

# Finding the Value in Your Value Network

## *Prioritizing and Accelerating Process Improvement for Profit*

Arnold Mark Wells, CPIM with Mike Okey

### What is the Ultimate Goal of Supply Chain Planning and Execution?

In his recent book, *Islands of Profit in a Sea of Red Ink*, Jonathan Byrnes opens Chapter 1 with this statement, “***The most important issue facing most managers is how to make more money from their existing business without starting costly new initiatives.***”

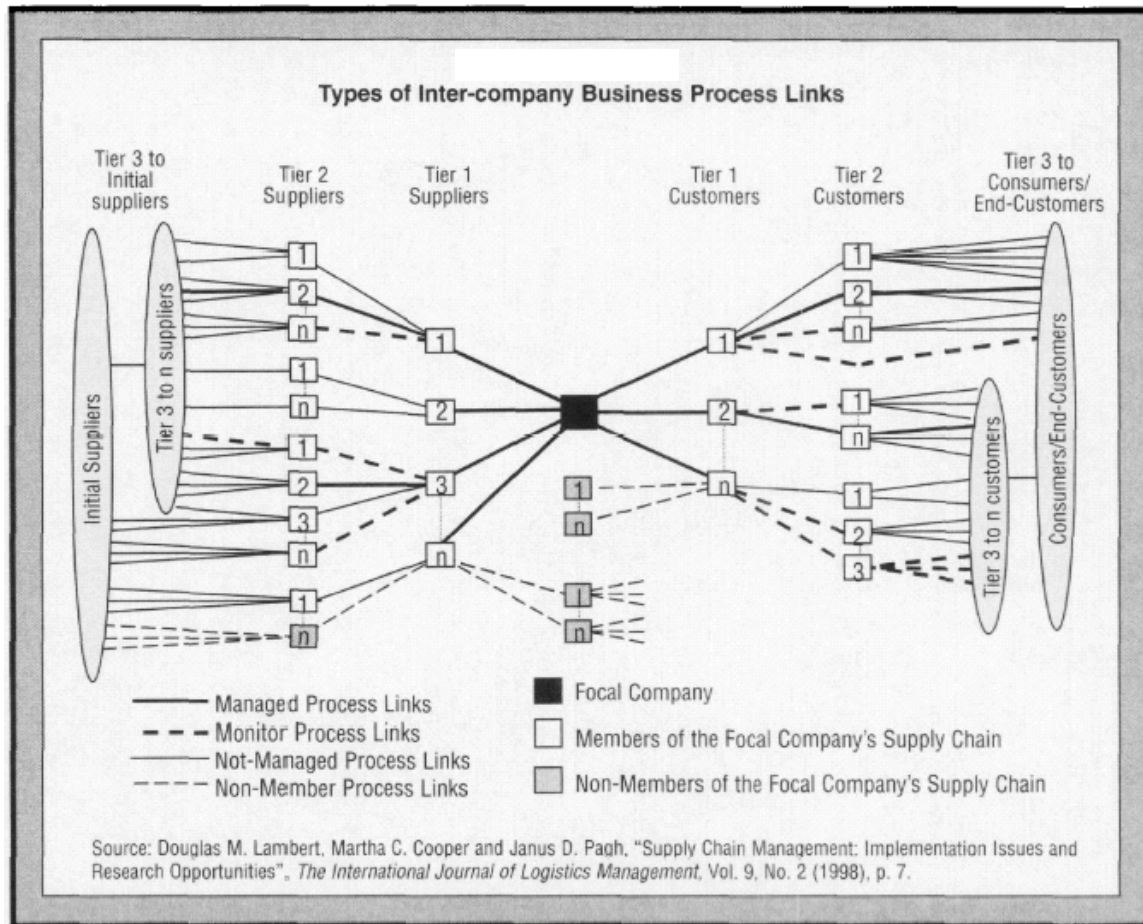
That is your goal. Yet, you face more tasks than you can accomplish. Some activities are so critical that operations falter, customers complain, and senior management reacts if you do not perform them well. You form a crucial link in a network of processes and activities involving colleagues, vendors, customers, and partners. Smart planning and flawless execution remain your standard, but you are measured on aggregate KPI’s which do not identify where hidden value lies.

You owe a responsibility to your shareholders through the organizational chain of command. Those who have invested their own equity into your company expect that the value of their investment will grow as fast as possible. Your challenge to find more revenue, improved margins, and a higher return on assets continues. You need a practical method to help direct your efforts for maximum shareholder impact – a map to higher enterprise value through the supply chain.

Benchmarking studies may tell you that more treasure waits for your shareholders based on comparison with peer businesses. Ok, that’s good to know, but capturing this treasure remains elusive. Worst still, benchmarking is a comparison of aggregate averages. This is not very useful if you are trying to find ***precisely where*** the value lies.

If the supply chain were (as the term implies) really a linear, sequential relationship of entities exchanging goods, information, and currency in a binary, stepwise flow, it might not be quite so difficult. However, you know that **the supply chain really is a complex network of inter-dependent people, organizations and fixed assets, and that goods, data and currency pulse from node to node in almost any direction following the path of least resistance.** This “value network” (see Figure 1 for an example) contains the money you seek. But, since the movements of material, data and cash are continuous, dynamic, and interdependent, the benchmarking results that tell you that you have some aggregate potential do not often change, despite your efforts to the contrary.

Figure 1<sup>1</sup>



### An Approach We Can All Use

You do not have a crystal ball, but you still need to make higher quality (i.e. more profitable/valuable) decisions in less time. The value network is a complex machine, if not an organism. How do you prioritize your efforts to attack undesirable business symptoms with better decision processes so that revenue growth, return on net assets, and profitability are increased?

Let's start with what we know. We know the undesirable business symptoms. These are the measurements that make our sleep fitful, cause our hair to turn gray, churn our stomachs, and make some business meetings uncomfortable. Examples of these can be seen on the horizontal axis in the Process/Symptom/Value (PSV) Matrix (Figure 2). From the PSV Matrix, we see that undesirable business symptoms directly and negatively impact financial measures that determine the value of the enterprise (e.g. Economic Value Added or EVA<sup>®</sup>).<sup>2</sup> We want to ameliorate these symptoms. A symptom that does not significantly inhibit revenue growth, return on net assets, or margins can

be addressed as a secondary priority.

The problem is that the undesirable business symptoms are aggregate measures. They require decomposition in terms of the root cause. The PSV Matrix has been constructed to reflect a broad group of decision processes throughout the value network without regard to a particular methodology within a given decision process (e.g. Theory of Constraints, Lean, software applications, etc.). The PSV Matrix relates business decision processes to symptoms, ultimately allowing us to link potential root causes within each decision process to undesirable business symptoms.

In the PSV Matrix, decision processes form the “y-axis”. It is helpful to think in terms of decision processes so that once the true root causes have been identified and prioritized, solutions can be addressed systemically through the improvement of a decision process. Multiple root causes in multiple decision processes can relate to a single symptom (multiple shaded cells in a vertical column in the PSV Matrix). On the other hand, a single root cause may be causing multiple undesirable symptoms (multiple shaded cells in a horizontal row). Consequently, we must quantify and prioritize the root causes so that we know which business decision process should be attacked first.

Figure 2 – Process/Symptom/Value (PSV) Matrix<sup>3</sup>

Root Decision Processes	<u>Top Line Revenue Growth</u>					<u>Higher RONA</u>							<u>Higher Operating Margin</u>					
	Undesirable Business Symptoms																	
	Slow Concept to Production	Too Many Emergency ECO's	Lost Market Opp.	Too Many Canceled/Unfillable Orders	Too Many Returns	High FG Inv	High Intermediate Inv	High Raw Stock Inv	High Risk of Obsolescence (Reserve for write-down)	High DSO	Low DPO	Profitable Use of Fixed Assets	High Shipping Costs	High Late Penalties	High Mfg. Costs	High Waste	Non-optimal Product Mix	High Carrying Cost
Collaborative New Prod. Dev.	Blue	Blue	Blue	White	Blue	White	White	White	White	White	White	Blue	White	White	Blue	White	White	White
Structural Cost & Opportunity Analysis	White	White	White	White	White	Blue	Blue	Blue	Blue	White	White	Blue	White	White	Blue	White	White	Blue
Collaborative Planning and Forecasting	White	White	White	Blue	White	Blue	Blue	Blue	Blue	White	White	White	White	White	Blue	White	White	White
Capacity Planning	Blue	White	Blue	Blue	White	White	White	White	White	White	White	Blue	White	White	Blue	White	White	White
Safety Stock Optimization	White	White	White	Blue	White	White	White	White	White	White	White	Blue	White	White	Blue	White	White	White
Synchronized Planning	White	White	White	Blue	White	White	White	White	White	White	White	Blue	White	White	Blue	White	White	White
Detailed Finite Scheduling	White	White	White	Blue	White	White	Blue	White	White	White	White	Blue	White	White	Blue	White	White	White
Accurate Order Promising	White	White	White	Blue	White	Blue	Blue	Blue	Blue	White	White	White	Blue	White	Blue	White	White	White
Transportation Planning	White	White	White	White	White	White	White	White	White	White	White	Blue	White	White	White	White	White	White
Statistical Process Control	White	Blue	White	White	Blue	White	White	Blue	Blue	White	White	Blue	White	White	Blue	White	White	White
Sourcing & Contracting	White	Blue	White	White	Blue	White	White	Blue	White	White	White	Blue	White	White	Blue	White	White	White

**This is only an example, though perhaps not too far from what a PSV Matrix would look like for a manufacturing firm. However, the PSV Matrix for each firm should be constructed specifically for that firm.**

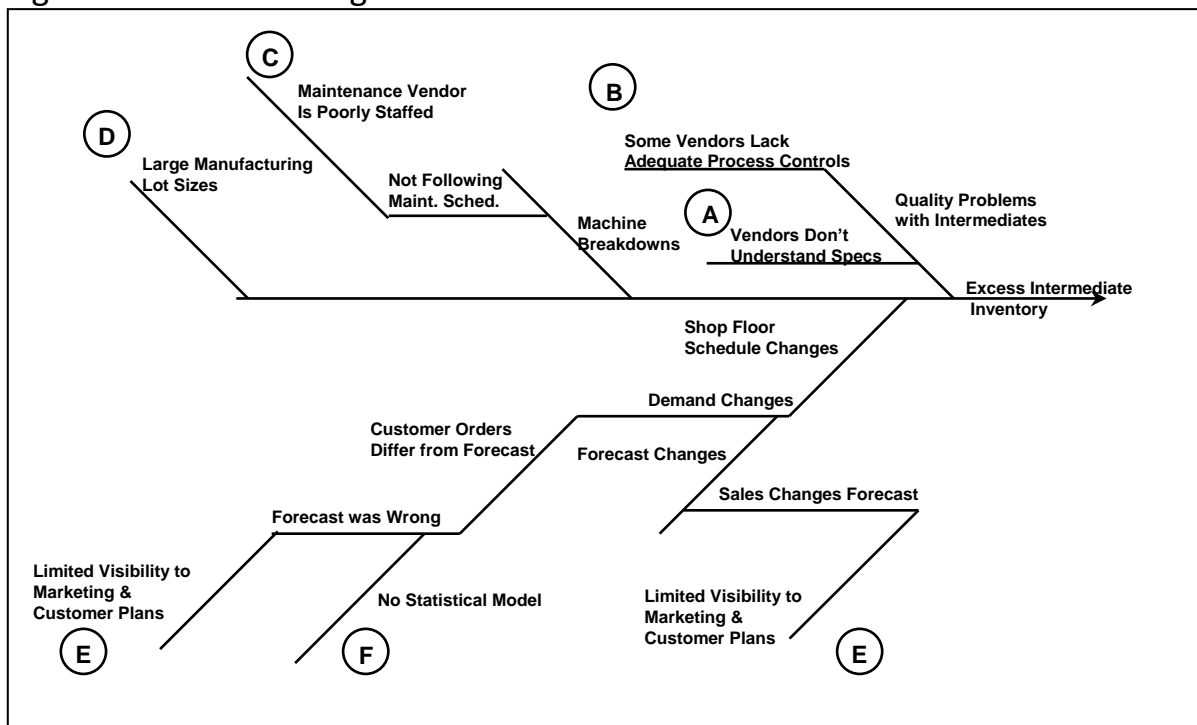
Each meaningful intersection can also be scored according to relative impact, providing a “heat map” of opportunities for improvement. Columns and rows can then be totaled in order to provide an intuitive, top-down sense of priorities. However, one must keep in mind that data-driven analysis often contradicts intuition. Therefore, some level of analysis is recommended before any scoring is attempted.

Since all businesses have income statements and balance sheets, the formula for corporate value (e.g. EVA<sup>®</sup>) remains the same, though degree of challenge in moving the needle on each factor in the formula may vary across industries. The symptoms themselves, as well as the emphasis and criticality, can also vary across industries, but many firms will have a lot in common.

### The Hard Part of Getting to the Value

For each symptom, we trace the potential causes that make it so undesirable. Remember that one of the big problems we face in doing this is that metrics, some of which embody an undesirable business symptom, are aggregate indicators. They do not tell us exactly where we are making sub-optimal decisions. The key is decomposition. This requires a granular analysis. In some cases, this may require a comprehensive analysis of costs and pricing by customer and product attributes or even actual shipments and invoices. In other cases, fairly simple tools are available to structure our thinking. Figure 3 shows one of my favorites for identifying potential root causes—a fishbone or Ishikawa diagram.<sup>4</sup>

Figure 3: Fishbone Diagram<sup>5</sup>

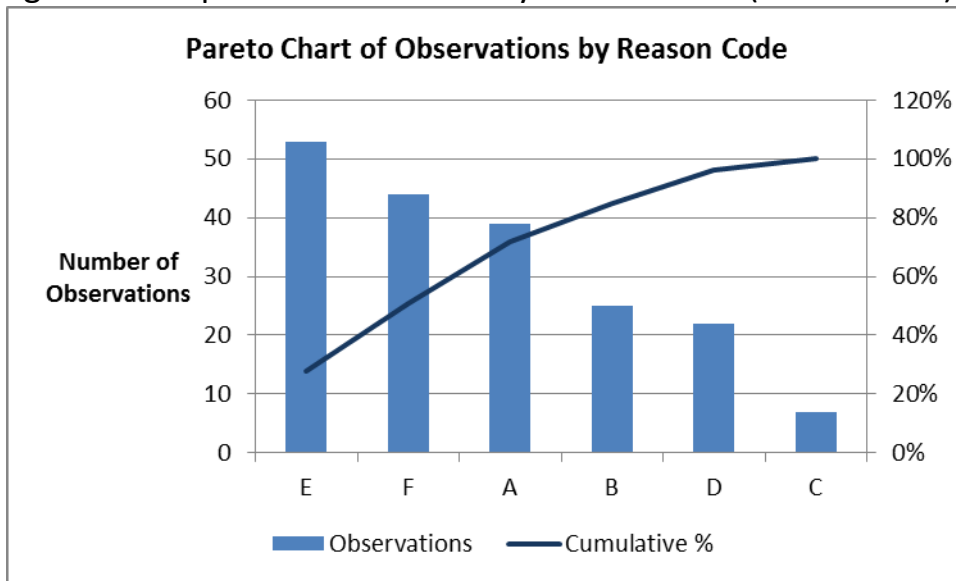


Despite the growing preponderance of business “intelligence” and “analytics”, or as we used to say in the old days, “reports”, that we might have, it is likely that the data necessary to prioritize some of these root causes will be difficult to find. Requisite data may not even be captured anywhere in our databases, spreadsheets or paper documents. For example,

consider Figure 3. The symptom is unacceptable levels of intermediate inventory. How do we capture the significance of each of the root causes (reason codes “A” through “E”)? For example, forecasting may be coming from sales. We can probably measure the accuracy pretty well by saving the forecast and then by comparing it with orders or shipments. It is harder to determine how much more effective our purchasing, manufacturing and distribution would have been if forecasts were 50% more accurate, or what the value to the shareholders could have been.

By making some observations, like how often a production run had to be interrupted to start another one based on a canceled order or a forecast that was wrong (in a make-to-stock environment), we can begin to build a collection of data that will be the foundation for answering this question. Then, by creating a graph (see Figure 4) that shows the schedule changes by reason code, we will get an understanding of the relative size of the factors that contribute to the undesirable symptom of excess intermediate inventory.

Figure 4: Graph of Observations by Reason Code (Pareto View)<sup>3</sup>



In our example, reason code “E”, limited visibility to customer plans, is the most significant root cause of excess intermediate inventory according to Figure 4. Additional information regarding future demand may be available from our customers or even our own marketing plans, but we do not have access to it in the forecasting process.

If we can build a demand planning business process (the process of anticipating future consumption) in which to embed our sales forecasting activities that facilitates collaboration, (both internal and external), we will address that particular root cause and reduce our intermediate, or work-in-process (WIP), inventory. By establishing a hypothesis regarding how much improvement in forecasting might be possible through this approach, we can project a possible reduction in average WIP by the average amount of WIP caused by a schedule change

resulting from a poor forecast, multiplied by the assumed improvement in forecasting accuracy. By testing several hypotheses with regard to the potential improvement in the forecast accuracy and stability through a more collaborative business process, we can get a sense of the range of possible improvements.

Consider this example:

- we believe that we can reduce forecast errors by 50% through a collaborative demand planning process
- we have 4 plants, each with 40 unplanned schedule changes per year
- 25% of unplanned schedule changes or 40 schedule changes in a year are due to late forecast changes/errors
- average WIP inventory is \$1,000,000
- average increase in WIP caused by a schedule change is \$20,000 with only minor variation

Therefore, a collaborative demand planning process could reduce work-in-process inventory as follows:

50% reduction in forecast changes/errors x 40 schedule changes due to forecast errors = 20 less schedule changes

20 less schedule changes x \$20,000 average increase in WIP due to a schedule change = \$400,000 less WIP in a year

\$1,000,000 current average WIP minus \$400,000 less WIP created in a year means an average WIP of \$600,000 – a 40% reduction in average WIP by the end of one year, reducing the amount of working capital that is required to finance inventory, freeing it up for other uses and increasing the value of the enterprise.

If the new collaborative demand planning process also includes better statistical analysis, we will take care of reason code “F” as well. We can see from Figure 2 that a collaborative demand planning process will impact many symptoms other than intermediate inventory. In fact, we may reap positive results in customer service, management of all inventories (making what customers want to buy, not what we like to produce), late penalties, production costs (less changeovers), and product mix (more profitable mix).

The point here is **not** that a collaborative demand planning process is the cure for WIP. Rather, this is merely an example to illustrate how **root causes of undesirable business symptoms can be identified, prioritized and addressed through a business process improvement, guided and prioritized through the use of the PSV Matrix**. In your business, the root cause of excessive WIP might be poor scheduling rules, setups that force long production runs, or something else

altogether.

Keep in mind that a change in a decision process that exchanges the severity of one symptom in our domain for that of another symptom in the domain of someone else does little for our shareholders. In order to keep the cure from being worse than the disease, we must holistically consider the impact of addressing a symptom. Additional analysis or modeling may be required in order to determine whether a particular approach of addressing the symptom on which we are focused will have a **net positive** impact on revenue, RONA and costs (and therefore margins). This level of analysis usually requires a skilled and experienced practitioner who can draw on a breadth of powerful analytical techniques.<sup>6</sup> Such analysis can, and is often required in order to, facilitate the cross-functional (integrated) decision-making that is required to bring a decision process to the “next level”.

### Making It Stick

Making an improvement last (or hopefully even continuous) requires going just a bit further. We have learned from the Total Quality Management effort, the Six Sigma practices, and Lean operations that continuous improvement is not only desirable, but feasible. Systematic measurement and analysis of root cause factors are required for this. Hopefully, we can find a way to capture the required data using a combination of our ERP (Enterprise Resource Planning), WMS (warehouse management), and MES (manufacturing execution) systems, and the use of bar codes, RFID (radio frequency identification), or the ever growing mass of data from smart devices. In some cases, we may need to create an analysis of data from different systems. For example, timely monitoring of a production process, customer order status, and in-transit shipments may need to be combined in order to analyze and track the impact of production scheduling on late shipment penalties and customer service.

Acquiring the data and performing the analysis can be challenging to do, even once. Sustaining better value network decisions requires improving the decision processes that were driving undesirable business symptoms and constantly seeking more process improvement. This, however, may mandate a continuing analytical awareness of the relevant decision factors, which in turn requires a tool, specifically designed to deliver the analysis.

It is important to remember that the most important symptoms or metrics for value creation (aka making money) do vary by industry, and companies achieve competitive advantage by innovating in their value network decision (and execution) processes so that managers at all levels make more profitable decisions in less time. Just as it is never good enough to rest on our laurels, neither is it sufficient just to mimic the “best practices” of another organization.

### Summary

Through careful data gathering and analysis, aided by the Process/Symptom/Value Matrix, we



can identify the undesirable business symptoms that are most critical to our business. The PSV Matrix relates these symptoms to decision processes, giving us the insight we need to generate more value through the business network by driving improved revenues, lower costs, and/or higher return on net assets.

The key to achieving this goal lies in following the simple method we have discussed in this article:

1. Identify the undesirable business symptoms
2. Relate them to financial impact (revenue growth, return on net assets, and margins) and relevant business decision processes through the PSV Matrix
3. Rank or prioritize the undesirable business symptoms based on their detriment to value. This may be intuitive, but should be confirmed with data analysis.
4. Map symptoms to the root causes by leveraging tools such as cause and effect analysis (fishbone diagram)
5. Evaluate and prioritize root causes. This may require data cleansing, capture and analysis.
6. Relate root causes to business decision processes (i.e. which decisions need to be improved in order to eliminate the root cause) through the use of the PSV Matrix
7. Eliminate the most critical root causes of the most undesirable business symptoms (the things that keep you from making more profit) by improving the appropriate business decision process or processes. This may require analysis and modeling to ensure that cross-functional and integrated decisions are achieved.



**Arnold Mark Wells** is a Principal at End-to-End Analytics, LLC. He has worked in supply chain for more than twenty-five years in steel distribution, consumer products, and electronic retailing as well as in consulting with companies in the chemicals, medical devices, consumer goods, high tech, and retail industries. Mark's focus is helping managers manage for profit by making higher quality decisions in less time. He regularly speaks at industry events, has been published in multiple periodicals, including the *Journal of Enterprise Resource Management* and *CSCMP Comment*, publishes a weekly blog, *Friday Forethought*, and can be reached at [mark@e2eanalytics.com](mailto:mark@e2eanalytics.com).



**Michael W. Okey** is an independent business advisor in operations improvement and organizational competence. He previously served as a Manager, Global Supply Chain for a large American manufacturer with global operations. Mike has 40 years of experience in supply chain, focusing on forecasting, inventory management, business process and supply network reengineering, global ERP implementation, and project management. He can be reached at [michael.okey@gmail.com](mailto:michael.okey@gmail.com)

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<sup>1</sup> Lambert, Douglas M. and Pohlen, Terrance L., "Supply Chain Metrics," *The International Journal of Business Logistics*, Vol. 12, No. 1, p. 9.

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<sup>2</sup> Young, David S. and O’Byrne, Stephen F., *EVA and Value-Based Management*, New York: McGraw-Hill, 2001, p. 46. EVA<sup>®</sup> is a registered trademark of Stern Stewart and Co.

Penman, Stephen H., *Financial Statement Analysis & Security Valuation*, New York: McGraw-Hill, 2001, p 438.

<sup>3</sup> DSO is the abbreviation for Days Sales Outstanding; DPO is an abbreviation for Days Payable Outstanding; Typically, DSO should be as small as possible and DPO should match a supply contract which is negotiated to fit the requirements for supply management to support the corporate strategy.

<sup>4</sup> Another helpful aid can be a scheme of cascading performance metrics organized by process such as the Supply Chain Operations Reference (SCOR) model that has been developed by the Supply Chain Council.<sup>4</sup> This can be a very useful tool in continuously tracking and measuring performance by process. However, from any given starting point, we can accelerate the process of finding value in our value network by quickly identifying the undesirable business symptoms in the PSV Matrix and then identifying and prioritizing the root causes. <http://supply-chain.org/scor>

<sup>5</sup> George, Michael L., *Lean Six Sigma*, New York: McGraw-Hill, 2002, pp. 189, 193.

<sup>6</sup> Kessinger, Colin, “The interactive nature of analytics,” *Analytics*, March-April, 2011, p 4.