

## The metrics of lean

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### **Many lean initiatives get off to a promising start, but fall flat through lack of leadership and focus. Alan R. Earls finds out how value stream mapping and KPIs contribute to a sense of purpose**

"One of the best things about lean manufacturing initiatives is that they are biased toward action, which is very positive, but that can get in the way of measurement," says Professor Peter Ward with Ohio State's Fisher College of Business and an expert in lean manufacturing management. However, he adds, "there is no inherent reason why it has to be that way."

In a survey conducted earlier this year by The Manufacturer, over three quarters of manufacturers said they were following a program of continuous improvement. That's encouraging and should be a cause for optimism about the future of North American manufacturing operations. However, a fifth of respondents also said that they had not been able to measure the results of their initiatives. That's worrying, and indicates a lack of understanding of the metrics of lean.

Robert J. Scott, vice president, manufacturing operations & IT at Possis Medical, Inc. in Minneapolis, has taken that realization to heart. Scott says he has had too much experience with what he calls "soft starts"—initiatives that get started, begin to look promising, and then get sidetracked and are never completed. "The problem with lean initiatives is that there is too much resistance outside of manufacturing in accounting, documentation and engineering," he says. Furthermore, he says, manufacturing itself often has not had a core focus on lean, though Scott says his organization has a history of measuring things like yields, average labor cost, shipments against orders, and time to shipment, percentage of planned shipments, throughput percentage, and past due shipments (where his organization has come close to reaching zero). Still, something has been missing.

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Now, though, Scott says his company is moving toward lean goals from a number of directions. For starters, three master's degree students from George Washington University in St. Louis have come aboard to help energize value stream mapping. Scott says his measurement efforts have also been helped by using a software tool from a company called Business Objects, which is not only helping to generate reports but will also help with a metrics dashboard Scott hopes to build.

Above all, though, Scott says what he has learned about lean is that any initiative will fail without a process owner. With that in mind he recently convinced his management that lean won't work without having a dedicated champion on staff. "It took me six months of selling with my colleagues to get them to agree to this." So the next step will be up to Scott's new, full-time continuous improvement maven who is tasked with negotiating buy-in across the operation and making sure lean efforts are brought to completion and actually achieve their goals.

In addition to value stream mapping, Scott says his newly promoted continuous improvement champion will be pursuing a specific vision. "I have coined a phrase, 'balanced continuous flow', which is my idea of utopia—you sell one item and you start making one—we have a long way still to go but that is the target and the vision," he says.

While Scott has struggled with lean initiatives at his mid-size organization, David Lien has been fighting the same battle as manager of engineering services within the Steering Systems Division of Delphi. Lien says as Delphi separated from General Motors several years ago (business with GM today accounts for less than half of revenues) they looked closely at best practices around the world and have adopted practices championed by Ambrake Corporation, Toyota, and NUMMI (the GM-Toyota joint venture). Delphi's lean-continuous improvement initiatives have focused on kaizen techniques, looking at

machine-specific steps in the manufacturing process. But another more recent innovation has been implementation of the Delphi Design Methodology (DDM) which aims to better integrate engineering, manufacturing, and quality issues.

However, as with every other initiative, it all ultimately came down to measurement. “Value stream mapping was really how we approached this,” says Lien. The result was a clear picture of where waste occurred from conception, to execution, to delivery of the finished product. Based on that baseline knowledge, Lien says the organization has implemented “horizontal modeling” which cuts out steps, particularly in engineering, and eliminates waste. “We have cut the time it takes to create a model by half and we have seen a 90 percent reduction in the time needed to edit models.” Indeed, in one shining example, Lien says Delphi was able to eliminate 12 of the 13 designers it had required in product development. However, he adds, “you can’t improve something until you can nail it down first.”

And that may be just the problem for most organizations, according to Ward at Ohio State. He theorizes that with lean projects people may not tend to think immediately of measurement as they would with a six-sigma project, “where measurement is critical even in the design of the project.” He says it is ironic, though, that in his view the lean projects often have the potential to be more valuable, simpler, and better aligned with the needs of the business than six-sigma efforts.

Still, he admits, because of the strong, built-in focus on measurement, six-sigma projects often end up getting executed with greater success. For companies challenged by the quantification aspects of lean, Ward, for his part, recommends incorporating some of the focus of six-sigma. He says he likes to start with a current state value stream map followed by development of a definition of the projects needed to get to a future state. “In the definition of those projects we are very specific about performance indicators and we have very clear goals about how much they will move,” says Ward. Only then can you make a case for what you have done, he adds.

Ward says it is crucial to be careful to think through how you define the key elements in your value stream mapping and to link your map to KPIs. And, while the process can be partially automated, Ward says thorough work with paper and pencil can be just as good, and sometimes better. “The templates available in a computer program might help you get it done but you can be more creative with paper and pencil,” he adds. In either case, the goal should be to gain realism and accuracy.

Similarly, Jerry J. Mairani, president of ASQ and director of corporate quality at Sacramento-based Beutler Corporation, the largest centrally located residential HVAC contracting, engineering, and sheet metal fabricating company in the United States, says the truth is that quality tools, including lean, never fail. “What fails is the quality system around the effort,” he says. What’s more, says Mairani, it isn’t a problem confined to large companies or smaller ones. It can actually be easier for small companies to implement lean initiatives, he says. “Small companies often tend to run lean anyway but they can struggle with the concept of spending scarce resources on measurement,” he explains.

In general, though, George T. Haley, director of the Center for International Industry Competitiveness and professor of industrial marketing and international business at the University of New Haven's School of Business, says the biggest problem facing lean initiatives, for which the lack of measurement

knowledge is a symptom, is that most of them are initiated from the top and never fully penetrate down to the shop floor. "If you are going to have successful lean or six-sigma initiatives you must build support at least within middle management," he says, "otherwise as soon as senior management looks away, middle management will go back to doing things they way they have always done them."

His prescription for change focuses on changing the company's mindset and shifting standard operating procedures. "Others must understand the goal intellectually and they must see the benefit," he explains. "3M did this starting in the 1970s, before anyone talked about lean manufacturing, and they have continued to improve each year ever since," he adds. Indeed, but for those efforts 3M would have had to cede many markets to competitors, he says.

Haley says internationally, the best teachers are still the Japanese. "They have better interactions between senior and middle management than we have in the US, where the system is really more authoritarian," he says. On the metrics front, Haley says the key element to look at is determining which measurements are the most crucial. Identify the components in the process that are critical to success, he says, then "get them under control with regular measurement." After that, you can broaden your focus and get to the other things that need to be measured.

"One aspect of measurement that is frequently ignored is going to your major customer and spending time with them to see how they interact with your company and your product and learning where potential problems could arise," says Haley. "That is a metric that is frequently put off and companies try to get by with just measuring customer satisfaction," he adds.

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