The Relevance of IT Component to Corporate Performance

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Abstract

This study attempts to examine the impact of Information Technology (IT) on corporate performance. Specifically, the study explores how a growing high-tech manufacturing company has used the data and functionality of its newly implemented ERP and other systems as part of its IT strategy to develop and create a database for analyzing and refining its business functions in order to improve customer satisfaction, enhance corporate growth and sustainability, and boost its profitability. Problems and issues are identified and discussed as they relate to the assessment of corporate operational performance. A careful review of the information generated by the ERP system and how it is integrated for functional efficiency reveals benefits from an IT strategy. The metrics presented in this study highlight three main areas of business: Strategy, Tactics and Operations. In addition, the influence of the new system implemented by the IT department on the quantitative and qualitative enhancements as well as on the corporate culture is appraised.

Keywords: Information Technology, ERP, Metrics, Tactics, Operations, Execution, Production, Performance, Growth, Sustainability

1. Introduction

This study attempts to document the IT primacy to corporate performance. In today's global business environment, no firm can compete, grow, survive prosperously, or achieve any of its strategic goals without being at the cutting edge by using the state-of-the-art technology and investing in the information assets that would provide, on an on-going-basis, the performance feedback on its processes and a comprehensive status of its operations for timely measures and adjustments necessary to remain in control of its vigorous future. Information Technology (IT) in a business context is the application of computers and telecommunications equipment to store, retrieve, transmit, manipulate and secure business data (6, 7). The IT department is tasked with maintaining and implementing computer software, hardware and related equipment, while ascertaining that the data is viable and secure for aiding the firm to run its business efficiently with current information. The IT component is a primary resource in software selection, user training, installing and maintaining hardware and software updates, and providing organization wide services to safeguard corporate success and its sustainability.

The IT capability is used internally to run an efficient organization by providing the data and, more importantly, the information needed to align all functions within an organization with the corporate goals and business strategy. Externally the benefit that IT services offer is to help a firm become agile and responsive to market threats and opportunities, as well as being able to react to and compete in a global economy, where economic, environmental and political challenges are overwhelming and constantly shifting.

The IT department, through the services it provides, enables a firm's Business Strategy (both internal –operations and business functions - and external- competition and environment) to be viable, successful and sustainable (8, 9, 16, 18). The three functions that IT provides - data capture and communication, data storage and retrieval, and data manipulation and reporting (6, 7) provide the framework for a firm's ongoing success and sustainability.

In the context of DAM, the company under study, the executive leaders were aware that they would need better, faster and more accurate information in order to remain competitive. At the top level they had realized that their firm's future sustainability, growth and success demanded the benefits afforded by IT (documentation, training, and management of new processes, and software and hardware). Through initial and ongoing training of managers and workers, they felt that the continuous improvement driven by collaboration between management and IT department plus employee involvement would lead to success.

A vast body of literature is available that substantiates the relevance of IT to improved efficiency in business and a host of industries, such as the steel manufacturing (6, 7, 8, 9, 16, 18). The promising applications of IT to the electronic industry and the beneficial outcomes are well documented. Current extensive research, where 100's of IT Directors and top executives were surveyed (8, 9), substantiates a strong link between IT and organizational agility. While more IT spending does not lead to greater agility, spending in such a way as to enhance and foster IT capabilities does. Using data from the survey of IT and business executives, a positive and significant link between alignment and agility and business performance was uncovered. In the Development of a Winning IT Strategy for a Steel Manufacturer (8), it is clearly shown how IT contributes to a firm's success and sustainability.

The current study describes the problems and challenges DAM faced and the opportunities it seized to overcome those difficulties. Initially and most audaciously, they invested in (a new ERP system) IT capability to improve quality, reduce costs, lower delivery lead time and to manage Production, Purchasing, Marketing, Engineering, Finance, and Human Resources. Secondly, the IT investment and training helped them vastly improve their agility – their ability to respond in a positive fashion to the marketplace, win substantial new business, and build their reputation as a leader in the field. The company has been making great strides, improvements, and business growth (4). Through collaboration across executives, managers, and workers, the IT Primacy has enabled the firm to launch a business strategy that appears to be effective in achieving and sustaining its goals. The IT based system helps store and protect information, automate processes, allow working remotely, and enhances fast, effective and essential communication of the business transactions. The current study further documents the evidence of IT primacy to the operations of a manufacturing firm that designs electronic devices used in the radar systems, satellites and telecommunication equipment with civil and military applications. The analysis of the data, generated by the use of the IT assets, provides compelling evidence that IT is a prime component in the ever intensifying competitive global business environment (9, 16, 18).

A pictorial of DAM's ERP selection and implementation process is presented in Figure 1. Initially, the CEO along with the executive committee specified the firm's goal. As can be seen, the outside functions (balls) show a consistent pattern of a "Top Down – Bottom Up" approach to achieve the corporate goal. The communication and collaboration between all management functions, executive committee (IT Director, ERP Manager, CEO and CFO), software consultants, functional managers, and the workers insured that this undertaking would be viable and successful. Open communication and collaboration were the key initiatives to successful company training, management of the process, staying within budget, and implementing an ERP system that would help meet the corporate goals well into the future. A corporate wide enthusiasm for the new system was a direct result of pursuing this approach, where everyone felt part of the team.

Figure 1: A Top down – Bottom up Interactive Communication Approach

2. *Background*

In the expanding global markets, a business organization must be competitive in the areas of quality, service, technological expertise, and cost effectiveness in order to earn customers' trust and satisfaction. Continuous improvement in each functional area is needed for maintaining growth and sustainability in a competitive environment. This paper reports the progress of a young high-tech firm that developed and deployed a strategic approach to reach its short-term and long-range corporate goals to enter new markets, while remaining competitive and profitable. It evaluates the strategy, tactics, and operations that the company adopted to meet its objectives, and assesses the effectiveness of these measures in the actualization of the targeted outcomes. Additional areas for further enhancements are also identified.

Years of experience facing challenges and uncertainties in meeting its commitments and quality goals led the management of the DAM Corp. to overhaul and streamline all its operations, from vendors to customers. The company realized that its strength stemmed from its talented employees and its engineering and technological capability. Also the EVO software at the time in use for ERP lacked the capability to offer all of the needed Supply Chain Management functionalities.

The company was in dire need of a software system equipped with necessary tools to integrate all business functions, including Customer Relationship Management, Marketing & Sales, Engineering, R & D, Quality Control, Production and Inventory Control, Finance and Accounting, and Purchasing. The Management felt the need of training and guiding its workforce to mobilize employees' continued commitment to the organization's competitive edge. To fully benefit from a new ERP and other IT systems (Bar Code Tracking, CADCAM software, etc.), training and complete employee involvement right from the executive suite to the shop floor would be necessary.

An earlier study on the ERP implementation (4) described the corporate goals set by the company and the strategy to be pursued by its management team to achieve them. The study also outlined the selection of a new ERP software by the company, the training of employees to work on the new system and the implementation process. The IT component was the driving force to ensure the data accuracy and the maintenance of all computer hardware, peripheral devices (bar code scanning equipment, printers, scanners, etc.), as well as maintaining the existing software and implementing the software revisions plus the new software. Prior to implementing the new ERP system, the IT cleansed the data to ascertain that items such as part numbers, item master, customer data base, supplier data base, and other files were accurate. The IT manager, in consultation with other departments, made changes to part number descriptions, so that searches are quick and simple. The current paper, however, presents the results of an impact study that measures the effectiveness of the newly implemented IT systems in terms of improvements in profitability, growth and sustainability, which the company executives describe as: Strategic, Tactical, Operational capabilities of the company. It should be noted that the IT is defined to include the technology of computers, telecommunications, and other devices that integrate data, equipment, personnel, and problem-solving methods in planning and controlling business activities. It provides the means for collecting, storing, encoding, processing, analyzing, transmitting, receiving, and printing text as well as audio/video information.

The DAM Corp. designs and manufactures precision rotary joints and slip rings used in air traffic control radar and generator/motor applications. These rotary joints are used in radar systems and satellite communications worldwide. It's the largest independent manufacturer of microwave rotary joints in the US with $10m in sales in 2010. The company competes in a niche market that totals about $100m worldwide. About 40% of its sales stem from commercial applications, such as municipal airports, and 60% from the US Government sales, providing military applications, satellites, and communications equipment.

In 2010, DAM management selected and began the implementation process of a new ERP software to monitor and gauge their business functions. The new Infor Visual ERP system they selected went online in May 2011. The selection process, implementation and training of the new ERP system are described in a study by Frazee and Khan (4). The current study discusses and documents the challenges and improvements DAM has experienced since the installation of the new system by reviewing the functionality, integration, and the data generated by the ERP system (5, 6, 8).

The senior management at DAM developed objectives, goals and strategies by utilizing the functionalities and capabilities of their new ERP system. Their goals focused on stability, profitability, growth, and long term sustainability. The data available within the ERP software helped to identify areas for improvements, added visibility to data, empowered workers to find needed information to be able to create their own reports for analysis and improving business operations. To attain the corporate goals and objectives, three main areas, termed as, Strategic, Tactical, and Operational were targeted by the management.

3. Rationale for Selected ERP System

As early as 2009, the management realized that their current operations software was deficient in offering the ability to control and analyze their business functions and to help the corporation grow sustainably in the future. The year that followed turned out to be a banner year in shipments, registering a record of $10M in sales. This was not, however, without creating chaos across the organization. The promised delivery dates, for instance, to customers were not met consistently; and the quality was a problem, both from the suppliers' side and at the production end, resulting in many returns and reworks and displeased customers. The delivery and quality from suppliers lacked the caliber needed by DAM to become a world class manufacturer. Often 'silos' existed within the firm, but communication and coordination across departments was missing, making a timely analysis of the data difficult.

The cumulative impact of these problems and more, the management felt, was hampering the company's ability to grow and prosper. The top management team, thus, concluded that new software tools – ERP software, Bar Code Tracking System, and CADCAM software were essential to integrate all functions within the firm and to provide all groups within the organization critical information in a timely manner for effective decision making and to succeed in planned operations and scheduled deliveries. The company's rationale to invest in new IT software systems essentially translated into a rigorous control of its destiny and ability to grow - doubling revenues within the decade -, enhance profitability, and succeed in acquiring a commanding position in the industry, while satisfying its customers and shareholders.

4. Literature Review

The published literature provides helpful guidance in understanding the value of successfully implementing ERP software in an organization. Through its application, a company can integrate all its functions within the organization by having a quick and easy access to pertinent data needed to analyze, monitor and ultimately control its destiny (2, 3, 4, 8). For an ERP system to be successful, a number of important points must be considered. An overview of the history of IT since the 1950s, for instance, and the background of ERP in particular is useful (3) in understanding that the estimated market of ERP is $23 Billion in annual sales and that there is a wide range of ERP software providers to choose from. This, however, makes the selection of software challenging as well as costly. A new system may have an expected lifespan of 10 years or more, making a successful launch a sound strategy for effective accounting and management – especially internal control over many departmental activities and functional efficiencies. The implementation of ERP system and 'go-live' can, however, create a number of problems and challenges for an organization (4, 5, 6, 7, 9, 11, 12), including resistance to change, employee/worker acceptance, training, management's ability to articulate a strategic business vision/mission of ERP, involving users in the implementation, and security risk (8), and Metrics and KPI's (2, 4, 8, 13). When a newly implemented ERP 'goes-live' there may actually be a short term backsliding (7) – the stabilization phase. The management must concentrate on getting the users and workers into the continuous improvement phase where the productivity will begin to improve. An ERP system provides quick access to data, allowing to measure output, monitor, control, and improve operations (2, 3, 4, 6, 8). Furthermore, an ERP system can be customized to a firm's unique operations (10), but this is always a costly alternative (4).

5. Analysis and Control

The following sections will explore how the Strategy, Tactics, and Operations areas within the firm deployed the functionality of the integrated ERP software system and the data generated by it. Reports, shown in Table 1, were developed and categorized within each area identified as:

- **Strategic:** Value in determining long-term direction and correction used by management;
- **Tactical:** Value in determining the detailed focus points – how/what tools to use to implement the strategies pursued by the department managers.
- **Execution/Operational:** Value in managing the day-to-day activity used by supervisors to monitor and manage their workers and staff.

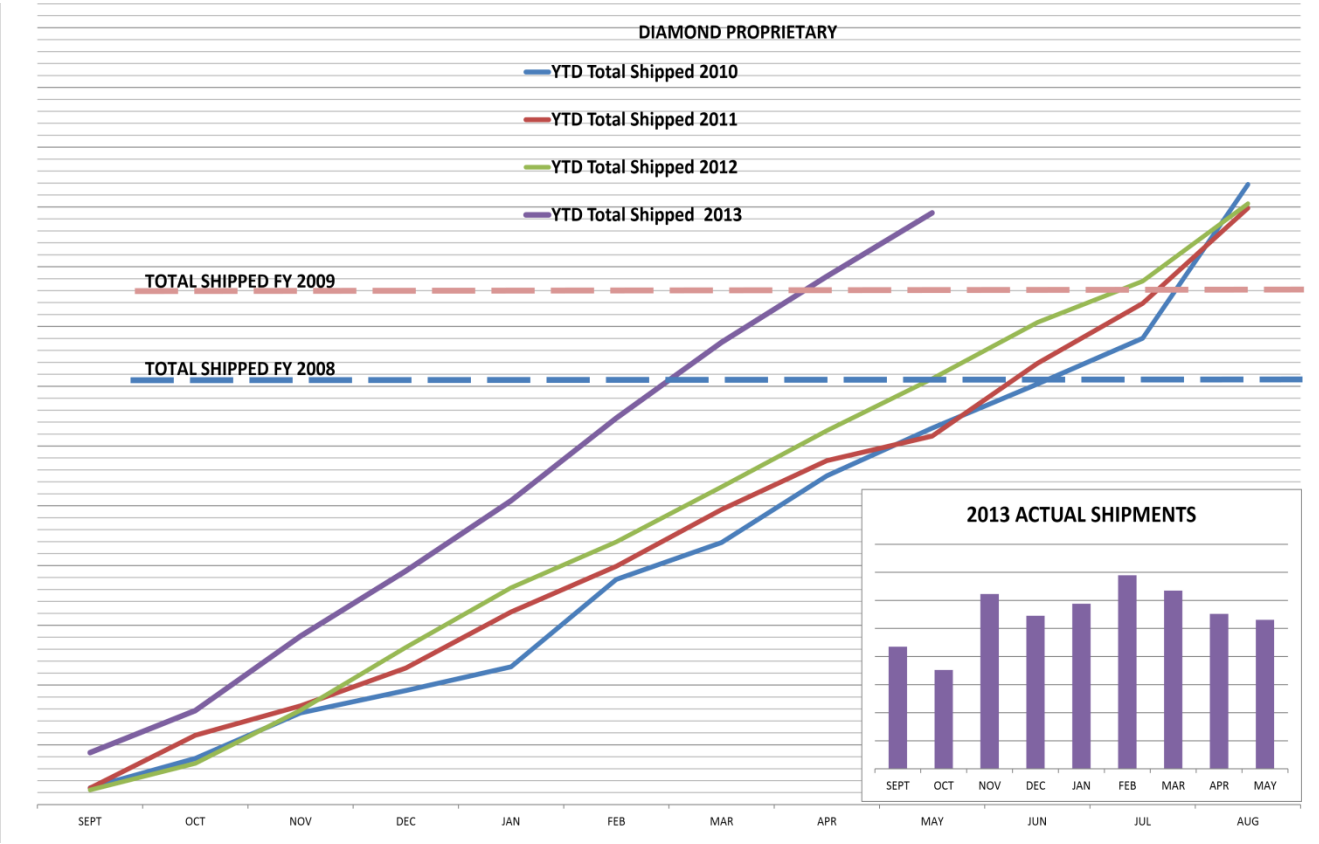
Table 1: Reports by Category Developed by Utilizing the Data Available from ERP System

Strategic: Value in determining long-term direction and correction
Tactical: Value in determining the detail focus points - how/what tools to use to implement the strategies
Execution: Value in managing the day-to-day activity of the business

BUNDLE	REPORT	CATEGORY	BRIEF DESCRIPTION OF PURPOSE
Vendor Management	Quality	Tactical	Capture and Communicate Vendor Quality Performance to the Business and Vendor
	On-Time Delivery	Tactical	Capture and Communicate Vendor Delivery Performance to the Business and Vendor
	Strategic Vendors	Strategic	Identify Critical Vendors for Collaborative Efforts
	Vendor Improvement Glide Path	Tactical	Monitor Vendor Performance Rating to Attain and Sustain Business Goals
	Supplier Performance Report	Execution	Publish a Quarterly Aggregate Vendor Performance (AVP) Score to Each Vendor with Activity in the Selected Quarter
	Detail Supplier Performance	Execution	Compilation of Individual Records used to generate the Vendor's AVP
	Vendor Survey	Execution	Tracking Count of Vendor Surveys
	Delivery Lead Time Analysis	Tactical	Comparison of Standard Lead Time Versus Actual Lead Time
Business Health	Sales Backlog Analysis	Strategic	Evaluate Order Position to Historical Performance and Fiscal Goal
	Open Purchase Orders by Month	Tactical	Monitor Expected Monthly Cash Outlay and Inspection Resource Load
	Open Purchase Orders by Product Code	Strategic	Monitor Expected Cash Outlay in Terms of Major Material Categories
	Margin Analysis	Tactical	Analytical Review of Incurred Costs Relative to Selling Price to Drive Improvement and/or Re-assess Selling Price
	Slow Moving Inventory	Tactical	Evaluate Parts in Inventory with Little or No Usage During Time Period Selected
	On-Time Shipment	Strategic	Capture Customer On-Time Shipment Performance
	Year-Over-Year Shipment Line Graph	Strategic	Evaluate Cumulative Shipment Performance to Historical Performance and Fiscal Goal
	Inventory by Product Code	Strategic	Monitor Distribution of $ Invested in Terms of Major Material Categories
	Purchased $ Received Compared to Material $ Issued	Tactical	Inventory Throughput
	Engineering Throughput	Tactical	Number of Designs Pending, Number of Designs Generated, Number of Designs Released to Mfg. Engineering Time from Order to Release
	ECN Throughput	Tactical	Number of ECNs Pending, Number of ECNs Generated, Number of ECNs closed
	Delivery Lead Time Analysis	Tactical	Analysis of Delivery Lead Times
	Engineering as a Profit Center	Strategic	$ Spent on Customer NRE Versus $ Billed for Customer NRE.
	Rework Costs	Tactical	Evaluate Cost of Rework Activity by Source of Error
	Part Lead Time Review	Tactical	Analytical Review of System Standard Lead Time Compared to Actual Lead Time
Business Health (cont.)	Part Shortage Report	Execution	Presentation of Outstanding Material Needed for Date Range of Job
	QC Expedite Report	Execution	Presentation of Material Needed for Open Receipts in QC Inspection
	Job Operation Review	Tactical	Evaluate Actual vs. Standard Hours for Operations Completed Prior Week. Hours, Value, and % Variance
Quality Root-Cause	NCMs Created for Selected Date Range	Tactical	Presentation of NCM Occurrences for Problem Resolution
	NCMs Closed for Selected Date Range	Tactical	Presentation of NCM Competitions for Root-Cause and Systemic Correction
	NCMs Pending	Tactical	Presentation of NCM Occurrences to Monitor Progress
	Cost of Internal NCMs	Tactical	Capture Cost of Rework During Production Process
	Warranty Analysis	Strategic	Analytical review of Warranty Units and Cost to Repair
	NCMs by Department	Strategic	Presentation of NCM Occurrences to Monitor Progress by Department

The reports and graphs the company documented have assisted the management to set its goals and to measure, monitor and control its business destiny.

Figure 2: Year to Year (Month by Month) Shipments



The goals of growth, profitability and sustainability can be accomplished by the workforce applying the functionalities and capabilities of the software and by being flexible and thoughtful as the business changes within and without. The currency of these reports is sustained through revisions, updates and additional reports to further fine tune the analysis and control of business functions.

A review of some of the documents generated by the new set up demonstrates the functionality and robustness of the ERP system and, more importantly, how this active instrument is capable of assisting the enterprise in attaining its business objectives. For DAM to maintain its competitive edge and grow to the point of developing long term business relationships with global corporate customers, such as Panasonic, Boeing and Raytheon, they must prove to gain confidence that they can monitor, control and excel in their functions of engineering, manufacturing, quality control, customer support, and resource allocation. The company is convinced that the new ERP and other IT systems have helped the organization move from operating in an environment of chaos to operating in a setting of confidence and control. Each category, described above, will now be discussed and analyzed in turn.

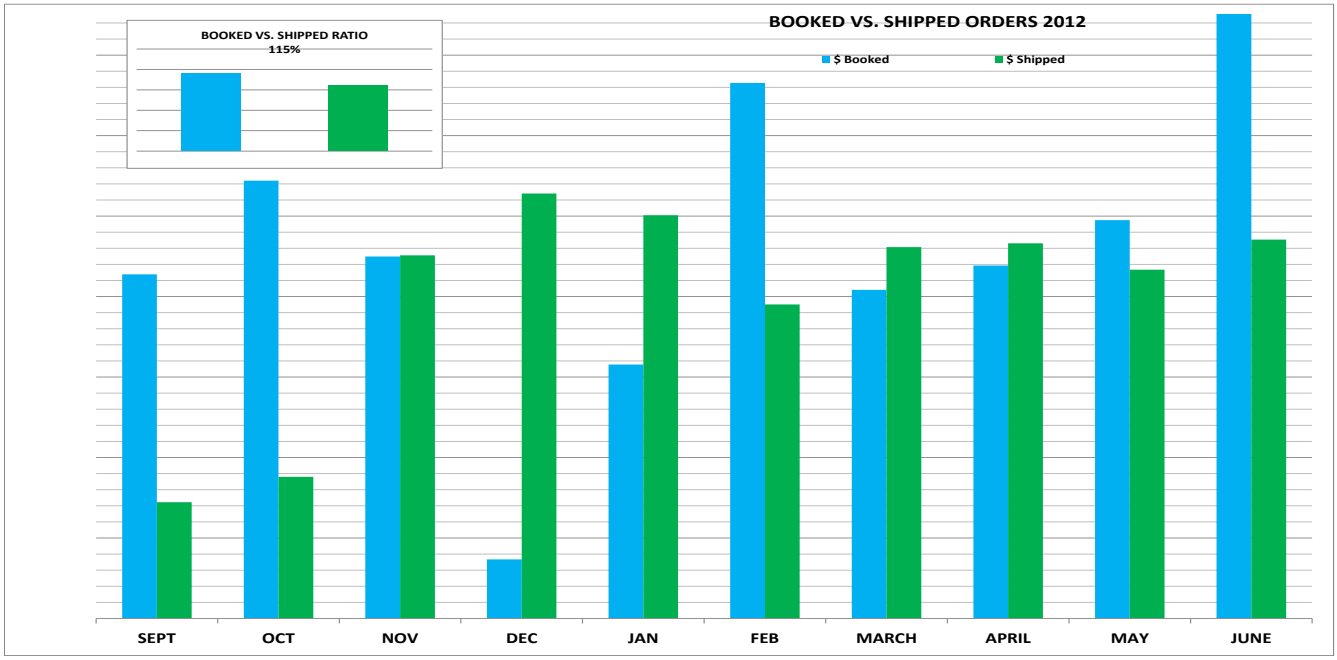
Strategic: From the strategic management area, for instance, a shipment graph is presented in Figure 2 for illustration. This graph compares month by month and year to year current Actual Shipments vs. Target/Plan Shipments. It also compares to previous years' shipments. It serves as a quick indicator for the Management and Operations to see whether or not they are achieving planned short range goals and whether the company is tracking the yearly goal/objective of shipments and revenues. If some slipups are noticed, corrective measures must be set into motion.

The insert for year 2013 in Fig. 2 shows a significant improvement in shipment regularity over the previous years. They are increasingly more consistent by month, especially from March through May, suggesting that DAM is utilizing capacity efficiently as well as fostering integration across departments, such as Sales/Marketing, Engineering, Quality, Production, and Finance; and working toward efficient use of its vital resources and integrated planning. All these functions are supported by data collected from ERP.

Specifically, the new ERP system provides the needed data to compare year to year results as well as month to month performance, measured for the current year and compared against the previous years. This dynamic approach, that constantly updates the report, enables the management to measure monthly performance against the forecasted revenues. It also allows it to measure year to year improvement and growth, moving toward the corporate goal of increasing its shipment revenues by 100% by the year 2020. Beside the top management, the report has its usefulness at other levels of the organization as well. For example, it has its use at the production level leading to insure good efficiency and utilization and that the necessary capacity is available. Similarly, it has its use by HR for hiring new employees; and, on the financial side, in the critical areas of cash flow, ROI, and needed capital aquisition. The firm's goal is to be in control of its operations and, by frequent analysis of this metric, it can promptly identify and understand the root causes of any deviations from the target and make necessary adjustments in a timely manner to remain on track. It is essential in their growing market that they quickly monitor and analyze data enabling them make sound decisions. Prior to the new system, the data needed to create this report was a real challenge for timeliness and accuracy.

Tactical: From the tactical side, the Functional Managers of various departments, such as Sales & Marketing, Engineering, Production, Materials, Quality Control, Logistics, and Finance, need good information to be successful in performing their specific functions that aid the firm in achieving its goals (2, 6, 7, 8). A few of the tools that the company uses to analyze and control its operations will be examined here for illustration. The new ERP system offers tremendous capability to the firm to analyze data and use it for making better business decisions. The analysis of data on order bookings and shipments, for instance, can provide a quick check on the backlogs whether they are growing or diminishing, as well as on potential backorders. The statistics on booking and shipping for 2012 are graphed in Figure 3.

Figure 3: Booked vs. Shipped Orders 2012



While a moderate backlog may indicate a healthy business, a growing backlog most likely indicates a lack of capacity or ability to meet customers' needs, causing potential problems in production, purchasing and operations. Prior to updating the system, the company had been experiencing increasingly growing Backorders. That required the company to expedite its operations, further causing disruptions and challenges to the Quality Control, Purchasing, Engineering, and Production Departments. The graph in Fig. 3 also alerts Accounts, Receivables, and Finance to the financial health of the firm and its cash flow needs. Notice how March, April and May are consistent and stable. The currently ratio of DAM's booked to shipped orders is 1.15, indicating almost a 15% backlog. Some months, like Oct, Feb, and June have very high bookings compared to shipments, putting high pressure on various departments, including Finance due to cash flow. The underlying data that supports this graph enlightens the Operations Department as it searches the root causes of the problem and resolves the issues.

The Marketing and Sales can also use this analysis to better quote lead times to customers so that the backlogs do not become backorders, which would potentially affect future business and firm's ability to maintain a healthy margin. The backorders often drive up production costs due to expedited material and required overtime to complete orders on time. Also poor customer relations, that can affect future business, and inefficient uses of company resources, like capital, engineering capacity, quality control, manpower, and plant & equipment needs, are factors that add to the production cost significantly.

Vendors and suppliers performance has direct impact on organization's ability to process all its functions on the production side in keeping pace with the schedules. An analysis of suppliers' performance history can provide insight in establishing their reliability factors and classifying them in various categories. These factors must be built into time estimations. The Class A Vendor percentage of DAM's purchasing spends lists is shown in Table 2. A short list of just 14 suppliers, that account for only 6.5% of company's total supplier base, represent nearly 60% of DAM's yearly purchasing spend.

Table 2: Class a Vendor Percentage of DAM'S Purchasing Spends

VENDOR ID	RECEIVED QTY	QTY OPEN	% $ SPENT	CLASS A
MAGMAC	25007	2244	8.70%	YES
MKS	4277	321	8.46%	YES
ALPBEA	2246	637	6.17%	YES
DETAIL	4147	165	6.02%	YES
BTENGI	4672	615	5.77%	YES
METCAR	4739	2384	5.06%	YES
BEARING	422	22	4.49%	YES
HURLEY	3152	1475	2.89%	YES
EDNORM	2595	56	2.16%	YES
KC	1577	144	1.90%	YES
MONALEX	2302	98	1.76%	YES
MARCAM	2707	1710	1.51%	YES
CABASS	1341	32	1.50%	YES
PLASTECH	1084	25	0.28%	YES
TOTALS	60268	9928	56.68%	
Class Vendor Count				14
Total Production Vendor Count				216
Percent Class A of Production Vendors				6.48%

The measurement of supplier performance, which implies cost, quality, and on-time delivery, provides the basis for building long term mutually beneficial supplier relationships. A composite score, in which quality is weighted 2/3 and on-time-delivery 1/3, measures how well the key suppliers are doing and is used by the management to uncover problems and to work with important suppliers to improve their performance. At least one key supplier visits the company under review each month to go over their rating, discuss areas needing improvements, better understand company's needs, and how both parties can work together more effectively. One recent vendor visit led to an agreement with the company to move orders forward helping the vendor fill his capacity. Analysis of Purchasing and Production data showed that if a vendor's order was 14 days or more late, the company could not recover and that would have impact on lead time and delivery to customers. This would in turn create a backorder situation and potentially loss of business and revenues; and would therefore be considered a catastrophic event. The "Class A Vendor Purchasing" chart has identified a supplier with a very poor performance, and the Purchasing Management is actively seeking a replacement.

The firm has designed a Vendor Glide Path to Improvement program to help under achieving vendors improve their Quality, on time delivery, and other metrics. By data mining, this critical information can be quickly accessed. The poor performing vendors must either show improvement or the company would actively seek a new vendor. The Tier 1 suppliers, considered as Strategic Vendors, are key partners in company's long term success.

It's interesting to note that, by being able to monitor, measure and analyze data from the ERP system, the Purchasing has reduced Past Due POs by 75%, compared to performance under the previous system. This ability to gather data and information from the ERP system has been invaluable in helping the company dramatically improve vendor performance. A sample of selected vendor improvement in delivery performance, forged by DAM as a result of the new system, is included in Table 3.

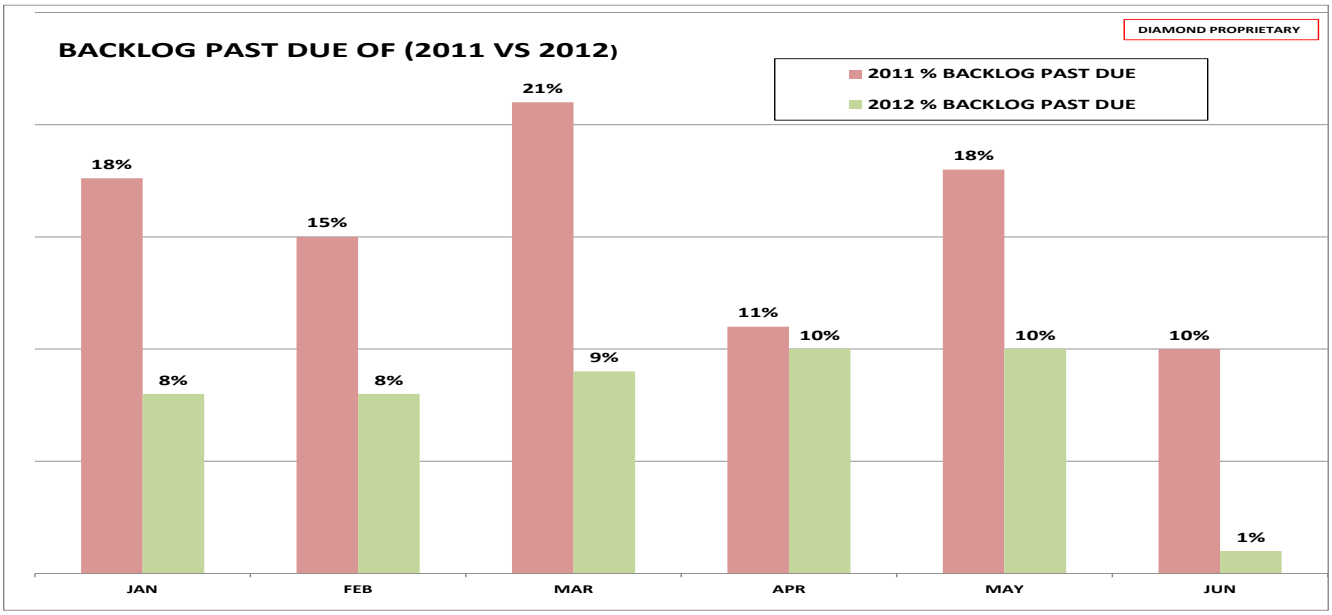
Table 3: Selected Vendor Improvement Post-Visual ERP

Selected Vendor Improvement - As a group (Alpine, BT, Detail and MKS)		
Before Training		
	Delivery Score	51% On Time
	Quality Rating	93%
	Total Performance Score	79%
After Training		
	Delivery Score	93% On Time
	Quality Rating	94%
	Total Performance Score	94%

These statistics clearly reveal the extent to which the company has been able to improve vendor delivery performance from a score of 79% under previous system to 94% as recorded under the current system on a select number of Class A Vendors. Monitoring of delivery performance data on the Tier 1 suppliers as well as other suppliers the company uses will continue.

Obviously, improved vendors' delivery performance has direct impact on company's ability to improve its on-time delivery to its customers. This enhancement is reflected in Figure 4, which shows declining past due orders and a dramatic improved on-time delivery to customers.

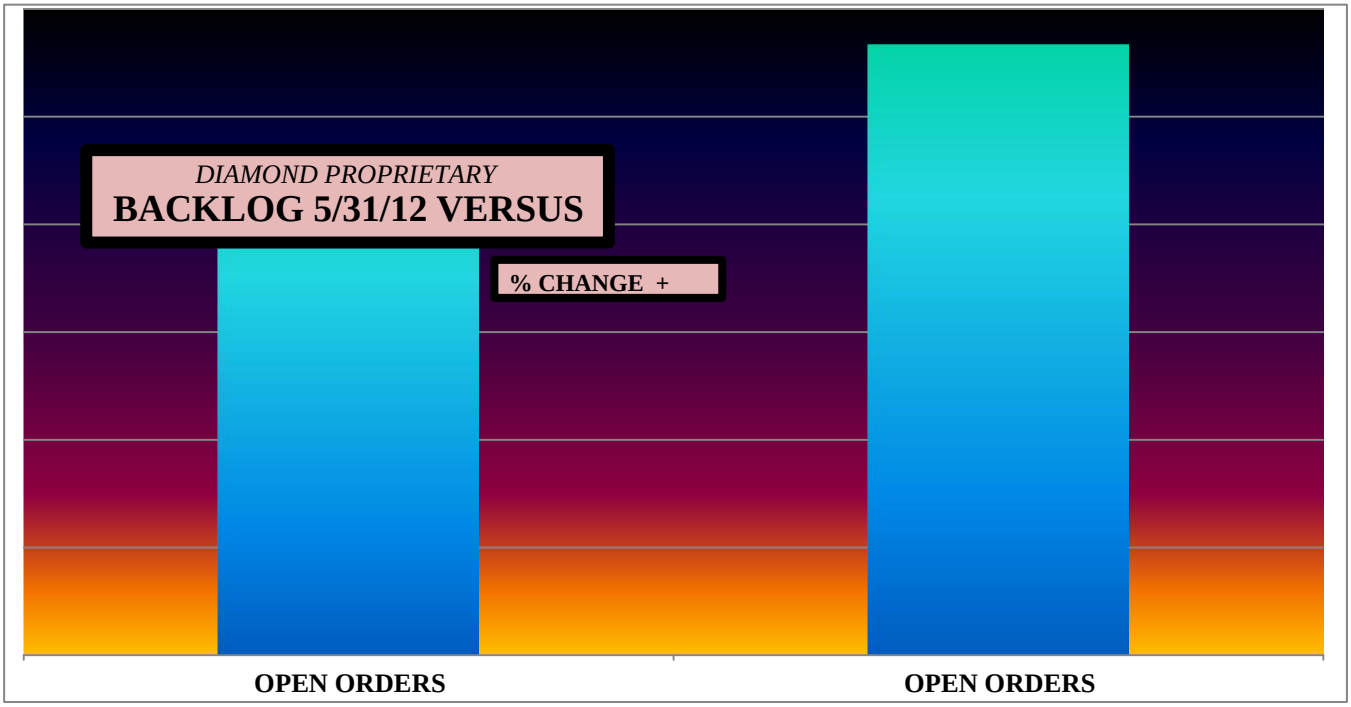
Figure 4: Improved On-time Delivery to Customers



The company's goal is to consistently have no past due orders. With the data and information available from the new system and continued monitoring, analysis, and proactive management involvement, the set goal is very attainable. This graph depicts positive or negative trends that can be further explored and analized to get to the root causes of issues that must be addressed and corrected. The urgency of this need is underscored by the fact that almost 60% of company's business is with the US government agencies that have strict guidelines and stipulate serious economic penalties if the contract terms are not met precisely. These terms include on-time delivery, quality, warranty, and pricing.

The past due orders indicate being out of control. But hard work by the managers and employees have brought functions and processes under control in measureable ways. Installation and implementation of the new system has helped generate valuable data that the management can review and analyze to troubleshoot the problems. During year 2013, past due orders have been consitently less than 4%.

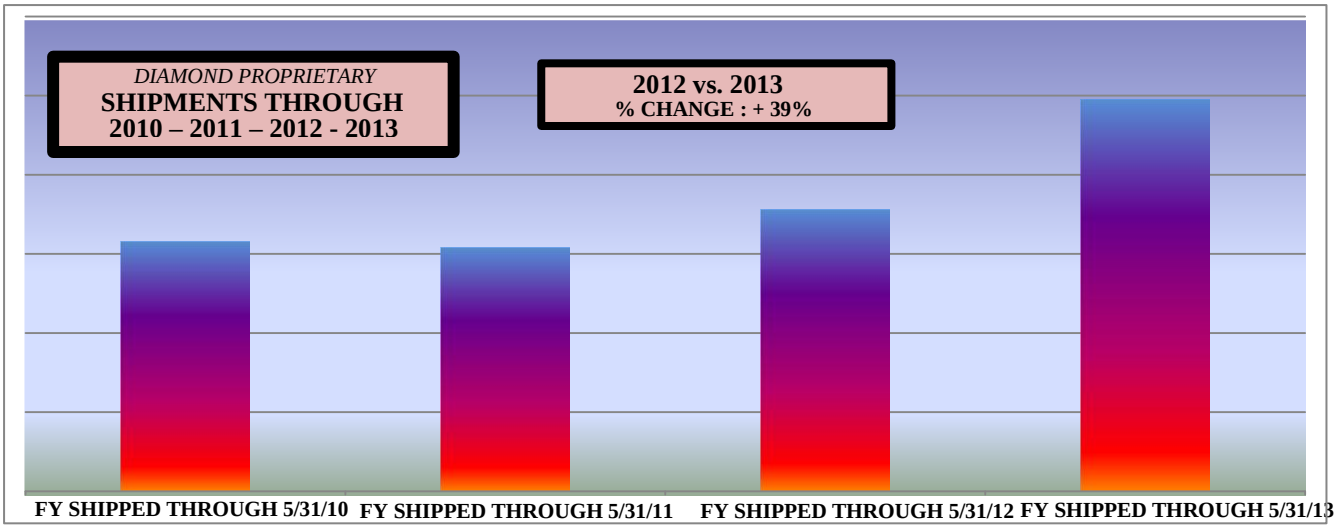
Figure 5: Shipments 2010 through May 2013



A comparision of year to year shipments provides the management with useful information to measure the yearly goal and also to trace the trend toward the long term strategic goals of growth and expansion. The shipment graphs for 2010 – 2013 are presented in Figure 5. These graphs show a dramatic 39% increase between shipments through May, 2012, compared to shipments through May, 2013. Using and sharing the data from ERP, Bar Code Scanning and CADCAM IT systems has been instrumental in planning and controlling business activities at the production, purchasing, quality, finance, materials, sales and strategic planning stages.

This information is used by both the top management and functional managers and supervisors. This is a quick snapshot to alert management if it's on target to reach its yearly goal as well as whether they are trending to their long range goal of doubling shipment revenues within the decade. As can be seen, as of May 31 the company has shipped 39% more than in the same time period in 2012. The company is tracking well toward its fiscal year 2013 goals. Solid data from IT - the ERP system, Bar code tracking system, and CADCAM - will help insure management has the right information to make timely informed decisions.

Figure 6: Open Orders 2012 vs. 2013

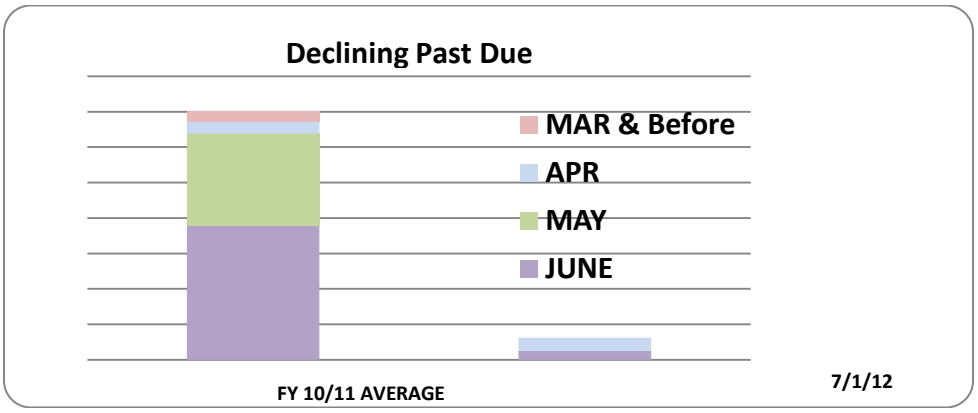


A comparison of open orders through May of 2012 and through May of 2013 shows a growth of 21% in orders. Management must work hard to ensure that resources – plant, labor, capital, material and time - are available in adequate amounts to support the orders. Continued growth will be challenging and capacity may need to be added. Information gained from the IT systems will help control and manage the growth of the firm.

Previous to the new IT strategy (i.e., new ERP software, Bar code scanning to track work orders and labor hours, CADCAM integrated with key suppliers) shipments in 2010 were erratic. A host of problems in areas of Production, Quality and Engineering were uncovered and corrective measures were taken to rectify them for improvement. This resulted in poor utilization of resources and caused chaotic environment. These conditions prevailed prior to selecting and implementing the new ERP system.The monthly shipments, however, became increasingly more stable each year from 2011 though 2013, as data and information became available from the IT systems. This helps the firm make performance gains in all its business functions. It enhances, for example, the Finance department's ability to estimate cash flow, Production's ability to level load manufacturing and predict needed capacity, Quality's ability to estimate labor load on QC, Purchasing's ability to manage vendor deliveries, and Marketing & Sales ability to quote accurate lead times to customers. The ERP system along with a dedicated workforce has been instrumental in making all this happen.

Backorders or past due orders is a major issue in the tactical area and it can adversely affect a firms' reputation and quickly impact its cash flow position, profitability, growth, ROI, and the Employee Stock Option Plan (ESOP). Prior to the new ERP implementation, the backorders had adversely affected all areas of the firm and created turbulent conditions across the organization. The availability of integrated data allowed the management to analyze its business activities by developing Pareto charts, control charts, and to undertake analysis to improve vendor lead times and production processes and standards. These reports guided the company to discover the root causes of problems and redevise strategies to effectively reach the corporate benchmarks. A declining backorder trend is visible in Figure 7 below, which shows a dramatic improvement that can be attributed to the ERP software. The management has been proactive in managing and eliminating past due orders. By doing so, the company's year to year growth is up along with profits and the outlook for a sustained trend in the future appears promising. This provides further evidence that IT is aiding the firm in working away from a state of chaos to a state of control. Backorders for 2013 have been consistently below 4%, an incredible achievement.

Figure 7: Declining Backorders



How and/or what tools to use to implement a corporate strategy are Tactical decisions. A review of reports, such as Vendor Improvement Glide Path (1) and Margin Analysis, will provide additional details of the Tactical side of company's operations. Unreliable and poor performing vendors not only cause backorders but also jeopardize other phases of the process that follow with a chain reaction and serious consequences. Suppliers, in general, should be evaluated by their performance and assigned ratings. Poor performing vendors need to be identified and warned or weeded out. Vendors associated with the company under study rated vendors primarily on the basis of quality and On-Time Delivery, and weighted these attributes respectively as 2/3 and 1/3. The company simply does not want to work with poor performing vendors. By rating its vendors and identifying poor performers, the company is able to make sound business decisions. Top suppliers are graded and placed on a "Vendor Improvement Glide Path." They are informed where they stand on this scale and if there are areas where they need to improve, they are so advised.

Healthy and long term supplier relationships are important, but performance must be measured, communicated, and followed through for them to continue beneficially. The Quality Report is a critical measurement tool in company's long term success. It uses data from the ERP system (11) to measure not only quality from the vendors but also in house production quality, reflecting reworks cost time and money to improve communication, systems and processes. The subject company makes rotary couplers and other precision instruments that are part of bigger systems and the quality is absolutely critical, just as the brake component on an automobile is for its safety.

The Purchasing Department can review the status of the Purchasing Orders by glancing at the "Open PO's by Month" report for ensuring that the right material is coming in at the right time. The Purchasing can use this report to minimize Past Due PO's and to eliminate surprises that could have impact on the production floor and quality. It can also be used by the Finance Department to gauge cash needs and by Quality to anticipate labor needs.

The Margin Analysis is yet another tool available to finance and marketing executives to judge whether a particular product is profitable or not and what is the margin on it. Sometimes a product with slim margin is acceptable if the volume is big or the order is from a key customer. Often it's also a part of business strategy to keep the price on the low side in anticipation of bigger contracts or future business. A Margin Analysis report generated by the company is included in Table 4, below:

Table 4: Margin Analysis of Current Orders

Margin Analysis of Current Orders		
Report Produced on 7/2/12		
Part #	**Description**	**% Off Target**
58-845-0 Total	Pitch And Roll R/J	461%
49-746-0 Total	1 Channel, Wr-90 L" Style Rotary Joint"	292%
80-2255-0 Total	R/J, Dual Ch, Coax, Sma/2.9mm	261%
28-545-0 Total	1 Ch, I-Style Wr-187 R/J	241%
2322-0 Total	Three Channel Rotary Joint	198%
2360-0 Total	3 Ch Rj (Wr90,N & N)	188%
57-845-0 Total	Azimuth Rotary Joint	174%
39-847-0 Total	Wr-90 Rotary Joint	172%
21-2220C-0 Total	Dual Channel Type N Rotary	170%
16-2120-0 Total	R/J, Single Ch, Type N	166%
18-345-0 Total	I" Style Rotary Joint"	166%
43-2124-0 Total	Rotary Joint, Single Channel	160%
84-2255-0 Total	Dual Chan Rotary Coupler, Sma	158%
12-2120-0 Total	Coaxial Rotary Joint (Type N)	157%
18-2120-0 Total	Rotary Joint, Coax, Type N	153%
25-847-0 Total	Wr-75 L" Style Rotary Joint"	145%
22108-0 Total	2 CHL R/J With 38 CH RR	140%
47-845-0 Total	Rotary Joint, Wr75 Single Ch	134%
22125-0 Total	R/J, 2 Ch, Wr28 & Sma	134%
30-2240-0 Total	Dual Ch, R/J, High Frequency	132%
20-2220D-0 Total	Type 'N' Dual Channel R/C	132%
55-846-0 Total	1-Ch, Wr90, Double L" R/J"	131%
49-845-0 Total	Wr-75, L-Style, 1 Channel	127%
10-2630-0 Total	6 Ch R/J W/20 Ch Roll Ring	126%
35-2281-0 Total	Dual Ch R/J Assy	122%
38-2049-0 Total	Rotary Joint, 7/8 Eia Coax	121%
40-846-0 Total	R/J (Ref Dwg # 1012c013-00)	116%
46-2244A-0 Total	Dual Chan Rotary Coupler, Sma	114%
24-2266-0 Total	2 Ch, L-Style, Wr-62/Sma R/J	113%
38-847-0 Total	Single Channel Wr-75 R/J	112%
2409-0 Total	Rotary Joint, C-Band (4-Ch)	109%
15-2620-0 Total	6 Ch R/J With 24 Circuit R/R	108%
23-746-0 Total	Rotary Joint, 1 Ch, Wr112 W/G	107%
41-2120-0 Total	Rotary Joint	107%

The analysis of this margin data provides guidelines to management for making informed decisions supported by empirical evidence, rather than only intuition. For each part number or assembly in Table 4, there is a % Off Target with the associated dollars (omitted). The management, especially Finance, CFO, and President, can see what items the margins are eroding, and analyze further for root cause analysis. By analyzing margin for each job or customer, the management team can learn and develop better quoting on future orders to the customers. Moreover, it can gain a better understanding of production issues to be able to set more accurate production standard times, minimize and eliminate reworks - whether caused by worker skills and training or whether there was a communication problem with areas such as Design Engineering, Quality, Purchasing or Marketing/Sales.
The ability of the company to track actual costs versus standard costs, as well as the impact of Lead Time quoting, will dramatically strengthen it in the future. This knowledge will boost its confidence quotient with a favorable impact on its capability to plan, coordinate and communicate, and transform it from working in a state of chaos into a state of control.

Operational Category: Managing day-to-day operations is critical to achieving the tactical and strategic goals of an organization. On the Operations side also, the DAM management focused on generating a number of valuable reports that would provide data for analysis and improvement.

The PO Expedite Report and QC Expedite Report, for instance, are used by the respective units to manage day to day operations. In fact, these are the tools developed and used by department workers. For illustration, Table 5 reflects a PO Expedite Report for the company. The Purchasing Department uses this report for expediting backorders and to prioritize vendors to be contacted to insure they will deliver on time.

Table 5: PO Expedite Report Used by Purchasing Department

OPEN PO's AND PAST DUE ORDERS as of July 20, 2012						
Part Number	**Description**	**Vendor**	**Quantity**	**Due Date**	**Where Used**	**Comment/Action**
5-1201	Oil Seal Collar	Magmac	10	July 23, 2013	80-2255-0	
5-787	BRG1.0X.50X1.50	Fafnir	36	August 8, 2013	2322-0	
2-6182	Valve	Hurley	6	August 12, 2013	2322-0	
12-2841	Housing	BTENGI	4	July 7, 2013	58-845-0	Expedite Vendor, Alert Production
0-199	Cover seal lower	Plastech	4	July 27, 2013	80-2255-0	
0-291	Solenoid Valve	Detail	12	August 28, 2013	57-845-0	
5-5922	Shaft	Marcam	8	September 5, 2013	58-845-0	
5-1200	Thrust washer	KC	50	August 26, 2013	21-2202C-0	
7-1298	Circuit Board Controller	MKS	12	July 27, 2013	58-845-0	
7-4376	Motor, controller	MKS	12	July 12, 2013	58-845-0	Expedite Vendor, Alert Production
For illustration only - not actual data						

The flow of information between the Purchasing and other units of the organization is essential for smooth operations. The column designated as "Where Used" in Table 6, is an important field that allows the Purchasing to communicate areas of concern, like POs late or part shortage, to Production. This report can be run by Due Date, Vendor, Item, etc.

The Supplier Performance Report provides details on suppliers' practices, including on-time delivery, cost, quality, and other tangible as well as intangible elements. This report, in combination with Detailed Supplier Performance Report, measures a vendor's performance. Using this information as the basis, the company developed a Glide Path to Improvement for vendors who are not performing up to its expectations. Similarly, the Part Shortage Report will underscore immediate concerns that potentially affect production, shipments, customer service; and the financial implication these concerns entail.

The QC Expedite Report shows items needed by the Production to satisfy customers' orders. It is also used by QC to prioritize its work with the potential for overtime (OT) or adding inspectors. A QC Expedite Report for the company is shown in Table 6.

Table 6: QC Expedite Report Used by Production and QC

QC Expedite Report as of July 20, 2012							
Part Number	**Description**	**Vendor**	**Quantity**	**Due Date**	**Where Used**	**Comment/Action**	**Work Order #**
7-4376	Motor, controller	MKS	12	07/16/12	58-845-0	Expedite Vendor, Alert Production	1072
12-2841	Housing	BTENGI	4	07/18/12	58-845-0	Expedite Vendor, Alert Production	1072
5-1201	Oil Seal Collar	Magmac	10	07/23/12	80-2255-0		2025
0-199	Cover seal lower	Plastech	4	07/27/12	80-2255-0		2025
7-1298	Circuit Board Controller	MKS	12	07/27/12	58-845-0		1072
5-787	BRG1.0X.50X1.50	Fafnir	36	08/08/12	2322-0		3302
2-6182	Valve	Hurley	6	08/12/12	2322-0		3302
5-1200	Thrust washer	KC	50	08/26/12	21-2202C		4359
0-291	Solenoid Valve	Detail	12	08/28/12	57-845-0		4890
5-5922	Shaft	Marcam	8	09/05/12	58-845-0		1095
For illustation only - not actual data							

The reports, charts and graphs presented and discussed here are just a few for illustration that can be created by deploying the data mining capability of an ERP software system. The wealth of information the system generates provides tremendous value to the enterprise and supports its strategic, tactical and operational organizational objectives. The data and reports reviewed in this study provide sufficient evidence to conclude that the ERP system the firm selected for streamlining its operations for bolstering efficiency and expediting various processes to meet its business commitments and strengthen relations with corporate customers as well as vendors was a sound strategy. Equally successful was the implementation phase. It has aided the firm embark its journey toward continued improvement for sustained growth and profitability.

6. Conclusion

The DAM Corp. has experienced a measurable success in its manufacturing operations since the implementation of a new ERP system, recently installed. The integration of Quick Book Financials with the financial module of the new ERP software has been a challenge. This required the IT department to work closely with the ERP software vendor, which added cost and complexity. The operations and supply chain side of the house has used the new ERP software with little or no customization and has experienced significant improvement and broad acceptance.

Another challenge that has confronted the company in the past pertained to the warranty claims. Its products are normally warranted for one year. Too often, due to past mistakes, the company has received a unit back under warranty more than once. This is costly. The management emphasizes that warranty claims affect profit sharing for all employees and it's in everyone's interest to minimize them.

Recently, even with all of the data available, the Purchasing department has not been as proactive as should be as seen in a recent Challenge Team Meeting (a S&OP – Sales and Operations Planning meeting) held at the beginning and mid-month to review all open Sales Orders). Accurate Purchasing input is critical to an organization and this issue was quickly resolved.

IT continues to be a major component in insuring data accuracy and system success. The IT manager on a regular basis sends out changes that Purchasing, Production, Sales & Marketing and Human Resources as well as other departments have made to review data found in the Supplier files, Customer files, Production files, and HR files. This essential function helps maintain accurate and vital data needed to run the business efficiently.

Everything the firm has done is not only to satisfy its customers with the highest quality product and to enjoy a healthy ROI, but to move in the direction of continued improvement that would guarantee the firm's long range goals of growth and sustainability. A valuable asset of the company that promises sustainability is its talented and empowered workforce.

The balance of this decade for the company will be a challenge. The company is moving away from being a small firm that operated under chaos for years to a corporation that is in control and on its way to success. Its most recent financial records reveal that in the current fiscal year the sales have increased by 26% over the previous year, stock value has gone up by 43%, and the workforce of the firm has expanded by about 26%. During the same period, company's revenues have increased to $16 million, a healthy jump of 14.3%, and are expected to grow further in the current year. Overall, the business is growing and the management must continue to maintain a sustained growth and healthy margin rather than over extending.

All evidence examined in this study, subsequent to the implementation of the new ERP, strongly indicates that the DAM Corp. continues on its successful journey in pursuit of its place in the corporate arena. The impact of the new IT systems is visible across all functions and departments. As in any software tool, the users are the key to its day to day successful utilization. The company is well placed in that respect. In sum, any organization that has the right tools, a talented and trained workforce with competent IT support, a market that needs to be served, and excellent customers and suppliers is bound to grow and sustain its prosperity.

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