

# How (and How Often) Do You Measure Supply Chain Results?



**Mary Wilson**

Director,  
Global Supply Chain Management  
Planning Systems,  
Fairchild Semiconductor

The Global Supply Chain Management Systems team at Fairchild develops and manages the global supply chain systems and related business processes that drive our supply chain success. Our CEO, Mark Thompson, highly values and understands the leverage that an efficient supply chain can give the company, and has given us the resources to be successful. Our supply chain organization consists of several hundred people in locations around the globe, and forecasting and measurement are key components of our success. Our focus on supply chain measurement and process improvement during the last five years has delivered great results.

Every week our team measures key supply chain performance metrics and reports the results to our senior executives. The report includes our top-tier metrics, such as inventory turns, shipment-to-commit and delivery-to-request performance, and the revenue outlook—measuring our backlog and our position relative to revenue realization. We also take it to the next level and look at areas like new product delivery performance, customer delivery performance and lead times.

While geared toward C-level management, these weekly metrics reports are also distributed to the supply chain team. This broad distribution offers visibility into our metrics achievement throughout the supply chain, allowing team members to quickly review the performance of their product group or manufacturing site and, if necessary, to do a root-cause analysis and remediate issues. Speed is another key component to our success. There is significant complexity in our supply chain, and sudden changes in demand, supply or costs require us to be fast, flexible and able to react based on real-time information.

Our longer-term view of the supply chain is managed through a monthly sales and operations planning process (S&OP). The comprehensive metrics package we publish plays an important role in that process. We start with a consensus forecast roll-up, and then managers from each functional area of the business meet to determine our capability to respond to that forecast—and what that

means in terms of revenue and expense for the company. Visibility and accessibility of supply chain performance data are critical to the S&OP process because they empower us to better respond to requests for internal or subcontractor capacity, analyze progress on major initiatives such as new product introductions, or capitalize on excess capacity for increased revenue-generating opportunities.

Annually, we conduct a supply chain metrics review to assess our total supply chain management costs and asset utilization. We engage a consulting firm to conduct a comprehensive SCOR® (Supply-Chain Operations Reference-model) assessment for us, and also to benchmark Fairchild against others in our industry. We use this annual review process to identify performance gaps and solutions to close those gaps, as well as to prioritize improvement initiatives and investments.

One of the areas of significant improvement realized through the metrics and benchmark analysis process is delivery performance to commit date. Fairchild targeted 10-plus percentage points of improvement to increase our competitive advantage in service. We used detailed root-cause analysis and regular metric reviews, and also developed some new functionality to monitor performance through the factories to proactively manage late work-in-process instead of waiting until the time of shipment. Timely availability of results allows the planning teams and factories to rapidly respond if things are off track.

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Our root-cause analyses also revealed that our order-promising system was not adequately accounting for a number of secondary constraints. Despite some products being nearly interchangeable in our system from a capacity perspective, we were not fully allowing for these when promising orders. Consequently, we factored more detail for significant secondary constraints into our process models, and the problem was resolved.

Another important area of improvement for Fairchild involved taking better control of our channel inventory. An extensive review of our channel inventory processes has enabled us to substantially improve our inventory controls and sell-in, helping us to mitigate the bullwhip

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effect. Our weekly measurement and monitoring have led to significant improvements in stability of weeks-on-hand and buffer stock.

I am fortunate to work for a company with an executive team that realizes and appreciates the strategic value that a well-managed supply chain brings to the overall business. Our focus on results and commitment to weekly, monthly and yearly monitoring and evaluation have made us a more efficient, productive company—and made supply chain management a competitive differentiator for Fairchild Semiconductor.



**James Geesey**  
Director of eSourcing,  
Emerson

Emerson has over 60 divisions with more than 270 manufacturing facilities all around the world. Raw materials are approximately 40 percent of our sales, so our procurement processes are very important to our overall performance.

At the corporate level, we handle the sourcing for any materials or components that have leverage opportunities across business divisions, and that turns out to be about 60 percent of our direct materials. Procurement is the only function that is center-led. Corporate commodity teams are organized in a business/commodity matrix, leaving the business divisions to manage commodities that are non-leverageable at the corporate level.

To measure our performance and to drive improvements, we look at one overarching metric, and that's return on total capital (ROTC), which we then break down into its components—cost of goods sold and working trade capital.

**When you tie everything back to return on total capital, you manage all things relatively well.**

On the cost side, we monitor net material inflation, which we manage to reduce the cost of goods sold. We've developed a proprietary tool to track certain events that influence our material costs. If, for example, we see changes coming in the cost of steel or copper, we get early warnings on that and we take action to deal with it.

We measure inventory monthly and net material inflation at least quarterly. Based on that data, there are a number of ways we can respond. We can look for alter-

native materials or sources. We are very fond of on-line and electronic negotiations—including reverse auctions, Dutch auctions and multivariate events—all of which are well-known methods that help us reduce component costs.

In those processes, however, we are always very careful to only invite suppliers that we are very comfortable with. We will never invite an unqualified supplier to bid just to drive down costs, as sometimes happens in this business. You introduce a lot of supply chain risk into your operations if you are not careful in that way. When you cut corners, you jeopardize market integrity, and that's something we won't do.

We also find it very important to get in front of the product development process by inserting the procurement function into new product design, so that our engineers are working with a design-for-sourcing mentality. This is important because once a bill of materials is fixed for a product, a good purchasing person can only take about 10 to 20 percent of the material cost out of that product by using the best sourcing practices available. When you get engineering and purchasing working together in the conceptual phase, however, you can often take 35 to 45 percent of the material costs out of the product. So that's where the biggest gains are made.

## Return on total capital

On the trade, working capital side of the metrics, we look at what we call "raw-material inventory velocity," which is measured by days-on-hand of inventory. It's a commonly used measure of asset utilization. We also strive to improve days payable outstanding, so we shorten the days in the cash cycle, which is also known as the cash conversion cycle.

We take this approach because we think that when you tie everything back to return on total capital, you manage all things relatively well. You end up making more holistic decisions about sourcing by not just focusing on one element.

These days, anyone can go to Asia and get significant cost reductions, but you also have to consider the additional capital costs required for that decision, or the supply chain risks that enter into the equation. The longer the pipeline, the larger the bullwhip effect.

Of course, we are well established in Asia, but we primarily use Asian sources for supporting domestic production. We also use Asian suppliers to support North American production, but we use a sourcing decision support tool to help us analyze price, working capital and supply chain risk. It's also a multi-function effort—it's not just procurement sitting in a vacuum. Everyone has a seat at the table and that helps us make the best decisions.

Because our business models are so diverse, all functions except procurement are led at the division level. So to share supply chain best practices, we have quarterly meetings, where division and corporate leaders gather to exchange ideas, to inform each other about what their teams are doing, and to set strategy.

At Emerson, we are growing at a healthy clip, and we have to ensure that our supply chain is as solid as it can be to sustain our top-line growth and to mitigate risk. Therefore, carefully monitoring our supply chain and measuring its performance are critical to our ongoing success.



**William Bryan**  
Director,  
Supply Chain and  
Supply Chain Economics,  
Timken Steel Group

The steel group at Timken has approximately 2,500 employees, and in 2007, we had more than \$1.5 billion in revenue. We have a complex business, performing 100 different operations, with more than 300 different steel types, and about 9,000 customer specifications in our system.

It is important that the supply chain group shares a significant portion of the economic responsibility for the overall business, because what we do drives much of the financials for all of Timken Steel. In a similarly correlated relationship, the accuracy of our planning assures better customer service through on-time delivery to our promises and more precise determination of lead times.

We must excel at a number of key factors to leverage our supply chain performance; having, and meeting, the right performance metrics at all levels of the business is critical to our success. At the highest level, you need to bring together the key metrics that interact with each other. We call it a balanced metrics approach, because you can't just look at any one metric in isolation.

On our top-level scorecard, we balance throughput, inventory, on-time delivery, lead times and cost. They are all connected, and you have to consider them all to understand the whole supply chain picture. I view our metrics like a pyramid, with each element getting segmented and more detailed as you move down each level on the pyramid.

Our top-level management group focuses on the top of the pyramid—the metrics that look at process path constraints and other key areas for our business. For example, melting steel, or “heats,” as we call it, is a critical process. Every day we see the number of heats from our melt shops, and as long as we're achieving the planned

heats per day and the planned output from a handful of other key processes downstream, then we're not sweating the metrics at the next level down on the pyramid—those metrics will be for others to monitor.

If we don't see the right output at key process points, then we know we're not going to be able to finish and ship the right amount of product this period, and we need to start asking questions. Each time you take a step down on the pyramid the amount of data explodes, so we stay focused at the top. You can't look at everything or you'll be overwhelmed.

### **Our system of checks and balances forces us to think through the overall ramifications of various supply chain decisions.**

Of course, we have people on the sales, manufacturing and supply chain teams that are looking at the data at each step down the pyramid. At any given level in the pyramid, we can measure data in months, weeks, days, hours or minutes. We'll get down to the level of one work center or machine. We'll measure the inventory in front of that machine, and the sequencers will monitor and schedule that machine on a shift-by-shift basis.

We're looking at lead times every week, comparing working capital to sales on a monthly basis, and reviewing operating expenses on a daily, weekly and monthly basis. When we see deviations at any level, the people responsible for that area will start asking questions, performing analysis and taking actions as required.

### **A balancing act**

None of this happens in a vacuum. These metrics are used in our S&OP (sales and operations planning) process, which my group leads. Every Wednesday afternoon we bring the business representatives to the table to review the metrics, our plan and where we stand. And, unless it's Christmas Day, we seldom cancel that meeting. It's not unusual for Timken Steel's president to stop by and participate in that meeting—and it is huge for us to have that kind of support. It shows that he views the supply chain as important to the success of the business.

In that weekly meeting we balance the needs of the sales team with those of the manufacturing team. These needs are inherently at odds with each other in any organization. Sales folks want every product available in any quantity, at all times, to satisfy customers anywhere in the world. Manufacturing folks want to make batch sizes and

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sequences of similar items to get production efficiencies. My group is responsible for bringing these teams together and achieving a mutual goal of delivering both customer and shareholder value.

We're constantly adjusting capacity in response to demand, taking into account the whole picture from raw materials to customer delivery. Our system of checks and balances forces us to think through the overall ramifications of various supply chain decisions. This includes playing the hand you've been dealt as best you can, as well as influencing future scenarios. To me, it's just common sense, although some would argue that common sense is not all that common.



**Mahender Singh, Ph.D.**

Research Director,  
MIT Supply Chain 2020

Measuring supply chain performance on a regular basis is obviously important for having a supply chain framework that is aligned with a company's business strategy. Real-time data are important, particularly on the execution end of things—for tracking components and raw materials, for on-time delivery of finished products, and so on.

Data, however, do not capture everything you need to know to make good supply chain decisions that support the business's goals. People are comfortable with numbers, and there is a sense that if I am measuring 5,000 data points, then I can't miss a thing, and that is good for the supply chain. But that's not always the case. In short, I believe there is an over-reliance on hard data in the industry.

We believe that no amount of analysis will provide wisdom—that hard data do not equate with insight. Making matters worse, in this over-reliance on numbers, supply chain managers are under increasing pressure to make faster decisions, because businesses are moving at much faster speeds today. What I am seeing is that because of this pressure to make fast decisions, managers have a tendency to exclude much of the data available to them and to focus on selected key performance indicators (KPIs).

Unfortunately, ineffective KPIs can lead to wrong decisions, too. I have interacted with several companies facing this challenge, and people will often say that they can't take in a lot of data to make a decision because it slows them down. Then, if they are slow in making decisions, they will miss opportunities and pay a heavy price. However, we are finding that this tendency to ignore

some data is also counterproductive.

When managers make supply chain decisions based on limited data, they are prone to make more iterative, sequential decisions. This happens because the managers know they are acting on limited data, and they are worried about making a big mistake. Therefore, in their efforts to make fast decisions, they end up slowing things down by taking small, sequential steps. There is some research that supports this observation.

## Using new networking technologies

What is better, therefore, is to capture the most important real-time data available, and use that data, along with other environmental uncertainties and drivers, to do multiple-scenario simulations that consider the system-level impact of various choices. This approach yields better supply chain decisions.

To do this, companies need advanced systems and tools, of course, but more importantly, they need to be very good at communicating across multiple functions of the business, so the person making decisions has a good grasp of the context of the entire operation. This is important because information takes time to harden into data that can be used for quantitative analysis. Furthermore, during its transformation into hard data, information often loses its texture and context.

## Social networks and blogs...create a continuous communication process.

At MIT's Supply Chain 2020, we see real value coming from the blogs and social networking sites that are growing all around us. We are now working with companies who are contemplating using these new ways of communicating in their supply chain process. I believe companies that do so effectively will see significant improvements in their supply chain performance.

Although many companies' supply chain leaders meet regularly to discuss problem areas—say every Friday at 3:00 p.m.—that doesn't mean that you are getting people's best thinking at that time and place. Ideas come at all times. Inevitably, supply chain events will trigger new thoughts and concepts. People come across information that is important to be shared immediately, not at an appointed meeting time.

Social networks and blogs give managers and others the ability to stay connected at all times. They enable people on the team to think proactively, post information and ideas, react to information, and in this way create a continuous communication process.

For example, if I were a company manager, I could be

on a trip in Singapore and overhear a discussion or read in the local newspaper about problems with a small supplier that my company is using. This information wouldn't make headline news, and by the time it showed up in our process, either through late deliveries or quality problems, it would be too late for us. Using a mechanism such as a blog, I could post this information, and everyone on the supply chain team would immediately be aware and take steps to validate and act on the information.

Using these new networking technologies is the next step in supply chain management, although none of these tools is a substitution for measuring real-time data. The value here will be in creating better ways to utilize the data that are available, both through traditional metrics and through tapping into the wisdom of the people on the team. The results will be better, faster decisions and increased flexibility of the supply chain.

## The Last Word



**Michael Berry**  
Executive Vice President and  
Chief Financial Officer,  
i2 Technologies

As a CFO, I have always been interested in the supply chain, because it is one of the largest components of a company's ability to achieve its business objectives. Furthermore, one of the great things about the supply chain is that it allows you to measure so many things about your business, which is always attractive to the CFO—we live in a world of numbers and measurements.

All CFOs are responsible for assessing and measuring the costs and the return on investment for their company's initiatives. While we have many tools to do that, at the end of the day, my focus on metrics comes down to one thing—cash flow. Especially in our business, cash is king.

The CFO has always been at the forefront of optimizing the company's spending to make sure the business objectives are met. Within the past couple of years, however, I am seeing more CFOs thrust into the role of evaluating their company's supply chain. It makes perfect sense to do so, because it's in the supply chain that you find the things that have the potential to really rock your world and impact your company's performance significantly. For this reason, CFOs are now more involved in measuring the supply chain, looking at inventory turns and

product cycle times, for example, and tying those back to improving working capital and gross margins.

As supply chains continue to evolve, growing in length and complexity, the role of the CFO also should grow. Now, more than ever, CFOs need to have a good view of their company's suppliers and the financial and regulatory risks that come with a more complex and extended supply chain.

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Just consider the increased trend to outsourcing, often in international locations that are more difficult to monitor from a company's corporate offices. The CFO must evaluate the stability of the chain, factor in the extension of capital and the already huge and growing costs of transportation. Plus, there are new risks when supply chains are so extended, including the sourcing of products from other nations. The CFO needs to have a strong level of comfort about the people building the product and the materials going into the product, because the associated risks are so significant.

## Capturing efficiencies

Furthermore, the uncertainties we see in the economy today make the CFO's role in supply chain management even more important. In our current economic downturn, growth for many companies will be very hard to come by. In the absence of growth opportunities, to maintain financial performance companies must do whatever they can to find and capture efficiencies in their operations. Again, it is in the supply chain where they will find the leverage to make adjustments and capture those efficiencies.

In general, there is never a lack of information available to CFOs, but it's important to draw a clear line between reporting and analysis. Numbers are great. Data are important. But you always have to ask, "What does this mean for the business?" To do that, it's important for the CFO and others to maintain good lines of communication, so they will benefit not only from the numbers, but from the knowledge of the entire team. At i2, we continuously communicate with people across various functions within the company, as well as with our customers and peers outside of the company, to understand the trends and the context of the business environment.

Opinion interviews were conducted by freelance writer  
**Michael Cohen.**