped to make such changes can behave in very dysfunctional ways which may lead to poor project results. Vroom's expectancy theory [10] suggests that motivation depends on three factors: valence, instrumentality and expectancy. Valence refers to the value the employee places on the potential outcome; with respect to ERP systems, employees need to appreciate system benefits such as stronger communication throughout the organization. Instrumentality is associated with an employee's belief that they have the necessary skills to achieve the desired outcome; instrumentality can be a challenge in ERP systems, particularly for employees unaccustomed to working with sophisticated information technology. The final element of Vroom's theory, expectancy, is the probability that, if an outcome is achieved (i.e., learning how to use an ERP system), the desired reward will be provided. For an ERP project, rewards can include increased job satisfaction and performance. According to expectancy theory, motivation is the **product** of the three factors (valence X instrumentality X expectancy); so, if any one of the factors is "zero," resulting motivation will be "zero."
- **Project management**: ERP implementation is inherently a team effort, requiring involvement from information technology, operations, marketing, accounting / finance, human resources and other areas of the business. In addition, given the scope and length of most ERP projects, "the ultimate product is almost always shaped by unanticipated and late breaking circumstances." [6, p. 65] Thus, the interdisciplinary team needs to be prepared to manage change.
- **Information technology**: Although it is not only an IT matter, ERP systems implementations will necessarily involve IT resources and changes. Those changes may be small (e.g., upgrades of current products) or large (e.g., a complete technology change). Regardless, technical training on the new system will almost certainly be required.
- **Business processes**: ERP implementations provide an excellent opportunity to consider the ways business is done in an organization. Muscatello and Chen [6, p. 66] stated: "Using re-engineering techniques to develop a homogeneous vision depicting the company's processes after the ERP implementation, a firm is more likely to minimize uncertainty and achieve success."
- **Training**: Beyond learning new ways of doing business, personnel who will be using the new system must receive appropriate training. Technical skills and a conceptual understanding of the ERP system are important components to promote project success.
- **Project support and communications**: As with most (if not all) major business projects, communication is vital. Information about changes in personnel, business processes and specific job responsibilities should be disseminated widely and often to overcome natural resistance to change.
- **Software selection and support**: Every organization has nuances in its business processes and environment; a generic ERP system seldom is an "exact fit." Therefore, managers should use a well-structured systems analysis and design process

to select and support appropriate ERP modules, modifying them as necessary for their particular needs.

Summarizing their study, Muscatello and Chen [6, p. 76] concluded: "Firms are realizing that ERP implementations are a long journey and that results may not be readily apparent until well into the future." The present study acknowledges their assertion by examining the second phase of that journey: the period immediately following an initial installation of an ERP system.

Post-implementation propositions

This study followed up on related research by Muscatello and Parente [5], in which they studied eight diverse corporations. They employed (p. 66) "a case-study methodology to create propositions based on a longitudinal analysis of post-implementation factors that contribute to the successful installation and management of an ERP system." Their eight propositions were (pp. 73 – 76):

1) Firms who implement ERP systems will significantly change the education, training, and experience requirements for future hires.
2) Firms who address the gap in employees' abilities and performance after the ERP implementation, through an ongoing analysis, will have a greater likelihood of successfully implementing ERP than those who do not.
3) A firm's ability to successfully implement an ERP solution requires an ongoing assessment and implementation of technical and functional capabilities beyond the initial scope of the ERP project.
4) Firms that use ERP functionality to improve performance objectives shared by manufacturing and sales will strengthen the manufacturing-sales interface.
5) Firms that use ERP functionality to create relevant performance objectives for sales forecasting will strengthen the manufacturing-marketing interface.
6) ERP functionality will strengthen the manufacturing-sales interface and increase morale in both areas.
7) Purchasing's strategic and tactical value increases with the implementation of an ERP system.
8) The use of integrated purchasing teams increases with the implementation of an ERP system.

Acknowledging the exploratory nature of their research, Muscatello and Parente provided the impetus for this study by concluding (p. 77) "the effects of an ERP system need to be studied further, especially in light of its pervasive system of choice among operation and service organizations."

COMPANY DESCRIPTION

The company involved in this study manufactures two main products: metal transport cases and boat accessories. The cases can be used for handguns / rifles, ammunition, cameras and wine, while the boat accessories include heating units and shower systems, along with their related replacement parts. At the time of the research, the firm had about 70 employees, with annual sales of $10 - $12 million. The two

product lines are seasonal: cases are the emphasis from October through January, while boating accessories are from September to June. Both product lines are material dominated, with direct materials comprising 45 – 50% of total cost.

The company's physical plant comprises two buildings totaling 40,000 square feet: one for production and the other for administrative and sales functions. In the company's own words: "Our products began in the "marine" industry. They are not complex. They are simply designed for assembly and performance. It is the fit and finish of our products that sets us apart. The stainless steel fasteners and powder-coated exterior have become our world-renowned trademarks."

Prior to the implementation of its ERP system, the firm experienced numerous information problems: lack of integration between sales and production; insufficient detail about product components; weak inventory controls, including a "free-for-all" stockroom; inability to get information about production except by visiting the production floor. The firm ran two parallel accounting systems: MAS 90 and Microsoft Office Accounting. But, the two systems regularly gave radically different financial results. Management had no ability to drill down to product line profitability, and the accounting information system frequently reported negative quantities of finished goods on hand—despite continual increases in work in process inventory.

In August 2008, through an Internet search, the corporate controller contacted an ERP consultant to address those issues; the consulting firm was vendor independent. The project began by creating and installing a work order system that would address some of the most pressing problems: integration between sales and production, component detail and inventory control and reporting. The ERP consultant used a modified version of the systems development life cycle for the project, organized in five steps: education; software selection; network / virtualization; implementation; assessment and review.

The communications for this research took place in October 2009—just over a year after the system had been installed. Interviews focused on three main areas, derived from Muscatello and Parente's eight propositions: human factors, operations and the technology itself. Participants in the interviews included the ERP consultant, the director of supply chain management, the chief financial officer and the production scheduler.

RESULTS

With respect to ***human factors***, interviewees focused on training and development issues. Even a year after the initial ERP installation, employees were still in "learning curve" mode. Production employees were unaccustomed to having computers on the production floor, as well as to working directly with them. The company was engaged in ongoing training, but was trying to choose between an online / self-training format and a dedicated / on-site format. Human factors relate to the first two of Muscatello and Parente's propositions: firms who implement ERP systems will significantly change the education, training and experience requirements for future hires and firms who address the gap in employees' abilities and performance after the ERP implementation, through an ongoing analysis, will have a greater likelihood of successfully implementing ERP than those who do not. While their first proposition was not necessarily supported by this case, it was due to the lack of new hires in the months following the ERP implementation—which had more to do with economic conditions in the region than with the system itself. The second proposition is fully supported in this case; the firm took a direct,

hands-on approach to dealing with employees' skill gaps, thus leading to a successful ERP implementation.

In the ***operations*** area, the firm made changes to its business processes to promote more seamless integration between sales, purchasing and production. Both line employees and management initiated more inquiries after the ERP system implementation simply because more information was available to them. In addition, the firm was able to maintain greater control over all types of inventories (raw materials, work in process and finished goods) after the system was implemented. Those results support propositions four through eight in Muscatello and Parente's list. Interactions across the corporation were strengthened and employee morale improved; the firm started using integrated purchasing teams, and their strategic and tactical value increased as a result.

Their third proposition relates to ***the technology itself*** by pointing out the need for ongoing assessment of technical and functional capabilities. Almost no form of information technology works exactly as a firm desires "right out of the box," and this case was no exception. Interviewees noted two ongoing technology issues: the inability to delete part numbers from the database when no longer in use and needed modifications in database design. For the latter, interviewees specifically pointed out issues with parent / child relationships; that is, when importing data from flat files, the relationships were cumbersome to establish, leading to some inaccuracies in the database.

CONCLUSION

Overall, then, this case study confirmed most of the eight propositions advanced by Muscatello and Parente. Future research in this area could design a Likert-type survey with a broader sample to see if the propositions are confirmed more generally.

Bibliography

[1] Barker, T., and M. Frolick. 2003. "ERP Implementation Failure: A Case Study." *Information Systems Management*, Fall, pp. 43 – 49.

[2] Committee of Sponsoring Organizations (COSO), 1992. Internal Control: Integrated Framework.

[3] Committee of Sponsoring Organizations (COSO), 2004. Enterprise Risk Management: Integrated Framework

[4] Kaplan, R. and D. Norton. 1996. The Balanced Scorecard: Translating Strategy into Action. (Harvard Business School Press)

[5] Muscatello, J. and D. Parente. 2006. "Enterprise Resource Planning (ERP): A Postimplementation Cross-Case Analysis." *Information Resources Management Journal*, July – September, pp. 61 – 80.

[6] Muscatello, J. and I. Chen. 2008. "Enterprise Resource Planning (ERP) Implementations: Theory and Practice." *International Journal of Enterprise Information Systems*, January – March, pp. 63 – 78.

[7] Plant, R. and L. Willcocks. 2007. "Critical Success Factors in International ERP Implementations: A Case Research Approach." *The Journal of Computer Information Systems*, Spring, pp. 60 – 70.

[8] Stapleton, G., and C. Rezak. 2004. "Change Management Underpins a Successful ERP Implementation at Marathon Oil." *Journal of Organizational Excellence*, Autumn, pp. 15 - 22.

[9] Umble, E., and M. Umble. 2002. "Avoiding ERP Implementation Failure." *Industrial Management*, January / February, pp. 25 – 34.

[10] Vroom, V. 1967. Work and Motivation (Wiley).