

# Optimizing the Supply Chain

## Introduction

At the 17 October 2002 meeting of the FINE<sup>1</sup> Network Veena Gupta raised the premise that a more through application of principles and practices of mathematical optimization can improve the performance of the supply chain.

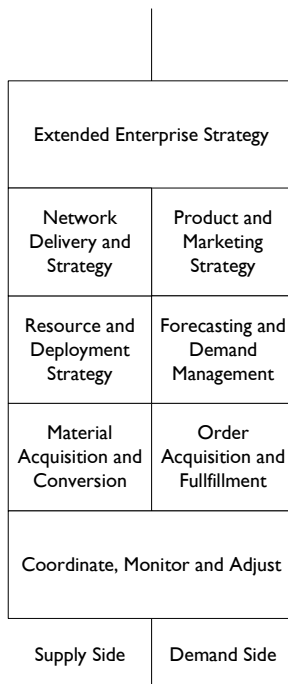
The intent of this paper is to begin a discussion of this matter to culminate at some later date in a conclusion as whether or not action should be taken to move further forward on the premise.

## The Supply Chain

The Council of Logistics Management Supply Chain Management as follows:

“Supply Chain Management is the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.”<sup>2</sup>

A project in which the author had an interest<sup>3</sup> defines the supply chain as a set of meta-processes as shown in the figure below.



There are five major outcomes to be optimized in a supply chain.

1. The flow of product.

The importance of optimizing the flow of product is dependent upon the geographical distribution of the processes that act to transform the product in some way. This is an area of optimization in that has a long and successful history of the application of mathematical optimization. It may be an area in which there is marginal opportunity for gain or advancement of the state of the art.

2. The flow of money.

The importance of optimizing the flow of money is dependent upon the time-value of money as fixed by interest and foreign exchange rates. Like the flow of product, much has been done optimize these flows. This may also be an area in which there is marginal opportunity for gain or advancement of the state of the art.

3. The flow of information.

The importance of optimizing the flow of information is dependent on how this information supports the decision processes that result in the desired outcomes for product and money flow. This is an area of optimization that has been receiving significant attention since the dawn of the modern age of business reengineering

<sup>1</sup> <http://www.ariesmart.com/fine/>

<sup>2</sup> <http://www.clm1.org/about/purpose.asp#definitions>

<sup>3</sup> Adapted from *The Supply Chain Management Project: Visualizing the Supply Chain and Its Opportunities 1994-1995*

age some 22 years ago.<sup>4</sup> It is likely to continue to receive considerable attention for the foreseeable future. Much has been done to optimize these flows. However, there continues to be significant opportunity for gain and advancement of the state of the art.

4. Processes.

The importance of optimizing the processes is that they determine the outcomes for product and money flow. This is an area of optimization, like information flow, that has been receiving and will continue to receive significant attention for some time. Much has been done to optimize processes. However, given estimates of the low success rates<sup>5</sup> for process optimization, there continues to be significant opportunity for gain and advancement of the state of the art.

5. The roles and responsibilities of the involved parties.

The importance of optimizing the roles and responsibilities of the involved parties is that these are the fundamental determinant of the success of the supply chain. Automation of processes and information flows has led to changes in roles and responsibilities of the involved parties.<sup>6</sup> Even so, these automation decisions result from involved parties making decision as to what to automate, why and how. Much has been done in this area, yet much remains to be done. Indeed, all these notions of optimization are imbued with the notion of change. Changes in the roles and responsibilities are perhaps the most difficult to bring about.<sup>7</sup>

In sum then,

Financial outcomes

Are dependent on

Financial flows

Are dependent on

Product flows

Are dependent on

Information flows

Are dependent on

Processes

Are dependent on

Involved parties.

The further one goes down this line of argument the more significant and difficult is the optimization process.

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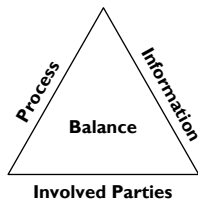
<sup>4</sup> Manske, F. (2000). PRECEPT - Process Re-engineering in Europe: Choice, People and Technology. Bremen, Artec, Research Centre Work and Technology. University of Bremen: 22.

<sup>5</sup> I vaguely recall success rates on the order of 50 percent..

<sup>6</sup> Third party logistics firms are an example of this.

<sup>7</sup> Gabel, J. E. and S. Pilnick (2002). The Shadow Organization in Logistics: The Real World of Culture Change and Supply Chain Efficiency. Oak Brook, Council of Logistics Management.

In the practice of business reengineering there is consideration of a balance between information, processes, and involved parties. One would not, for example, seek to undertake a significant change in process a correspondingly significant focus on organization change management. Indeed, it is precisely this lack of focus that has caused many reengineering projects to fail

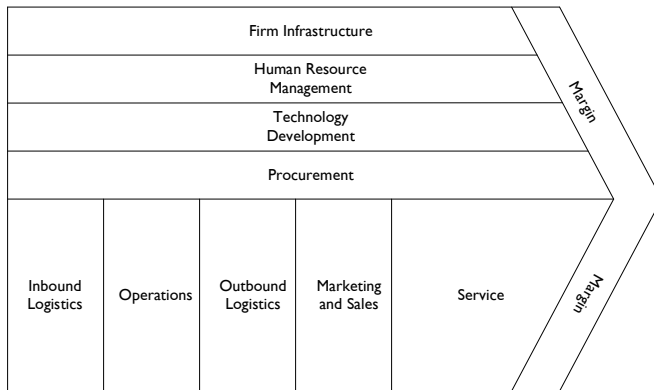


My experience, however, is that the central focus of reengineering is often on the process with follow-on focus on information since this is key to the implementation of the process recommendations.

Focus on the involved parties is often not for their optimization, but rather for how they may impact the process change.

Nor am I aware of any focus on optimization of these three items as a set.

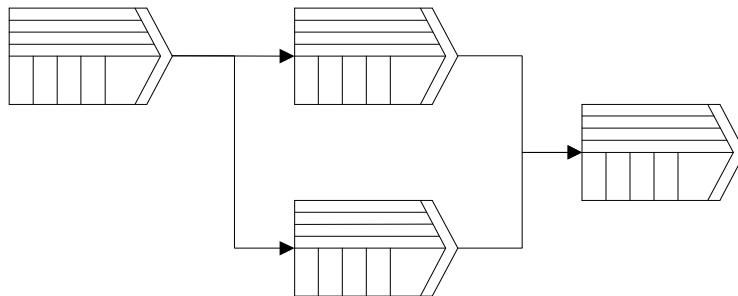
The supply chain exists within a larger construct portrayed by a Porter Value Chain.<sup>8</sup>



The supply chain model corresponds chiefly with the lower half of Porter's model.

In general, I think that current practice is one of optimization in individual areas of the Porter model, but not necessarily on the whole.

This whole matter becomes additionally complicated when one considers that the value chains do not stand-alone.



Depicted to the left is this network of interconnected value chains.

So, it seems to me we have five levels at which optimization can take place.

1. Individual outcome such as product flow.
2. Individual process such as order acquisition and fulfillment.
3. Integrated business system (i.e., process, information, involved parties).
4. The value chain.
5. A network of value chains.

One could, of course, take a vertical slice through this stack seeking to optimize, for example, information flow associated with inbound logistics.

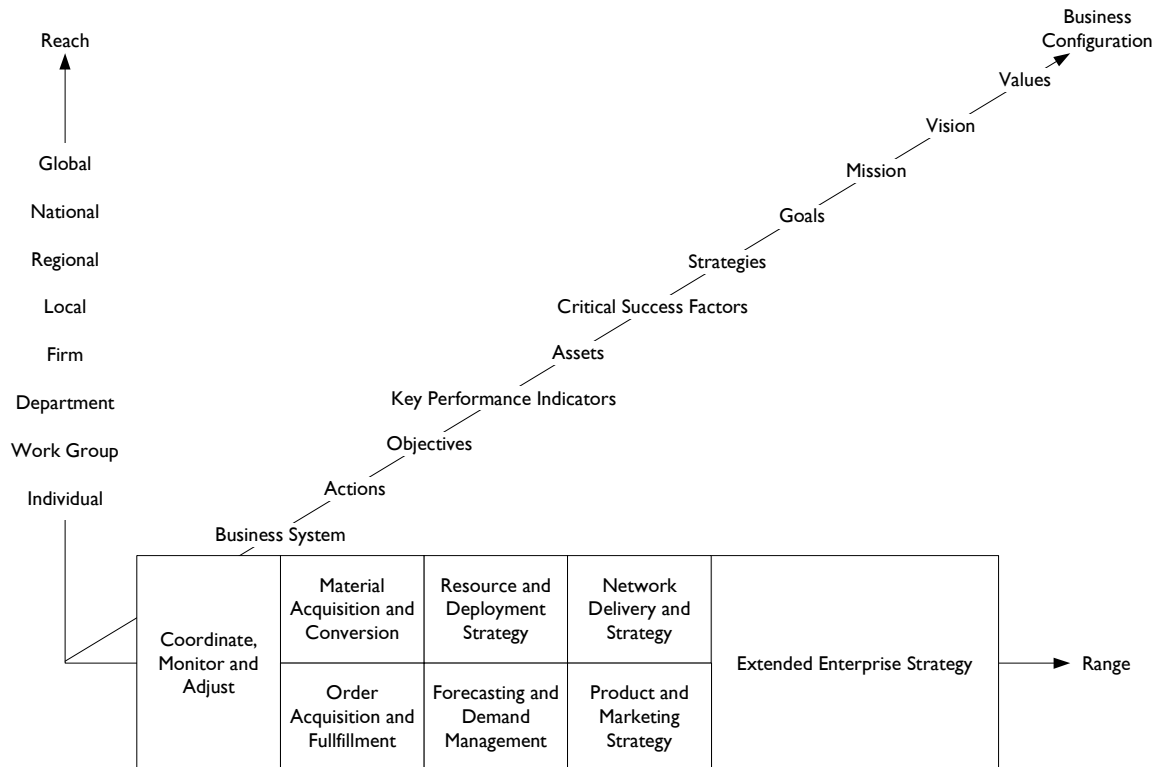
<sup>8</sup> Porter, M. E. (1985). Competitive Advantage: Creating and Sustaining Superior Performance, The Free Press.

What is lacking is a risk-reward assessment across these five levels. There may well be a margin point where additional emphasis on optimization does not yield a corresponding increase in benefits. Furthermore, on the basis that what makes everything possible are the roles and responsibilities of the involved parties, it may well be that optimization at levels four and five is difficult to conceptually grasp.

Notable exceptions to this last statement are the just-in-time concepts that have been implemented in manufacturing. Still, however, these are representative of a focused vertical slice through the stack.

This leads to a question of defining the problem space.

The following diagram borrows the idea of reach and range from Keene<sup>9</sup> and couples it with an idea of the components of a business configuration.



Reach represents the involved parties; range the function provided the parties; and business configuration the organizational components.

The pertinent questions are:

1. Where is optimization taking place in this space and how effective has it been? One doesn't want to necessarily work where other others have worked.
2. Where are other opportunities for optimization in this space that will yield real business benefits?
  - a. What business decisions are made to capture these opportunities and why?
  - b. What approach to making these decisions can be taken and why?
  - c. Where will the data be sourced in support of these decisions and how?
  - d. What are the risks associated with realizing these new opportunities and how can they be mitigated?

<sup>9</sup> Keene, P. G. W. (1991). *Shaping the Future: Business Design Through Information Technology*, Harvard Business School Press.

e. What are the associated costs?

It seems to me that a reasonable course of action from this point forward is:

1. Have the thinking outlined in this document vetted by respected practitioners in the supply chain field.
2. Establish a more-or-less standard model for looking at the problem space.
3. Identify within this model the optimization opportunities that have already been realized.
4. Identify within this model other promising opportunities. Promising means that significant gross benefits<sup>10</sup> have been identified.
5. Define the approach for realizing the selected opportunities.

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<sup>10</sup> The definition of significant gross benefits requires additional work.

# Supporting Ideas

## ***Collaboration Is Crucial To Business Success***

From Accenture

With an economic rebound less robust than anticipated and greater pressure to enhance shareholder value, companies see collaborating with suppliers and customers as an opportunity to increase top-line growth and reduce costs, according to research to be released November 25 by Accenture.

The research is based on a survey of 150 senior executives at Fortune 1000 companies in the manufacturing, high-tech, transportation, finance, insurance and utility industries. Participants were asked a variety of questions about collaboration with supply chain partners, including the benefits of collaboration, barriers to collaboration and key areas for collaboration.

Fifty-four percent of the survey respondents indicated that developing collaborative relationships in demand and supply planning with their customers and suppliers was very important, compared with less than 10 percent who said that such collaboration was not important.

"That the survey confirms a strong emphasis on collaboration, which entails sharing detailed information with suppliers and customers, shouldn't be surprising," said John Matchette, a partner in Accenture's supply chain practice. "During an economic downturn, successful companies focus on collaboration because it enables them to improve visibility and transparency in their supply chains, which helps increase efficiencies and ultimately reduce costs."

When asked what one area of collaboration creates or could create the greatest value for their business, the respondents were split between collaborative product design (26 percent), joint sales planning (23 percent) and production planning (21 percent).

When asked to identify the largest benefit their company achieves or expects to achieve by collaborating with trading partners, 28 percent of respondents said increased sales and top-line growth, another 28 percent said cost reductions or savings, and 21 percent said developing stronger strategic relationships.

"Our experience tells us that the growth and savings expected from collaboration come from two areas," said Matchette. "First, collaboration allows you to focus on your core competencies, freeing up your company's resources to drive greater growth. Second, the information-sharing inherent in collaboration increases understanding of customer needs. The more you collaborate with your downstream partners, sharing forecast data and user-demand data, the more you'll improve your forecasts, cut your inventory and reduce your production costs."

"Ultimately, Matchette continued, "we believe that the next cost and productivity frontier for companies is going to be with their channel partners because these partners are holding their products and shipping them to customers using, in many cases, duplicative assets."

When asked which information would benefit their companies the most, 43 percent of executives surveyed selected greater access to customer demand data (including point of sale, sales forecast, etc.), 20 percent said strategic plans about products and pricing, and 18 percent selected production plans, inventories, and shipping information. Among the survey's other findings:

"Lack of a clear value proposition" was chosen by the most respondents (26 percent) as the greatest barrier to successful trading partner collaboration in their organizations, followed by "technology and data synchronization hurdles," which 22 percent of respondents selected.

When asked what factor would most persuade them to invest in integrated processes and technologies with their trading partners, nearly half of respondents (48 percent) said "operational effectiveness," followed by 32 percent who selected "close relationships with customers requesting it"; only 2 percent selected "close relationships with suppliers requesting it."

<http://www.accenture.com>