

AN ANALYSIS OF THE INFLUENCE OF ERP IMPLEMENTATION ON FINANCIAL ACCOUNTING MEASURES

Martha Lair Sale, Sam Houston State University
msale@shsu.edu

ABSTRACT

This paper compares the actual to the expected long term and short-term results experienced by a company after implementation of an Enterprise Resource Planning (ERP) software system. Although ERP implementations are known to be unusually difficult, compared to other large-scale systems development projects (Hitt, Wu, & Zhou, 2002), several financial improvements are generally expected to follow implementation. These expected financial improvements, along with operational improvements, are often cited as partial justification for the time and resources spent on such implementation. This study is limited to the impact of implementation on financial measures. Other than the costs of implementation, there is little actual data illustrating how Enterprise Resource Planning software systems implementation affects financial measures of performance.

BACKGROUND

Enterprise Resource Planning (ERP) software systems evolved from inventory control systems of the 1960's. Currently, ERP systems allow integration of all application processes; not only in manufacturing, but also sales, accounting, and customer service (Olhager & Selldin, 2003). This integration has extended to encompass information from supply chain management, vendors, and customers of companies using ERP systems. ERP systems, in the 21st century, are no longer a source of competitive advantage; they are needed to simply operate on par with peer companies. Companies that cannot or will not use ERP systems suffer a comparative disadvantage (Hitt, Wu & Zhou, 2002).

There are numerous vendors of ERP systems. Although SAP is most popular with large and mid-size companies, Oracle, PeopleSoft, Cincom, and Lilly Software are just a few vendors that offer a fully integrated ERP system. These fully integrated ERP systems allow "real time" view of all the business processes. The primary benefit of these ERP systems is the ability to capture and analyze non-financial information. The ERP system replaces both the accounting and the operations planning system and has the ability to provide better information about customers, sales, internal processes, and financial transactions. It allows the centralization of administration activities, and the consolidation of multiple information systems reduces redundant data entry, reduces errors and discrepancies between systems, and provides managers access to broader information. By improving operational and management efficiency, ERP system installation and integration is thought to offer financial benefits as well as operational benefits.

It is imperative that decision makers understand and analyze the cost-benefit relationship in deciding to implement an ERP software system and in deciding which ERP vendor's software to use. These systems take an average of 21 months to install and cost a mid-size to large company several million dollars to implement (Hitt, Wu & Zhou, 2002). According to one recent study (Umble, Haft & Umble, 2003), an estimated 50-75% of US firms experience some degree of failure in implementing this type of advanced manufacturing technology. While all ERP systems are similar, they are very complex and diverse with regard to flexibility and the ability to tailor the system to specific needs. System differences make it important to examine the ERP software vendors to be sure of adequate

support and that the software will offer sufficient flexibility to accommodate the strategic plans of management.

So given the expense and the chance of implementation failure, what offsetting advantages do managers expect from ERP systems? Al-Mashari, Al-Mudimigh, and Zairi (2003) present a list of benefits managers expected from implementation based on a survey by Deloitte & Touche. The primary benefits were inventory reduction, personnel reduction, increased productivity, improvements in order management, monthly financial closings performed sooner, improved cash flow, reduction in IT, increased corporate data visibility, new or improved business processes, improved customer service, and Y2K compliance.

This list includes a number of expected outcomes that, while not expressed specifically in financial performance terms should impact financial performance measures. Specifically, changes in inventory, improved cash flow, and increased productivity should have an immediate and measurable impact on financial measures. Other changes, like improved business processes, improved customer service and reduced operating cost from changes in personnel, should result in a positive impact on financial measures of performance.

It is in the best interest of the implementing company that there be sufficient internal research on the ERP system under consideration to provide corroboration of its suitability for the needs of the company. They should keep in mind the strategic goals of the company and how well the ERP system fits those goals.

Among the successful implementations reported on SAP's web site (SAP, 2005), is Hawaiian Tropic. Hawaiian Tropic had enjoyed three years of double-digit growth, but their very poor inventory management system threatened their ability for continued success (SAP, 2005b). Management was hampered by the disjointed use of legacy systems. Inventory reports required data from systems that used different nomenclature and different item numbers. They required multiple manual entries of the same information on more than 500 Hawaiian Tropic products and 500 private label products manufactured for customers, assembled from a materials list with over 7,000 items. The system allowed them no information on the availability of products at the regional distribution centers; a tremendous disadvantage in a rapidly changing and highly seasonal environment where 80% of sales span only six months of the year. Management was undoubtedly diligent in determining the best system to meet company needs. However, one must consider that the previous system was reportedly so poor that change to any organized inventory control system would have been a vast improvement. ERP systems may deliver immediate results in this type of environment, but these results might be argued to have responded to any of a number of appropriate actions.

Texas Instruments, Inc. (TI) implemented SAP as their ERP software system in August of 1999. The project took three and half years and \$250 million dollars (Sarkis & Sundarraj, 2003). There were multiple motivations for TI to invest so heavily in the ERP system. Customer service, a move to standardized processes that support market trends, and standardize information systems are just a few of the opportunities that TI saw in the investment (Sarkis & Sundarraj, 2003). Unlike Hawaiian Tropic, where the motivation was apparently operations driven, in the case of TI, investment in the system was partially justified by an expected improvement in ROI (return on investment) and IRR (internal rate of return). While Sarkis and Sundarraj (2003) report that the major goals were met nine months after implementation, they offer little to support this assessment and the timing of their study does not allow for longer-term results. The financial data reproduced here illustrate these improvements are not evident that past the first year of implementation.

	2002	2001	2000	1999	1998
ROE	(3.205)	(1.692)	25	15	6
ROI	(2.974)	(1.536)	22	14	5
ROA	(2.343)	(1.274)	17	9	4
Employees	34,589	34,724	42,481	38,197	35,948
Productivity	242	236	279	248	235
Inventory	790	751	1,233	845	583

In 1999 ROI of 13.582% was over double the 1998 level of 5.388%. By 2000, ROI had increase to 22.363% an increase of over four times the 1998 rate. For the next two years the ROI dropped dramatically. Overall, Return on Investment, one of the main justifications for the implementation decreased from 22.363% in December 2000 to (2.97)% in December 2002. Mirroring ROI, the Return on Assets (ROA) decreased from 17.42% in December 2000 to (2.343)% in December 2002. This was after an initial increase to double then quadruple the 1998 level of 3.618% for 1999 and 2000. Return on Equity (ROE) followed a similar pattern of initially increasing from 6.236% in 1998 to 15.192% and 24.523% then plummeting to a low of (3.205)% in 2002. The fact that these three indicators moved similarly tends to support the assumption that the results are not anomalous results due to some one-time occurrence, but fairly represent the financial results of the company. A measure of the operational advantage that was expected to follow implementation was a reduction in the number of employees. Although the number of employees at December 2002 (34,589), was decreased 18.58% from the December 2000 high of 42481, at 3.78% the number has not decreased so substantially over the December 1999 total of 35,948. Perhaps a better measure than the absolute number of employees is the labor productivity as measured by sales/number of employees. Although, labor productivity rose from a low of 235.33 in December of 1998 to a high of 279.18 in December of 2000 and then fell from the December 2000 high it has not fallen below the 1998 level and at 242.36 is improved almost 3%. This is evidence of improved operational efficiency. The final measure examined here is the level of investment in inventories. The value of inventory reported on the balance sheet December 2002, represented a 6.5% decrease compared to December 1999. The results reported in the table illustrates that while there was improvement in the expected areas, the dramatic results reported in 2000, the first full year of implementation, do not appear to have been universally sustainable by TI.

The results indicated above do not take into consideration the impact of external factors that might affect the industry as a whole. In an attempt to normalize the results for economic influences that would affect the entire industry, the results for TI were analyzed in relationship to the average of companies in the same NAICS (North American Industry Classification System) code. Data for this analysis was obtained from Standard and Poor's Compustat Database with the aid of Research Insight in August 2005.

Return on Assets									
2002	2,002	2,001	2,001	2,000	2,000	1999	1999	1998	1998
TI	IND	TI	IND	TI	IND	TI	IND	TI	IND
3.62	-15	9	-3	17	-43	-1.27	-26.32	-3.34	-94.97
Difference	18		13		60		27.05		92.14

Return of Equity									
2002	2,002	2,001	2,001	2,000	2,000	1999	1999	1998	1998
TI	IND	TI	IND	TI	IND	TI	IND	TI	IND
6.27	24.51	15.19	8.41	24.52	0.11	-1.69	-20.98	-3.21	-13.5
Difference	-18.27		6.78		24.41		19.29		10.3
Return on Investment									
2002	2002	2001	2001	2000	2000	1999	1999	1998	1998
TI	IND	TI	IND	TI	IND	TI	IND	TI	IND
5.39	-4.26	13.58	-2.27	22.36	-0.24	-1.54	-31.35	-2.97	-145.23
Difference	9.65		15.85		29.6		29.82		142.26

Although it would not be judicious to make sweeping characterizations based on these results, it is not too reckless to claim that they fail to show development of an increasing advantage for TI. Considering ROA, a comparison of the results for TI compared to the industry average shows them going from a position that was 92 percentage points better than the industry average to one that was just over 18 points above the industry average, a negative change of 54.74 points. Considering ROE, TI's results went from a position 10.3 points above the industry average to one that was over 18 points below the industry average, representing a decrease of 28.57 points. On the third measure their comparative position fell from 142.26 points to 9.65 points showing a decrease of 132.61 points. So many elements are captured in these measures that they cannot be considered to be only the results of ERP implementation, but they do illustrate that the company failed to realize comparative advantage because of implementation.

According to Bartholomew (2003), one of the reasons that ERP systems sometime do not deliver anticipated results is that ERP systems are focused on delivering data, not lean systems. Managers may confuse the availability of data by which progress toward lean manufacturing is measured with actual accomplishment of the goals of lean manufacturing. Bartholomew in explaining the relationship between production and customer orders said, "Lean also emphasizes setting up the production process in the most efficient manner from the start and then continually finding ways to make it more streamlined and waste free" (Bartholomew 2003). There is now a response by ERP system vendors to incorporate the data analysis necessary for managers to assess the degree to which they practice lean operations. These systems deliver better reporting and analytical capability to help improve operations rather than delivering the capability and depending upon management to analyze it and use it to accomplish the objectives of lean manufacturing (Bartholomew, 2003).

While ERP systems may not always deliver the expected financial results, they do deliver several benefits in the form of improved information to management. This improved information, properly used, should result in financial benefits. Information is more easily accessible and the interaction across the enterprise improves after implementation (Olhager & Selldin, 2003).

CONCLUSION

ERP Systems are no longer providing a competitive advantage; these systems are necessary for companies to remain competitive. While the improved financial performances companies may have expected may not be immediate, there are many benefits of ERP software. Initial financial improvement may be the results of management attention to issues that should have been addressed independent of implementation of an ERP system. These issues, once resolved, should improve financial performance to the extent the problem is solved, but to maintain improvement a company must constantly look for ways to improve the business process. These improvements may be facilitated by information made more readily available using an ERP system, but it should not be expected that

implementation of the system should in itself accomplish dramatic sustainable improvement. Management should acknowledge the possibility of limited financial improvement from implementation of ERP itself and consider that they must be responsible for developing a strategic solution based on the improved availability of information.

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