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Critical Factors in the Implementation and Success of Enterprise Resource Planning (ERP)

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1. Introduction
There is a growing interest among companies of all sizes to implement enterprise resource planning (ERP) systems to overcome the limitations of fragmented and incompatible legacy systems. According to a recent study, the ERP market is expected to reach $1 trillion by 2010. ERP systems can provide substantial benefits to organizations through the improvement of information flows across departmental boundaries and integration of business activities. However, ERP implementation projects also require considerable organizational resources. An average ERP implementation costs around $10.6 million and can take almost two years to complete.

Given the substantial investments of time, money and other resources, as well as the risks involved, it is important to understand what is needed to ensure a successful ERP implementation. In this study, we looked at the following research question: How can we categorize the critical success factors for ERP implementations into a theoretical framework to provide insights into appropriate success outcomes? We provided empirical evidence from two West Michigan companies that have recently implemented ERP systems.

2. Critical Success Factors in ERP Implementations and ERP Success
Success outcome in ERP implementations is a multidimensional, dynamic and relative concept. Hence, no one measure of enterprise system success is sufficient for all the concerns that the organization might have about the enterprise system experience. As such, we examined ERP success outcome at three levels: project success, correspondence success, and interaction success. One major condition for the success of ERP systems is how well they serve the delivery of critical success factors. Figure 1 represents the critical success factors and ERP success outcomes identified in the literature and supported by case study evidence.

3. Methodology
Given the purpose of the study, case study methodology was found appropriate. Data were collected primarily through interviews, observations, and archival sources. Survey data was also collected from the case study companies to examine the perceptions of the end-users of the ERP system.

4. Case Study Companies
Company A is primarily a supplier of wiring harnesses for the automotive industry. As company A rapidly grew, it developed a centralized supply chain. Since the original system was written and supported by the parent company, it was difficult for the case company to tailor the existing system to support its own unique business needs. Another weakness with the system was that the general ledger system was not year 2000 compliant. These were the two primary factors that led the senior management to implement an ERP system.

Company B is a large automobile supplier that produces ready-to-install modules, components, and body parts for all global car manufacturers. Prior to the implementation of ERP, the sales, marketing, and operations functions of the company ran on about 30 different legacy systems. The mix of aging legacy systems that led to high cost support and lack of data visibility were the driving forces behind the implementation of the ERP system.

5. Research Findings
Project Success: Project success is achieved when the ERP project meets its time, budget, and scope goals. This measure of success is the one that has dominated the practitioner and academic literature on project management and information system implementations. In our study, both companies completed the ERP system implementation on time, on budget, and within scope. Therefore, both projects were successful.
**Correspondence Success:** Correspondence success is achieved when the ERP system meets its pre-determined specific objectives (business benefits). These benefits might include personnel reductions, a decrease in the cost of technology, better inventory control, an improvement in order and cash management, increased cost savings, etc.

Both companies have benefited extensively by implementing ERP. For example, previously in Company A, the accounts payable process required a staff of five people. It now only requires a staff three in spite of the fact that the company has grown and has more accounts payable activity. There were similar efficiencies gained in other accounting areas. The components plant of Company A also achieved greater efficiencies. Using the old system, this facility was perpetually in a state where 20% of the customer orders were past due. They required an average of $1.9 million in raw material inventory to maintain daily operations. Today they have less than 1% of orders past due and have reduced inventory levels to $1.3 million. Finally, the company has enjoyed a cost savings of roughly 10%. The projected cost savings is 20–25%.

**Interaction Success:** Interaction success is achieved when the end-users' attitudes toward the ERP system are positive. Employee expectations and satisfaction play an important role in determining the final acceptance and utilization of a new information system. In addition, employee satisfaction is a critical determinant of the satisfaction of the ultimate customer. Perceived usefulness and perceived ease of use of a particular system are important determinants of end-user satisfaction with that system.

To examine the perceptions of end-users (non-management professional users) of the ERP system, a questionnaire was developed. Two departments (accounting and human resources) within each case study company were selected to participate in the survey. Respondents in both companies were generally positive about the usefulness of the ERP system (See Table 1a). However, Company A respondents rated the usefulness of the system higher (range – 3.63 to 4.25) than Company B respondents rated the system (range 3.15 to 3.90). This may be attributed to the fact that the management of Company A had realistic expectations for improvement and, therefore, used the incremental approach to implementation. Also, the employees in Company A had more time to understand how the new system functioned and were more motivated.

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Six months after implementation, users in both companies moderately agreed on the ease of use of the ERP system (See Table 1b). Surprisingly, the mean scores of respondents in Company B (range – 3.25 to 3.75) were a little higher than those of Company A (range 3.15 to 3.55), in spite of less training and time for implementation. The reason for higher scores can be attributed to the fact that Company B developed and designed easy-to-understand manuals for its employees and also that these manuals were published in different languages for convenience. Lastly, as far as user satisfaction is concerned, the end users were generally positive about the ERP system (See Table 1c). Most users (in both companies) were generally in agreement that the ERP system increased their productivity and effectiveness. The users in both companies were also satisfied with the accuracy and the ability of the ERP system to provide up-to-date information.

6. Conclusion
In this study, we identified the critical success factors for ERP implementations from the relevant literature, categorized them into a theoretical framework and linked them to ERP success outcomes. We provided empirical evidence from two local companies that have successfully implemented ERP systems. We believe that the findings of our study provide the researchers and practitioners important insights to understand what is needed to ensure a successful ERP implementation. To the best of our knowledge, this is the first study that categorizes critical success factors into a sound theoretical framework and then relates them to ERP success at three different levels. The findings clearly provide concrete suggestions regarding what factors on which to focus, so that the company can better plan and organize its implementation strategy to ensure success. By focusing on these issues that are vital for a successful implementation, top management and project leaders can utilize organizational resources in the best way and minimize potential problems associated with the implementation.

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