HOW DO YOUR MEASUREMENTS STACK UP TO LEAN?

By Frances Kennedy; Lisa Owens-Jackson, CPA; Laurie Burney; and Michael Schoon, CPA

How many times have you read that you can't really *be lean* until you *measure lean*? In an ideal world, every company implementing lean principles would immediately toss away current measures and start from scratch. But who said it was a perfect world? There is usually strong resistance to changing performance measures when they are tied to incentive programs, performance appraisals, or simply have always been used.

In this imperfect world, there are good, solid reasons to question whether we are measuring the right things. At the very least, we should thoroughly understand the strengths and weaknesses of the measures we're using to guide business decisions. We'll explain how performance measures appropriate for lean enterprises differ from those in traditional organizations. We'll further describe three key dimensions of good lean measurement and offer a tool to help managers evaluate current performance measures from a lean viewpoint. Finally, we'll share how managers at Reliance Electric, a subsidiary of Baldor Corporation, are using this tool to speed the company's transition to a lean production environment and have already tripled its assembly line's productivity without additional resources.

Note: The assessment instrument discussed in this article is the focus of a workshop at the 2007 IMA Annual Conference. The controller from Reliance Electric will co-present.

USING PERFORMANCE MEASURES

Performance measures serve multiple purposes: They communicate, motivate, clarify, and evaluate. Top management uses written statements to describe a company's vision, mission, and strategic objectives, and management accountants use performance measures to help clarify these written statements and provide specific direction for deci-

sions. Measures track an organization's progress toward its goals and objectives. Many organizations assign responsibilities to units and managers and then use measures to assess accountability and reward performance. These measures can be lag indicators that provide feedback on what has happened or lead indicators that measure progress toward strategic objectives.

Basically, performance measures provide information and feedback to support the decision making necessary to meet strategic objectives. Therefore, aligning measures with the company's chosen strategy is critical. Many traditional performance measurements are anti-lean. For example, in one plastics manufacturing facility, the desired machine utilization was 92%, and any result below that level attracted close scrutiny by corporate managers. This metric was a heavily weighted portion of the plant manager's performance appraisal because the general belief was that to meet objectives it was critical to keep all machines making product. Increased capacity utilization would reduce manufacturing variances and drive down product cost. This culture encouraged—and even rewarded—producing excess inventory because it was in the plant manager's best interest to keep machines running. This is completely opposed to lean principles of flow and pull where customer demand, not internal standards, triggers production.

Traditional measures don't align with lean principles because they were developed in a world where only managers make most decisions and where it was believed that efficiency and productivity were the key drivers of good performance. In lean enterprises, cell and value-stream team members make most decisions, which revolve around providing customer value in a timely fashion as well as smooth product and information flow. These empowered team members need current information to make decisions, and performance measurements clearly must align with the company's lean strategy.

Many good resources suggest completely redesigning strategic performance charts—ripping out the old measures and replacing them with new lean measures. We absolutely agree this approach is best, but a complete redesign isn't always feasible. Sometimes circumstances require a smaller beginning. Some businesses that implement lean fundamentals are parts of conglomerates where the parent company has a measurement system in place and compels all subsidiaries to report on the required basis. For example, one lean manufacturing company that's a subsidiary of a much larger conglomerate measures and reports productivity even though the measurement motivates anti-lean behavior. One subsidiary manager said, "These measures are traditional manufacturing metrics, and, given the directives of corporate, they are not going to change." In cases like these, managers may not have authority to revamp the entire measurement system.

For other companies, the resistance to change is strong. When new measures are proposed, they're met with comments like "We have always measured it this way!" This resistance may be because employees have mastered manipulating traditional measures that are tied to a reward system. That's why many lean enterprises slowly introduce changes to minimize employees' resistance. Whether through this gradual evolution or through abrupt immersion, to reach their full lean potential companies must replace traditional performance measures with those that reflect lean strategies and motivate employees to achieve those strategies.

A good measure enhances the understanding of the business environment, helps identify problems, and provides relevant information to support decision making. We'll offer an evaluation tool to assess measures, ensuring they're consistent with the five principles of lean thinking: customer value, value stream, flow and pull, empowerment, and perfection. Table 1 summarizes these principles. For a thorough discussion, you can refer to IMA's Statement of Management Accounting, *Lean Enterprise Fundamentals*.

The assessment tool leads employees to consider lean principles and three attributes of good measures: technical, behavioral, and cultural attributes. Originally defined by Shahid Ansari, Thomas Klammer, Jan Bell, and Carol Lawrence in *Strategy and Management Accounting*, attributes are the inherent characteristics embedded within a measure that influence the user's interpretation and potential actions. This tool:

1. Provides a scaled assessment of how well a measure serves the organization,
2. Promotes logical and methodical consideration of the measure's characteristics,
3. Offers insight into the measurement system's limitations and strengths from a lean perspective, and
4. Promotes discussion concerning the measure's appropriateness and how it can be improved.

ASSESSMENT OVERVIEW

The assessment tool is designed to be completed for a single measure and repeated for additional measures. It consists of three sections, one for each attribute of a good

Table 1: THE FIVE PRINCIPLES OF LEAN THINKING

PRINCIPLES OF LEAN	DEFINITION OF PRINCIPLE
Customer Value	Lean enterprises continually redefine value from a customer's standpoint. The product or service provides value when it meets the quality, costs, and time needs of the customer.
Value Stream	The lean enterprise is organized in value streams. A value stream is the sequence of processes through which a product is transformed from raw materials to a finished product deliverable to the customer.
Flow and Pull	In a lean enterprise the customer order triggers or pulls production. Once started, the production process is designed to maximize the flow or throughput of the value stream and to minimize production time.
Empowerment	Lean enterprises' employees are empowered with the authority to interpret information and to take necessary actions. They are expected to make quality-related decisions and to collaborate with one another in a team environment to improve the process.
Perfection	Lean enterprises seek perfection, defined as 100% quality flowing in an unbroken flow at the pull of the customer.

Table 2: LINKAGE OF MEASUREMENT ATTRIBUTES TO LEAN PRINCIPLES

PRINCIPLES OF LEAN	TECHNICAL ATTRIBUTES	BEHAVIORAL ATTRIBUTES	CULTURAL ATTRIBUTES
Customer Value	Does the measure relate to customer service?	How does the measure relate to the business's strategic goals?	How does the measure reflect value as defined from the customer's viewpoint?
Value Stream	Is it a functional or process-oriented measure?	Where does the measure focus attention?	Does the measure encourage continuous improvement at the value-stream level?
Flow and Pull	Does the measure promote a smooth workflow?	How does the measure relate to employee output?	Does this measure encourage one-piece flow through the production cell?
Empowerment	Who uses this measurement information?	What individual employee behavior does the measure motivate?	Does the measure provide adequate information to the people making the decisions?
Perfection	Does the measure change between periods?	How well is the measurement goal communicated?	Does the measure promote the elimination of unnecessary steps or waste?

measure. Each section briefly describes the attribute to create a common starting point for all users. The first questions stimulate in-depth thought about the purpose, calculation, and use of the measure in a lean environment. Table 2 shows how some of the questions map back to the lean principles and the three attributes of a good measure.

The users review their answers and then complete the assessment portion, which consists of five statements about the measure. The employee scores his or her level of agreement with these statements on a five-point scale, and then the scores are averaged for each attribute.

Let's now discuss each attribute and highlight sections of the assessment tools.

Technical Attributes

Technical attributes of a measure refer to its ability to enhance the understanding of the phenomena being considered and to provide relevant information for strategic decisions. In a lean organization, managers understand that operating results are a function of how processes are organized. A process is a connected set of activities and tasks performed to produce a product or service. To manage lean organizations, managers need measures that are process focused. Generally, the accounting system should aid in the understanding of what causes costs, why unproductive or idle capacity exists, and how the various parts of the value chain are related.

Figure 1: TECHNICAL ATTRIBUTES SECTION OF THE ASSESSMENT TOOL

SECTION 1: Technical Attributes refer to the measurement-related qualities desired in the information. There are two key properties of good measures: *Decision Relevance* and *Process Understanding*. Information is relevant to a decision *IF* the information changes *AND* improves the quality of decisions. Measures increase process understanding if they consider an entire process rather than a single functional unit. This is because work flows horizontally across units and functional measures don't provide information needed to perform work.

	QUESTION	ANSWER
T1	Who uses this measurement information?	
T2	*What decisions does the measurement influence?*	
T3	Does the metric change between periods? (ex.: quarterly or annually)	
T4	*Is it a functional or process-oriented measure? (ex.: single department or multiple departments)*	
T5	Does this measure promote a smooth workflow?	
T6	Is the measure related to a bottleneck process?[1]	
T7	Does this measure relate to product or service quality?	
T8	Does the measure provide information on the causes of defects?	
T9	Does this measure relate to customer service?	
T10	What activity driver does this metric measure?[2]	
T11	Which costs does this measure monitor?	
T12	How major or minor is this cost with respect to total production costs?	

Review your answers to the questions relating to the technical characteristics of this measure (T1-T12). Evaluate using the following criteria. Score your answers according to the extent to which you agree with the statement.

This measure...		STRONGLY DISAGREE				STRONGLY AGREE
1	provides information that helps to manage cost, quality, and/or customer service.	1	2	3	4	5
2	*adds to the user's knowledge base.*	1	2	3	4	5
3	adds to the user's understanding of the process.	1	2	3	4	5
4	provides information concerning the sources of problems.	1	2	3	4	5
5	provides information that is relevant to the decision in question.	1	2	3	4	5

AVERAGE SCORE _____

[1] A bottleneck is a stage in the production that delays the movement of material through the process.

[2] An activity driver is any measurable factor that causes a change in the cost of an activity.

Measures need to be decision relevant, meaning they must provide information that changes and improves judgment. In a lean enterprise, where employees seek continuous improvements, the accounting measures can assist work-process redesign by identifying nonvalue-added or unsynchronized activities that don't address customer requirements. The measures can also lead to better distribution of resources by identifying and monitoring process bottlenecks.

Figure 1 displays the tool's technical attribute section. The first section poses questions (T1-T12) in order to thoughtfully consider the type of information derived from the measure. Employees identify what decisions are influenced by the measure, what activity driver is being measured, and which costs are being monitored. Employees also consider whether the measure promotes smooth workflow and relates to customer service. These questions highlight characteristics of lean principles as well as the technical attributes of a good measure. For example, the flow-and-pull principle of lean states that the production process is designed to maximize the flow or throughput of the value stream. The tool reflects this principle by directing employees to think about how the measure relates to bottleneck operations that can inhibit smooth flow.

The second section asks employees to evaluate whether the measure provides information that helps to manage cost, quality, and/or customer service. These factors con-

Figure 2: BEHAVIORAL ATTRIBUTES SECTION OF THE ASSESSMENT TOOL

SECTION 2: Behavioral attributes refer to the ways that measurements affect behavior by making information visible. Measurement communicates importance and signals priorities. As a result, employees are motivated to manage their behavior and output in order to improve those measures.

	QUESTION	ANSWER
B1	How does this measure relate to employee work or output? (ex.: quality, throughput)	
B2	*How does this measure relate to the firm's strategic goals?*	
B3	Where does the measure focus attention?	
B4	*What behavior is the measure attempting to motivate? (ex.: smooth flow)*	
B5	What behavior does the measure actually motivate?	
B6	What group behavior does the measure motivate? (ex.: produce volume, investigate quality problems, instill ownership and pride)	
B7	What individual employee behavior does the measure motivate? (ex.: signal for help, ridicule or envy)	
B8	*Do the users of this measure understand its calculation, definition, and purpose?*	
B9	How well is the measurement goal communicated?	
B10	What is the reward for goal achievement?	
B11	Who is held accountable for this measure?	
B12	Do those employees held accountable for the measure have control over the factors affecting the measure?	

Review your answers to the questions relating to the behavioral characteristics of this measure (B1-B12). Evaluate using the following criteria. Score your answers according to the extent to which you agree with the statement.

This measure...		STRONGLY DISAGREE				STRONGLY AGREE
1	provides information on how well one or more strategic goals are achieved.	1	2	3	4	5
2	*motivates desired behavior.*	1	2	3	4	5
3	evaluates the performance of only those employees able to influence the metric.	1	2	3	4	5
4	conveys clearly to the users how the measure is calculated.	1	2	3	4	5
5	conveys clearly to the users target expectations.	1	2	3	4	5

AVERAGE SCORE _____

tribute to customer value. Employees evaluate whether the measure adds to the user's knowledge base and/or adds to the user's understanding of the process. An understanding of the business's internal processes contributes to an understanding of the value stream. Employees also assess whether the measure provides information concerning the sources of problems or information that's relevant to the decision in question. This type of information assists empowered value-stream employees in making better decisions. Responses to this technical attributes section are then averaged, and an average close to five implies the measure contributes to lean process understanding and is relevant to decisions made by empowered employees.

Behavioral Attributes

Behavioral attributes refer to whether management accounting measures motivate employee actions that are consistent with strategic objectives. Whoever first used the old adage "You get what you measure" certainly had this attribute in mind. Employees pay attention to measures and refocus their efforts to activities accordingly. For example, measuring the percent of defective parts motivates a purchasing agent to select suppliers who have higher-quality products even if it means a modest increase in cost. If the procurement manager announces that the company instead will more closely monitor the purchase-price variance, the likely effect would be for the purchasing agent to negotiate lower costs—perhaps at the

expense of quality. The impact of measures on behaviors and decisions is even greater when tied to performance appraisals and incentives.

Figure 2 presents the tool's behavioral section. The top section (B1-B12) leads employees to contemplate how a particular measure motivates them to manage or change their behaviors and decisions consistent with lean principles. The questions ask how the measure relates to employee work or output. If the measure relates to quality as defined by the customer, then employees will emphasize behaviors that maximize customer value. The employees identify what behavior the measure attempts to motivate and what behavior the measure actually motivates. For example, if the measure is inventory turnover, it motivates decisions that improve the flow and pull of inventory. If the measure is productivity, it motivates employees to turn out product even when there are no customer orders, which would be anti-lean behavior that creates unnecessary inventory and eventually will hinder production flow. Questions related to employee accountability and control lead employees to contemplate how their empowerment affects the process and measures.

Employees evaluate whether the measure provides information that affects employee behavior by judging whether the measure relates to achieving one or more strategic goals. They evaluate the measure's ability to motivate desired behavior. The employees also determine if the measure evaluates the performance of only those individuals who have control over the measure.

Finally, the tool asks if the calculation and expectations of the measure are communicated clearly. Employees have a tendency to attribute success to their own behavior and to attribute failure to environmental factors. This tendency is especially evident when the measures for evaluation have no relationship to the company's strategic goals or when the employees have little understanding and/or no control of the measure. When the average score for this section approaches five, it indicates that the measure influences employee behavior and decisions consistent with lean principles.

Cultural Attributes

Cultural attributes refer to the beliefs and values embedded in a measure, and measures are symbols that represent mind-sets held by members of organizations. For example, the customer-value mind-set will force a business to consider measures that evaluate quality, cost, and time through a customer-focused lens. The mind-set of a lean enterprise's employees wouldn't support a measure that encourages overproduction of inventory because it contradicts the flow-and-pull principle. Employees would, however, recognize the value of a measure that encourages efficient use of space (for example, occupancy charge per square foot used) because they would quickly recognize that extra space as waste.

Figure 3 illustrates the cultural portion. The questions in the top section (C1-C9) motivate employees to link measures to lean principles. The employees identify how the measure reflects value as the customer defines it. The questions encourage employees to think about how the measure relates to the entire value stream or to individual cells. In addition, the questions reveal the measure's ability to encourage lean concepts, such as minimizing inventory or promoting continuous improvement. Employees are also asked about a measure's ability to eliminate waste and nonvalue-added activities.

After contemplating these questions, the employees assess the measure's fit with lean enterprise beliefs and values. They decide how well the measure generates information on process factors that affect customer value. They consider how well the measure provides information that promotes thinking about the process or value stream. And, finally, employees determine if the measure provides adequate information for making decisions. The average score indicates how well the measure reflects the beliefs, values, and mind-sets of the lean organization.

THE OUTPUT AND ITS POTENTIAL USE

Once the average scores are computed for each attribute, a summary graph, such as the one in Figure 4, reflects the measures' consistency with lean thinking. The graph helps identify strengths and limitations of the measures currently captured in the performance measurement system. Remember, scores closer to five indicate the measure is more consistent with the lean philosophy. As an example, the results for Inventory Turns suggest that the measure is fairly consistent with lean thinking as reflected in all three attributes. The results for Machine Utilization, however, indicate that technically the measure has certain benefits, but it isn't very consistent with the organization's lean culture and may not motivate decisions and behaviors consistent with lean principles.

The process leads employees through a series of questions to stimulate their thinking about a measure's desired qualities and the information the measure provides. As a result, employees may identify redundancies in the measures. Streamlining the performance measurement set facilitates a more accurate and timely evaluation

Figure 3: CULTURAL ATTRIBUTES SECTION OF THE ASSESSMENT TOOL

SECTION 3: Cultural Attributes refer to the beliefs, values, and mind-sets imbedded in a measure. Measures are symbols that represent mind-sets held by members of organizations and unconsciously guide sustainable behavior without the need for punishment or rewards. Employees use their belief system to interpret the meaning of accounting measures and determine what actions should be taken. For example, an organization steeped in lean practices would not be able to successfully introduce a measure that encouraged building excess inventory. The following questions consider the characteristics ingrained in a lean enterprise.

	QUESTION	ANSWER
C1	How does this measure reflect the belief system of the company? (ex.: fiscal prudence, lean practices, high quality)	
C2	*Does the measure encourage behavior that conflicts with ethical behavior?*	
C3	How does this measure reflect value as defined from the customer's viewpoint?	
C4	*Does this measure promote thinking about the entire value stream, or does it focus on an individual department/cell?*[3]	
C5	Does this measure encourage one-piece flow through the production cell?	
C6	Does this measure encourage minimizing inventory or building inventory?	
C7	Does this measure provide adequate information to the people making the decision? (ex.: cell or value stream)	
C8	*Does this measure promote continuous improvement at the cell and/or value-stream level?*	
C9	*Does this measure promote the elimination of unnecessary steps and/or waste?*	

Review your answers to the questions relating to the cultural characteristics of this measure (C1-C9). Evaluate using the following criteria. Score your answers according to the extent to which you agree with the statement.

This measure...		STRONGLY DISAGREE				STRONGLY AGREE
1	provides information on process factors affecting customer value.	1	2	3	4	5
2	provides information that promotes thinking about the process or value stream as a whole.	1	2	3	4	5
3	promotes continuous improvement.	1	2	3	4	5
4	identifies and/or eliminates waste.	1	2	3	4	5
5	ensures that employees who make decisions have adequate information.	1	2	3	4	5

AVERAGE SCORE _____

[3] A value stream represents all the things a business does to create value for the customer. A typical business-wide value stream includes all activities from the sales order entry to after-sales support. A cell is a structural or functional unit within a production process.

of performance. This process may also highlight the measure's limitations. By directing attention to the measure's characteristics and then assessing the measurement using consistent criteria, employees may realize the weaknesses in the measure from the calculation's accuracy, to the message it conveys to employees, to its consistency with the corporate mind-set. This knowledge facilitates improvements in measurement by revealing measures that need tweaking to be more consistent with the desired attributes.

A focus on the attributes underscores conflicts that arise among the measures. While a balanced approach to performance measurement inherently involves situations where improvement in one measure is offset by performance in another, better understanding of these conflicts enables employees to make more informed decisions about the trade-offs. This understanding also helps employees who are redesigning the performance measurement system. While a total system revamping often isn't feasible as the company transitions to lean, the set of measures will need to be adjusted to promote lean thinking. This tool highlights measures that aren't consistent with lean and identifies gaps that exist in the current system. In some cases, this assessment process may provide a mecha-

nism to communicate to top managers why there's a need to entirely rethink the performance measurement system.

IMPLEMENTATION

Reliance Electric, a subsidiary of the Baldor Corporation, Inc., manufactures a wide variety of motors and began to pursue lean objectives at this particular plant three years ago. The manufacturing processes have undergone significant improvements in line with lean thinking, such as tripling the assembly line's productivity without additional resources. One of its value-stream managers credits much of the improvement to five specific initiatives:

1. **Visual:** Creating a visual environment allowed employees to spot bottlenecks quickly.
2. **Flexibility:** Moving equipment closer and cross-training employees increased flexibility that helped to ease bottlenecks.
3. **Value-Stream Mapping:** Creating a visual map helped in understanding the process flow and how it related to the time required to meet customer demand.
4. **Communication:** Moving processes closer together encouraged better communication between operators.
5. **6S:** Creating a safer employee-focused environment resulted in higher morale.

While the company effectively uses visualization to communicate its performance measurement to employees, Reliance Electric has continued to depend on many traditional performance measures. After three years, the assessment tool provided a means for the company to evaluate these measures and determine whether they were driving lean thinking.

Three supervisors, three value-stream managers, and a Power Lean core team project manager completed the tool. By including managers from across all value streams, the organization could determine, on average, the consistency of each measure with lean objectives and perhaps encourage more honest evaluations by keeping identities anonymous.

After a brief overview of the measure's attributes and the assessment's purpose, the group selected five to review, including Productivity, First-Pass Yield, Safety, Customer Service, and Scrap. The company chose these measures because they're considered the "White Board Metrics" and are prominently displayed at various locations throughout the plant. Each manager then completed the assessment tool for each measure, taking approximately two hours to undertake a thoughtful evaluation. The responses were accumulated, and each manager received a graphical report, as Figure 5 shows.

Figure 4: EXAMPLE OF SUMMARY OUTPUT
Lean Assessment Results

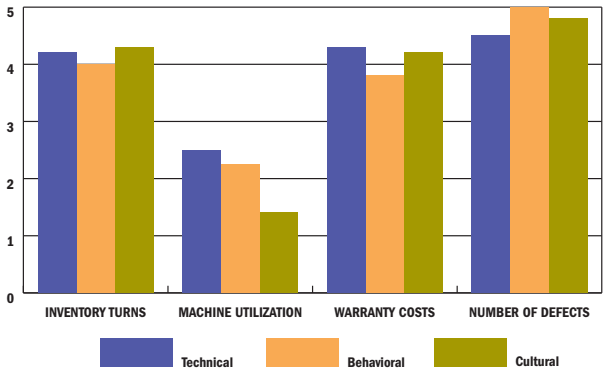
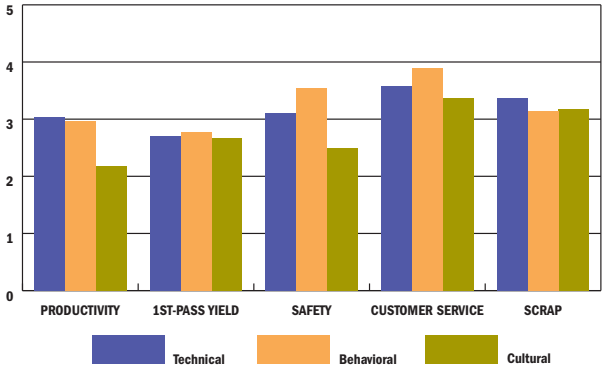


Figure 5: ASSESSMENT SUMMARY
Reliance Electric—
Performance Measures Assessment Results



As the managers reviewed the graph, they raised many questions and offered ideas. As noted, the measures in this plant had developed over time and have become embedded in its culture. This fact is reflected in one manager's comment that "These are traditional manufacturing metrics that we use because that is how we are evaluated."

The managers were most surprised by the scoring of Safety, a fundamental requirement and area the plant won't compromise. The anticipation was that Safety would score very high, but, on further reflection, a discussion evolved among the managers about how safety issues fit into the lean concept. Safety concerns are a unique focus in any plant and are an area that they considered outside lean because the plant will do what it takes to keep employees safe whether they are managed traditionally or with lean thinking. In addition, the managers felt that perhaps the attribute most relevant for Safety is the behavioral attribute since it primarily impacts employees' behaviors. As noted in the discussion,

some might contend that if lean thinking is implemented properly, then safety will follow.

The next major discussion area revolved around productivity. As noted, Controller Michael Schoon said productivity is more of a "culture issue, where you produce as much as you can to hit the goals." Alec Hicks, Power Lean core team project manager, said, "Productivity is not a lean measure; it is a short-term assessment as to whether the numbers add up on the P&L at month-end." The measure is also heavily impacted by the overhead-allocation process required by GAAP (Generally Accepted Accounting Principles). Within production, lean thinking encourages cross-training of employees so that they can move to the area of the line that needs help. According to the managers, the measure of productivity penalizes an individual if they're flexible to the line's needs. As a result, employees aren't motivated toward lean behavior because they need to stay in their own cell to increase productivity. Therefore, the low culture rating for this measure was no surprise.

Managers voiced many questions across the other metrics and brought up concerns related to the communication effectiveness of the system. Some managers wondered if the employees understood the purpose and calculation of some measures.

The discussion resulted in many thoughtful insights. Eventually the managers wondered whether they were even relying on the right metrics and what they should be measuring. They asked whether the metrics reported to the employees are too "big picture" and whether employees may have difficulty understanding how their actions impact the results. In due course the conversation shifted to the trade-offs that are inherent across the measures. The managers talked about how those trade-offs and the emphasis among the measures vary by department. The degree to which the measures aligned with organizational strategy was also a significant part of the dialogue. One manager commented that the plant doesn't reprimand people when the goals aren't met, but neither does it celebrate when the goals *are* met. As these comments demonstrate, the assessment tool led the managers toward a much richer discussion of the plant's overall metric system. Their concerns went beyond how they calculate the measures toward the intricacies of communication effectiveness, trade-offs between measures, and behavioral considerations.

RETHINKING THEIR METRICS

The assessment tool's questions provided guidance and discussion points that facilitated the deep discussion about the measures' scores. Ultimately, the managers developed feasible reasons for the results and, from there, suggested the next step was to decide how to improve the measurement process and to have a follow-up exercise to evaluate what the plant should be measuring in line with its lean culture. Perhaps the process may eliminate measures that are inconsistent with lean thinking. Or it could lead to something as simple as modifying the measurement factors, such as the frequency of reporting, the format used to report and display the information, or the individual held responsible for the measure's outcome.

The managers liked the three attributes: technical, behavioral, and cultural. The process made them think about the measures in a different way—through a lean lens. They also found it helpful to start with big-picture objectives and questions as included in the assessment. They felt these questions provided the context needed to evaluate the measures in line with lean objectives.

After the process, the controller summarized, "I envision significant changes in our metrics concerning production. The tool clearly indicated to me that our current metrics are not connected to having a lean manufacturing system." When asked what metrics he expects to be using in another year, David Conrad, the plant manager, responded, "I expect to have safety, quality (First-pass Yield as an example), and customer service as our primary metrics. My hope is that the focus on productivity will diminish as our processes are streamlined and more directly connected to customer demand." As a result of the assessment process, the managers felt that even though they had made significant progress toward lean processes, they still needed improvement in one very critical area—rethinking their metrics to encourage superior lean behaviors and decisions. ■

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