

EXECUTIVE INFORMATION FOR STRATEGIC DECISION MAKING

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ABSTRACT

The second half of the twentieth century saw the development of a new source of information within manufacturing organizations. This was especially true regarding cost information required for strategic decision making at the production stage. No longer was the accountant the sole provider of information. The Information Age is characterized by the technology that accumulates large amounts of data and processes it into meaningful information for management. The accounting function, however, still continues to provide the financial information. At the same time that the new information systems were being developed two other concepts became popular. They were Just-In-Time inventory management and Backflush accounting. The development of Backflush accounting has resulted in the accountant's withdrawal from their former role in providing information. This can be a serious problem in the manager's evaluation of the profitability of a supply chain or a value chain. This paper examines the various cost information processing mechanisms pertaining to Supply Chain and Value Chain evaluations in order to improve the management decision making process.

Keywords: Financial Supply Chain, Strategic Decision-making, Enterprise Resource Planning, Cost Information Processing.

INTRODUCTION

The success of supply chain management depends on the strategic decisions made at various stages of the supply chain, including that part of the chain which affects the actual production. In view of this, the availability of information required to make optimal decisions at the production stage becomes critical. With the advent of innovations in information technology (IT) and the increased use of Enterprise Resource Planning (ERP) systems, the situation has vastly improved in many areas. However, there are some areas such as making decisions on dropping/adding a product or business segment, replacing/keeping equipment or implementing alternate processes/type of technology where

automated systems are not that effective. The success of strategic decision-making at the enterprise level depends on the degree of accuracy of cost assessments done at the transactional level. In order for executives to accurately evaluate the profitability of their operations, they must receive useful revenue and cost information on a timely basis. Major changes in processing cost information occurred in the 1980s and 1990s [5, 17]. Manufacturers converted to the Just-In-Time (JIT) approach to manufacturing and the accountants changed their approach to gathering cost information. As a result, cost management from a total supply chain perspective is being utilized increasingly by executives.

For the overall profitability of the supply chain, it is necessary that the scope of cost-reduction initiatives include both upstream (supplier) and downstream (customer) members of their supply chains [7]. According to Barry [2], by optimizing the financial supply chain, supply managers and their enterprises can reduce their working capital needs by as much as 20-25 percent. This is achieved by using better invoicing control and cash-flow management. Before the introduction of e-commerce, in order to run an efficient physical supply chain, it was necessary to encounter excess working inventory and excess working capital to cope with the uncertainty of demand. The strategy consisted of having excess inventory, capacity and labor to compensate for demand forecasting limitations, inefficient distribution and lack of supply chain visibility [2]. The increased use of the Internet and Extensible Markup Language (XML) can be expected as a result of increased automation in supply chain transactions. To minimize disruptions during the change over to automation, it is necessary that companies must incorporate e-business concepts into their overall business strategies. The rest of this paper is organized as follows. A brief overview of value chain and supply chain concepts is given in the next section. This is followed by a discussion on information requirements for executives. The subsequent section attempts to integrate the different methodologies to

yield a better tool for strategic decision making. A summary is presented in the last section.

VALUE CHAIN AND SUPPLY CHAIN CONCEPTS

In a typical manufacturing enterprise, the value chain model consists of the following sequence of activities: inbound logistics, operations, outbound logistics, marketing & sales, and service. The objective is to offer the customer a level of value that exceeds the cost of activities [16]. In addition to the above primary value chain activities, we also need to consider the following supporting activities: firm infrastructure, human resource management, technology development, and procurement. Supply chain management (SCM) can be defined as the combination of art and science of improving the way an enterprise finds the raw components it needs to make a product and delivers it to customers. Viewed from this perspective, SCM is an important part of the overall value chain model. This approach is useful in analyzing the impact of Information and Communications Technologies (ICT) on the manufacturing environment.

The Financial Supply Chain is increasingly recognized as an area offering significant potential for generating bottom-line improvements and creating competitive advantage. According to Killen Associates, a typical billion-dollar company spends approximately \$27 million annually for unnecessary working capital and inefficient processing functions because they lack visibility into the Financial Supply Chain and receivables [3]. It has also been estimated that the total value locked up in inefficiencies associated with the global supply chain are between \$500 billion and one trillion US\$.

The Financial Supply Chain refers to the end-to-end trade processes and information that drive a company's cash, accounts, and working capital. From a buyer's perspective, this involves the full procurement-to-payment process. For the seller, it is the order-to-cash cycle.

In both cases, the goal of the Financial Supply Chain is to optimize:

- Accounts payable and receivable
- Cash management
- Working capital
- Transaction costs
- Risk

- Administration

But unlike the Physical Supply Chain, which has seen improvements ranging from containerization to fulfillment management, there remain significant performance gaps in the Financial Supply Chain that contribute significantly to the trapped value identified above. These gaps are the result of the:

- Time required to create, transfer and process paper documentation
- Cost and errors associated with manual creation and reconciliation of documentation
- Lack of transparency in inventory and cash positions when goods are in the supply chain
- Disputes arising from inaccurate or missing data
- Fragmented point solutions that do not address the complete end-to-end processes of the trade cycle

Financial Supply Chain benefits have proved elusive because of the complexity associated with international trade. The end-to-end trade cycle involves a number of different types of parties needing to exchange information and a variety of contractual documents in a timely manner. Point solutions have provided limited value with limited ability to scale and broader e-Commerce initiatives have failed to provide the platform to manage the complexity of Global Trade, typically being proprietary by nature and/or simply consolidating data and being unable to replace the full content and legal context of paper documents.

To overcome these barriers, enabling technology must meet critical pre-requisites to be practical, and deliver enduring value to each member of the trading community:

- Progressive acceleration, automation and optimization of the Financial Supply Chain processes leading to paperless trade
- Scalable to support all settlement types, all documents, all parties and cross industry applicability
- Interoperability with e-Commerce and Trade Community platforms and applications
- Incremental application components to deliver targeted value, speed of implementation and a direct return on investment

- Trusted Third Party platform with neutrality through governance
- Full coverage of the commercial, logistics, financial and regulatory documents required for international trade.

Even though outsourcing may reduce the cost of the actual product, some times they decrease the capital efficiency of the value chain for the following reason. Plants and equipment are often far more expensive to finance in emerging market countries [8]. Furthermore, inventory tends to get pushed downstream to suppliers, which often have a higher cost of capital. In addition, global operations can add weeks to the value chain, tying up as much as 30 percent of product price in working capital.

INFORMATION REQUIREMENTS FOR EXECUTIVES

Accurate processing of cost information is critical for successful financial supply chain management. A necessary precursor for costing is the proper tracking of inventories through the supply chain. Prior to the arrival of Just-in-time (JIT) manufacturing, the accounting function tracked inventories from receipt until the final units were produced. Theoretically in a JIT environment raw materials are received only when needed and there is little or no work in process used as buffers between work stations. To meet the needs of the new environment, the accounting profession developed a cost accounting approach called 'Backflush Accounting.' In this approach, the accountants would no longer track inventories. Rather, the manufacturing people would instead provide reports that the accountants then would use to prepare the statements that would describe the movement of inventories through the manufacturing process. A classic example was the Hewlett Packard Company's adoption of JIT. HP eliminated receiving reports, material requisitions, and work orders. Thus, most of the documentation and inventory reporting that management needed was eliminated. This did not remove management's need for real time information about their inventory. Since the requirement still existed, HP instituted an ABC inventory control system to provide the needed information and periodic physical counts were made to determine the number of units on hand. The department charged with providing this information was the MIS department [6, 10, 12, 14,18].

Enterprise Resource Planning (ERP) systems were expected to integrate operational transactions and informational requirements of managers for strategic decision-making [4]. However, in some cases, the rigidity of "template approach" has resulted in unsatisfactory results. Innovations in information technology provide a seamless flow of information at a relatively low cost. Companies can leverage the core competencies of their partners to create value, without trying to own the entire supply chain. The vertically organized enterprise is being replaced by hubs of value, described as a 'business ecosystem' by Harteley-Urquhart [8]. The traditional model is asset intensive and the emphasis is on value chain control. Information flow in such enterprises is managed through ownership. The new approach can be described as an extended value chain. The focus is on divestment of assets. Access to information is obtained by collaborating with partners. The extended value chain focuses on external optimization, synchronization and information. Financial supply chain can be optimized by integrating information about the physical flow of goods with the financial flow. The objective is to find the right strategy and combination of trade-offs in terms of costs and assets.

Due to increasing demands on manufacturing organizations, the ability to accurately and efficiently model fabrication and assembly operations and their associated time and cost is becoming increasingly important. While cost modeling systems can be implemented in many ways, two that are prevalent today in many engineering fields are Activity-Based and Cost Estimating Rules (CER) based.

Activity-Based Costing (ABC) models take a bottom-up approach. All relevant resources (people and machinery) and materials (purchased components and raw materials) are assigned a cost per unit, and they are tracked through all of the operations required in order to create the end product. In the end, all of the costs are summed at each level of the product structure, from piece part fabrication to final assembly. CER-based models implement a top-down approach. Cost estimating rules are usually based on historical data, such as "it costs \$20,000 per pound to launch a payload into low earth orbit."

Today, the managerial accounting function is promoting Activity Based Costing (ABC) as the appropriate means for valuing inventories. Financial Accounting Standards require that all inventories be valued at their full cost of production. In this approach, costs generated by activities that are not

directly connected with manufacturing are allocated to the cost of the final product. Where only one product is produced in a plant, the identification of a unit cost during a given time period is rather simple. One just has to divide the total overhead incurred by the total units produced to arrive at the overhead allocation per unit produced. The allocation is more complex when the manufacturing facility is a multi-product plant. In this situation, costs are allocated through the use of cost drivers. The cost driver could be something like the number of purchase orders generated in the purchasing department. In this way a portion of the purchasing department's costs will be allocated to the value of the inventory [1, 6, 10, 18]. The IT implications of such transactions play an important role in making decisions at the enterprise level. What appears to be an optimal solution at the division level may not be such a good decision at the enterprise level.

AN INTEGRATED APPROACH

The ABC system of overhead cost allocation has simplified the process. Possibly, it has improved the accuracy of product costs for inventory purposes. However, it is highly questionable that the ABC system has, in effect, identified the true cause of factory overhead costs and as a result, identified the cause and effect relationship between units produced and those costs. By definition, overhead is a capacity cost that is an "indirect" cost of goods manufactured and can never be truly identified with a particular unit of product. To further compound this problem of relating plant burden costs to units produced, researchers are reporting that most factory overhead costs are fixed in nature [10]. With the increase in more automated factories, there are fewer costs of production directly related to units produced.

For the valuation of inventories, the ABC system of cost accounting is a step in the right direction. From a financial accounting perspective, improved inventory valuation should enhance the correctness of the stockholders report. The new system, however, is not a great leap forward in providing information to managers for the strategic decision making process. Management is faced with numerous strategic decision making situations. Chief among these include:

- Special order
- Drop/add a product or business segment
- Replace/keep equipment
- Alternate processes/type of technology
- Eliminate an unprofitable segment
- Make or buy a component
- Analysis of performances (margin analysis)

All of the above decisions require that cost information must be provided on a fixed and variable cost basis.

A strategic decision of importance to decision makers is the possible elimination of a product in a multi-product production operation. The product may be unprofitable from a full cost basis. In this decision, however, the question to be answered is the effect on profitability by the elimination of the product. As long as a product has a positive contribution margin (price – variable cost per unit), it is reducing the fixed cost burden that other products would have to bear. An example would be the overhead burden from the typical purchasing department of today. In these operations, organizations are using the Internet (fixed cost), computers (fixed cost), and B2B or ERP (Enterprise Resource Planning) software (fixed cost) systems to provide material resources for the production process. Purchase orders are typically driven by an ERP system and are released to vendors over the Internet. The primary purpose of people in the purchasing department is to ensure that the system continues to operate. In short, the system is automated and people are primarily observers. As long as the product is making a positive contribution, it is enhancing the profitability of the organization. The question to be answered at this point: is any replacement product going to improve profitability to a greater extent than the product currently being produced? If not, and the current product has a positive contribution margin, then it should be kept, even though it is not profitable on a full cost basis.

An illustrative example is indicated in Appendix I. Consider a manufacturing facility which makes two products, Product A and Product B. Product B is the major product utilizing 80% of the time spent producing in the plant. As a result based on this activity level 80% of the depreciation of plant and equipment is charged to B and 20% is charged to A. This basis can also be used to allocate the costs (although there may be better methods of apportioning these costs to each product) of other factory costs such as administrative salaries, the cost of operating purchasing and receiving departments, the personnel department, quality control, and yes, even the cost of the Management Information Systems department. In short, when full costing a product, many and varied expenses are charged to the product to determine its full cost or value. As one can see in Appendix I, in doing this, Product A is now in a loss position. The question to answer is, will we improve profitability by elimination of this product? The answer is no. The allocated

depreciation and other allocated costs will have to be absorbed by Product B. The result will be to allocate 100% of the depreciation and other allocated costs to Product B and the final profit will now be reduced from \$1,020,000 to \$840,000. Even though Product A was losing money on a full cost basis, it contributed \$180,000 to fixed cost reduction which allowed Product B to be more profitable.

Another type of strategic decision making problem would be the selection of technology to be used in an operating process. The decision in this case would be to select between a labor intensive and a capital-intensive process. In the labor-intensive process, fixed costs would be low and labor costs per unit of production would be high. While in the capital-intensive process, fixed costs would be high and labor costs per unit of production would be low. Each would have an advantage given a particular environment. The critical decision would depend on the anticipated demand for the product. In a high demand situation, the capital-intensive process would result in lower total costs. In a low demand situation, the labor-intensive process would result in lower total costs. Thus, the important factor in this decision situation would be to match the relevant technology with the anticipated demand. In a standard transaction processing system, these differences will not be separately tracked and may lead to imprecise information being fed into the decision-making process at the strategic level.

In decisions such as the one referred to above, the information system for supporting strategic decision-making must provide information that will allow executives to make these decisions correctly. Such information requirements cannot be sufficiently met by the standard knowledge management practices, if any. The current use of financial accounting data does not adequately support this process since the primary focus of financial accounting is the generation of financial accounting documents such as the Income Statement and the Balance Sheet. As such, the accounting information system is not geared to the production of information which is necessary for some strategic decisions.

A mistake that many people make is the assumption that all costs are variable in the long run. In the long run, all costs are changeable. The short run definition of variable costs implies that there are different possible operating levels with the given set of production facilities. In the long run, managers have choices about the fixed factors that they are going to operate in the short run. They can make decisions with regard to plant capacity, technology, location,

etc. But, once these decisions have been made, managers must recognize that while their strategic decisions are made for the long-term, organizations operate in the short-term. As a result, managers must understand that some costs are variable in the short-term while others are fixed.

Second, the concept of distinguishing between committed and discretionary fixed costs must be brought into the analysis. If a fixed cost can be eliminated without penalty to the firm, it is a discretionary fixed cost. However, many fixed costs are not discretionary. They cannot be removed without penalty, and the firm must continue to incur them in one form or another. The practice of transferring them from the operations accounts to the income statement does not truly reduce the total expense. It simply advances the recognition of it. A classic example of this is transferring production from one plant to another and closing the first plant. In accounting, the cost of this closing is not charged to operations but rather to the nonrecurring expenses of the income statement. On the one hand, it makes operating costs look smaller, but the reality is a huge expense and a significant impact on current income. For the strategic decision maker to make the correct decision, relevant information must be provided by the information systems within an organization. If the accounting function is not going to focus on providing this information, then, who will?

Organization information systems have evolved significantly in the last fifty years, and they will continue to evolve. They have changed from paper and pencil to computer driven systems. While the means have changed significantly, the providers have also changed and in our estimation will continue to change. At one time the management accountant was the principal provider of information for strategic decision-making. Today, the managerial accountant has withdrawn from this function, and is now a recipient of information provided by the organization information system. The MIS system is now the provider of basic information such as inventories, personnel costs, equipment costs, etc. In short the ERP system collects data and distributes it to the relevant users.

It is assumed that the financial accounting system is independent of an organizations MIS system. While this may be true in part, it relies heavily on this system to prepare its reports. These reports in many respects are oriented to outsiders who will use these reports to assess the financial condition of the firm. While important, they are not in a framework for making executive decisions. This shortcoming can

be overcome by the MIS system creating the necessary reports.

SUMMARY

Contemporary information systems provide the real time data used by accountants to prepare financial documents. This results in fixed costs being mixed with variable costs to full cost a product. A product or a division may be losing money but still be making a contribution to overall profitability. Information must be presented to management which will reflect this possibility. Information systems can provide this data directly to management. ERP software such as SAP already provides a Strategic Decision module. It is just necessary to provide the proper data within this structure to management.

Jim Shepherd of AMR Research states that the notion that a company can transform itself into an e-business by simply using a piece of software and adding it to its existing infrastructure is wrong and dangerous [15]. As supply chain management becomes more involved in strategic decisions, it is critical that we have reliable information sources. In order to fully realize the positive impact of IT, it is necessary to integrate physical, informational and financial supply chains. In this paper, we have studied several strategic decision-making scenarios at the enterprise level. Future research involves developing a framework that enables extraction of relevant information that is needed for optimal decision making. We also plan to study the ways in which RFID technology can be harnessed in the context of inventory management and its effect on some types of strategic decision making.

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APPENDIX I

Income Statement

For the Year Ended 12/31/07

	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales	\$ 400,000	\$3,000,000	\$3,400,000
Direct Labor	180,000	400,000	580,000
Direct Material	40,000	460,000	500,000
Allocated Depreciation	<u>60,000</u>	<u>240,000</u>	<u>300,000</u>
Cost of Goods Produced	\$ <u>280,000</u>	<u>\$1,100,000</u>	<u>\$1,380,000</u>
Gross Profit Margin	\$ 120,000	\$1,900,000	\$2,020,000
Allocated Cost	<u>200,000</u>	<u>800,000</u>	<u>1,000,000</u>
Net Product Profit (Loss)	<u>\$ (80,000)</u>	<u>\$1,100,00</u>	<u>\$1,020,000</u>