Bonus Q&A from the IndustryWeek webcast:
Lean Manufacturing Visionary Jim Womack On Frontiers Of Lean Thinking
Sponsored by Microsoft Business Solutions
May 4, 2005

This document contains additional audience questions that were not addressed during the live webcast. To hear the webcast presentation again, including the verbal Q&A session, please visit the IndustryWeek Web Events archive at http://www.industryweek.com/webcasts. A recorded version of this webcast will be available through May 5, 2006.

Audience questions are shown in bold italics
Jim Womack's responses ("JPW") are in black text
IndustryWeek responses ("IW") are in red text
Microsoft Business Solutions responses ("MBS") are in blue text

With lean & Six Sigma, cost savings/reduction is a big factor. How does this come into play in lean consumption?

JPW: The added point from "lean consumption" is the customer's time. We believe that most providers today treat customer time as if it is free. The time needed to return the car for repairs or to get one's computer to work properly with one's printer and other software is never counted as a "cost" to the provider, yet is a large burden to the customer. We believe that a bit of attention to ways to reduce the customer's total cost (time plus price) will also reduce the provider's total cost. It's just like quality in the sense that it's free if providers look at the problem in a new way.

It seems to us that creating a consumption-state map would require a very high degree of customer participation. Our experience has been that our customers are unwilling to share this information at that level of detail. What has been your experience? Can you draw any conclusions from our statement that might indicate a systemic problem?

JPW: Dan Jones and I have created many consumption maps by simply walking through the customer's process. It's easy to do for retail customers and not that hard for intermediate customers if you use a bit of imagination. Looking for mountains of detailed information misses the point, which is that most consumption processes perform very poorly and can be diagnosed pretty easily. The hard part is jointly rethinking the consumption process and the provision process so it's a win-win.

As part of lean consumption, do you think that a plant should manufacture a product at a central facility, then complete the product at a satellite plant next to the customer?

JPW: I always have a hard time understanding why the scale of the central plant needs to be so high. In a perfect world, products would be made from start to finish near the customer, at least in the region of sale. But I can't give blanket advice that will fit every circumstance.

From your comments today - it seems that your concept of Consumption is very similar/same as the Six Sigma concept of Voice of the Customer and ensuring you identify the Critical to Quality measures that will meet the customer requirements/expectations. Do you agree? Or do you view it as something different?

JPW: The key point we are trying to add is what "consumption" really is. Is it just a product with given performance at a given quality level at a given price? Or does the customer really want to solve a problem where the product is only the means to the end? In many cases we think it's the latter and we note that providers have been strong on providing better objects but much weaker on the whole sequence of obtaining, installing, maintaining, repairing, upgrading, and recycling the product to solve the customer's problem over an extended period. However, if we are talking about the same product (a solution versus an object) there is no difference in the way Six Sigma and lean thinking approach the voice of the customer.

What do you suggest we do with employees who can't keep up with the new pace brought about by lean (usually the older workers)?

JPW: I never find the actual work pace to be the issue and Lean Thinkers urge implementers not to speed up the pace. Sweating doesn't work, no matter how young and energetic the work force, because people make mistakes when they get tired. The real issues are what Toyota calls "muri" and "mura". "Muri" is overburden by running a process too hard/fast and must be avoided. But at the same time "mura" needs to be avoided which is running an uneven pace caused by a gyrating schedule and breakdowns. Lean thinkers want to smooth (level) the pace from a pacemaker point and run the whole process very smoothly all day every day until a change in overall demand requires changing the rate of output. But this change is made by adding or subtracting workers, not by changing the work pace.

What workers do initially notice about a lean process is that there are no breakdowns and stoppages which many workers have looked forward to as a time to catch their breath. Therefore, the work pace needs to be set at a constant steady pace where everyone can keep up with no stoppages.

What would be your thoughts for materials managers going lean in their supply chains? What are some ideas that you have to achieve this goal in the market today (staying lean and keeping your suppliers thoughts lean)?

IW: You may be interested in attending an upcoming hour-long IndustryWeek-hosted webcast that focuses on this exact topic. "Driving The Lean Supply Chain" will take place on June 2, 2005. Please visit http://www.industryweek.com/webcasts for information.

What is the most effective way to change a traditional manufacturing culture to a Lean culture (i.e. training, kaizen events, communication, etc.)?

JPW: We always say that it's easier to act your way to lean thinking than it is to think your way to lean acting. So we recommend that you simply pick a product family and get started. Draw a value-stream map, envision a future state, assign responsibility for the tasks that need completing to get to your future state and get going. Then, go to the next product family's value stream and do the same thing.

Have you seen applications of lean in software development?

MBS: Lean can be applied to just about any process. The concepts of defining value from the customer's perspective and operating on continuous flow and pull are likely to make sense in creating computer programs.

I am now becoming involved in lean implementation projects -- developing the training, project plans, etc. How can I ensure successful buy-in of lean principles and help others in the organization to truly see the benefit of lean?

JPW: People buy in when they see results. So it's really important that your early projects achieve clear results. This means a clearly identified value stream in its current state, a clear list of the problems that everyone touching the process agrees with, and a clear set of responsibilities for fixing the process so you can achieve your future state. Some organizations need outside help in the form of advisors, some need to hire managers with previous lean success, and others can read books, go to seminars and screw up their courage to do it on their own. I'm always sympathetic to the latter approach because it is how you really learn. The problem often is that senior management believes in "risk taking" but doesn't tolerate any screw-ups, so the subliminal message is to get outside help to protect the internal managers in case everything doesn't go to plan. Another form of muda!

Can you please explain the "Gemba"? Is this a common term or a lean term?

IW: According to the Lean Enterprise Institute (LEI), "gemba" is a Japanese term for "actual place," frequently used for the shop floor or any place where value-creating work actually occurs. The term is often used to stress that real improvement can only take place when there is a shop-floor focus based on direct observation of current conditions where work is done. For example, standardized work cannot be written down at a desk in the engineering office, but must be defined and revised on the gemba. -- This definition is directly from LEI's Lean Lexicon glossary. It is a lean term.

What are TPM, TOC, BPR, TPS?

IW: TPM is Total Productive Maintenance. A comprehensive program to maximize equipment availability in which production operators are trained to perform routine maintenance tasks on a regular basis, while technicians and engineers handle more specialized tasks. The scope of TPM programs includes unscheduled maintenance prevention (through design or selection of easy-to-service equipment), equipment improvements, preventive maintenance, and predictive maintenance (determining when to replace components before they fail).

TOC is Theory of Constraints. The Theory of Constraints methodology of management, developed by Eliyahu M. Goldratt, proposes that in any complex system at any point in time, there is most often only one aspect of that system that is limiting its ability to achieve more of its goal. For that system to attain any significant improvement, that constraint must be identified and the whole system must be managed with it in mind.

BPR is Business Process Reengineering. Self explanatory

TPS is Toyota Production System. Developed by Toyota Motor Corp. to provide best quality, lowest cost and shortest lead time through the elimination of waste.

You many also want to visit http://www.industryweek.com/manufacturing101/glossary.aspx for more manufacturing definitions.

How can you successfully and easily educate the senior managers/executives in process thinking (1/3 of mind as you said). How do you get them to see the value outside of the production floor?

JPW: My approach is simple: Take a walk and participate in drawing a value-stream map of what is really going on today and what it is costing the organization. A few managers just can't see waste. But most have never been educated at all and find a value-stream walk a real eye opener.

What activities can be done to grow Lean culture?

JPW: In my experience, "culture" is an effect, not a cause. The organizations who have successfully applied lean thinking, beginning with Toyota, have gone to the gemba (the place where the work is really done) and gotten started with value-stream analysis. The organizations that haven't successfully applied lean thinking have often spent large amounts of time and money on classroom training exercises designed to instill lean "culture."

US manufacturing has two critical investments: training & education, and technology & equipment. How does lean fit in this investment structure?

JPW: Lean implementation typically requires a lot less capital and hard technology than management was planning to obtain and a lot more hands-on training that management was planning to obtain. It's amazing how many managers still think that an expensive, complex set of new technologies for the direct work and for information management will succeed when processes are poorly defined and many of the activities being automated are pure waste.

It is mentioned, often times, that in order for American industry to fully embrace lean initiatives, crisis needs to strike. Do you agree with this statement? If yes, in your experience, what steps need to be taken in order to self-trigger a crisis?

JPW: There are lots of ways to create a crisis. I worked as an advisor to Boeing Commercial Airplane in the mid-1990s when they signed contracts to build airplanes at a rate their production processes could never support. The whole idea was to force the introduction of lean methods to avoid catastrophe. In fact, the management signing these agreements was completely

incompetent and was fired when the process totally broke down. However…ten years later Boeing has learned an enormous amount from its crisis and is running a vastly leaner operation with moving assembly lines for most of its products. I think the long term success of the company is now much more likely than if there had been no crisis. I urge you to create your own crisis but hope it is one you can mange! Setting low goals and then meeting them with little effort generally leads to no progress in lean implementation in long term.

Describe what you mean about the dangers of the future of Lean?

JPW: The big danger is that it becomes a "program" that everyone is doing as a staff exercise but which no one understands and no one believes in. Then it is just another collection of tools without a context. It inevitably will fail.

Do you think Lean and Six Sigma (+ additional improvement tools) will merge to form an even more business results based initiative? i.e. something more than continuous improvement?

JPW: When I have a bit more time for a talk, I explain that "lean", "six sigma", and all the other programs focusing on process management are largely the same and are complimentary. It's only the packaging efforts of competing consultants that creates the perception of fundamentally different approaches.

What is your definition of availability?

IW: From the American Society for Quality: The ability of a product to be in a state to perform its designated function under stated conditions at a given time.

Is the pursuit of "perfection" sustainable from a lean thinking standpoint? Is Six Sigma a means to that? And at what point is the pursuit of perfection not value added in the eyes of the customer?

JPW: The fundamental objective of process-focused management is to create a perfect process (from concept to launch and from order to delivery) for every product. So the objective of "lean" and "Six Sigma" and every other process focused approach to management is perfection. We won't ever get there but our costs will fall rather than rise as we get closer.

When selecting a new ERP system and considering lean, should companies focus more on "out of the box" functionality or a systems ability to be modified to meet the needs of the business?

MBS: In a lean environment, opaque system functionality tends to do more harm than good. Complex algorithms that no one understands are usually not trusted and therefore not used. Flexibility in business process and IT ability to adapt to support a continuously improving environment is far more important.

For a firm seeking to improve - what comes first? Six Sigma quality or lean implementation?

JPW: Agh! These are all the same thing. You need to start with the value stream for very product, draw a map of its current state, and ask about each step: Is it valuable? Is it capable? Is it available? Is it adequate? Is it flexible? Then ask whether each step flows smoothly to the next but only at the pull of the customer as the process approaches perfection. Doing this simple exercise wraps together everything you need to know about TQM, TPM, TPS, Six Sigma, TOC, etc. So…it all comes together as an analytic process but you will devote the most work to your biggest problems. Sometimes these are capability and availability (which Toyota calls "stability" and which forms the foundation stone of the TPS house) and sometimes they are flow and pull.

What is the difference between Lean, Six Sigma, and Theory of Constraints?

IW: Lean manufacturing focuses on the elimination of waste, while Six Sigma is a quality-based initiative, and Theory of Constraints is concerned with bottlenecks in processes.

Lean manufacturing is an initiative focused on eliminating all waste in manufacturing processes. Principles of lean include zero waiting time, zero inventory, scheduling (internal customer pull instead of push system), batch to flow (cut batch sizes), line balancing and cutting actual process times.

Six Sigma is a program that originated at Motorola where the objective is customer satisfaction through continuous improvement in quality. Six Sigma means products and processes will experience only 3.4 defects per million opportunities or 99.99966% good.

The Theory of Constraints methodology of management, developed by Eliyahu M. Goldratt, proposes that in any complex system at any point in time, there is most often only one aspect of that system that is limiting its ability to achieve more of its goal. For that system to attain any significant improvement, that constraint must be identified and the whole system must be managed with it in mind.

Are Theory Of Constraints and Lean contradictory or opposing, since one recommends inventory buffer, and the latter preaches flow?

JPW: Theory of Constraints assumes that most value streams will need to share production assets and that these assets are large and hard to "right size." If this is true you may well have bottleneck problems and need to conduct bottleneck analysis. Toyota tries to separate value streams so they use dedicated assets sized to the same capacity. In these situations there is usually no bottleneck problem and TOC is less relevant.

How Lean is the average American business?

JPW: Just ask yourself in looking at any business how much of the current work is value creating, how much is incidental but currently necessary, and how much is pure waste that could be eliminated with a rigorous value-stream analysis. I think you will find that a large fraction of current activities are waste and that Toyota's activities have somewhat less waste. Thus, we are all a long ways from lean.

IW: That's hard to say because the term "lean" is frequently tossed around rather loosely. Certainly many manufacturers are using elements of lean, but it likely is the rare company that truly employs lean across its entire enterprise. Dell Inc. is one manufacturer that is well-known as running its supply chain in a very lean fashion.

For benchmarking data on how widely manufacturers are employing elements of lean, you may want to peruse the IndustryWeek.com Website, which contains articles pertaining to both the IW/MPI Census of Manufacturers and the IW Best Plants program, both of which collect "lean" benchmarking data. For a more comprehensive set of benchmarking data, consider purchasing the IW/MPI Benchmarking Toolkit database or the IW Best Plants Benchmarking Database, which can be found at http://www.industryweek.com/benchmarking

Are there resources where I can find lean ideas for specific industries?

IW: Not to be repetitive, but the IW/MPI Census of Manufacturers database allows users to drill into the benchmarking data by industry. Other sources may include the trade associations of the specific organizations. More info can be found at http://www.industryweek.com/benchmarking

You mention that Toyota has chronic over capacity. Is this a good pursuit for Lean to have ample capacity at all points in the value stream?

JPW: Perhaps I misspoke. Toyota never operates a process unless there is actual customer demand because in their view overproduction is the worst form of waste. This means that observers of their operations sometimes conclude they have over capacity because some equipment is able to run but is not running. Certainly they do not wish to have chronic overcapacity and they try to minimize overcapacity by buying equipment in small increments of capacity. Given the choice of ten small machines or one big machine to make a given item they will try to find a way to reduce the cost per part on the small machines so that it is nearly the same as for the big machine and think they will be better off because the big machine can only achieve low cost per part when demand exactly matches the machine's capacity. In life, forecasts of demand are usually wrong and often wildly wrong, so the lower cost approach over a long period is generally to have many smaller machines that only need to be bought and used as demand is verified.

What are some of the US based companies who best demonstrate a Lean mentality?

JPW: Danaher is one of my favorites, but they are very low key and hard to visit. Delphi has done a brilliant job of taking out costs through lean over the past seven years but gets no credit in the media because they have had to give all the cost savings away to GM. Lockheed has done a nice job in aerospace as had Goodrich, starting in its nacelle business in California many years ago. Almost all auto parts makers have at least some successes to show with lean. Jefferson Pilot has done a great job of leaning insurance policy writing and claims processing. Etc. So there are many, many examples.

Which are the best lean examples in Mexico (Industry, company?)

IW: Some facilities that have been IndustryWeek Best Plants winners in Mexico and exemplify lean techniques are:

- Delphi Rimir (Matamoros, Tamaulipas, Mexico)
  http://www.industryweek.com/research/bestplants/bp_profiles.asp?Input=107
- dj Orthopedics de Mexico (S.A. de C.V., Tijuana, Mexico)
  http://www.industryweek.com/research/bestplants/bp_profiles.asp?Input=155
- Textron Automotive Co. de Mexico SA de CV (Saltillo, Coahuila, Mexico)
  http://www.industryweek.com/research/bestplants/bp_profiles.asp?Input=124
- Kodak de Mexico, Single-Use Camera Div. (Guadalajara, Jalisco, Mexico)
  http://www.industryweek.com/research/bestplants/bp_profiles.asp?Input=120

What aspects are most lacking to achieve Lean Product Development?

JPW: Practically everything is lacking to achieve lean product development including understanding what it is. My late colleague Al Ward has written a very helpful guide to lean product development, explaining the critical role of the chief engineer, the need for trade off analysis to prevent endless re-invention, the need for concurrent engineering of alternative designs to avoid premature selection of the "right" approach, and the need for process mapping of every step in the development process. We at LEI hope to publish this sometime soon.

How do you deal with wide variability in demand?

JPW: There are two kinds of demand: "Real" demand based on the actual need of the customer and "created" demand caused by the dynamics of the selling and production system. Real demand is….real. Providers must respond to it. And if it has a good bit of variation the only approach is either to provide buffer stocks or to install more capacity than needed on average. (The former is usually a better approach.) Created demand is…created. For example, by bonus systems motivating sales staff to make the month or make the quarter and producing a wave of orders at the end of the reporting period. A better approach to these problems is to revamp the bonuses so they are rolling averages rather that don't encourage big batches of orders.

What about Lean in the transactional functions of a manufacturing? After value-stream mapping, how do you start improving these processes (with or without technology)?

JPW: Draw the map and ask about each step: Is it valuable? Is it capable? Is it available? Is it adequate? Is it flexible? And do the steps flow one to the next at the pull of the downstream customer as the performance of the whole process heads toward perfection? Once you've asked these questions you know where to start. Then don't start until you've reached your envisioned future state!

Is there a major lean movement in the healthcare industry?

IW: Lean healthcare is a movement that is gaining ground. For more information please refer to these IndustryWeek articles and columns, each written by IW editor-in-chief Patricia Panchak:

- Curing The Health-Care Costs Blues
  http://www.industryweek.com/ReadArticle.aspx?ArticleID=2311
- Lean Health Care? It Works!
  http://www.industryweek.com/ReadArticle.aspx?ArticleID=1331

- Lean Health Care Success Stories
  http://www.industryweek.com/ReadArticle.aspx?ArticleID=1332

What are your views regarding Lean techniques/roadmap in a process industry (steel, etc. - high volume/low variety) vs. discrete manufacturing (Widget manufacturing - low volume/high variety)? Where would you start and what are the differences?

JPW: The key thought process needed in any batch industry is "every item every interval" where the objective is to make the interval smaller and smaller. Just starting with every item (in the active catalogue) every month may be a big leap that forces the process engineers to think about flexibility. Then as you move toward every product every week and then every day you will find yourself dividing your products into high and low value and creating separate product processes for each. Ian Glenday at the Lean Enterprise Academy in the UK (info@leanuk.org) is the best authority I know on how to do this.

What are your thoughts on the application of lean concepts (or Value Stream Management) to administrative areas? The Lean Office seems to be much less emphasized than manufacturing or consumption areas.

JPW: We are seeing an enormous surge of interest in the lean office. In fact we are running a conference on this topic in Boston June 8-10. You can check the details by clicking on Summits at http://www.lean.org or by going directly to http://www.lean.org/Events/Index.cfm?TrainingOrSummit=Summit

What company(s) is using "Lean Accounting" today?

IW: You might want to check out the IndustryWeek.com Website, which has several articles about lean accounting. Among companies that employ it are Southco, Marquip Ward United and Parker Hannifin, at least on a limited basis. Several books address the topic, including:
Practical Lean Accounting, Brian Maskell and Bruce Baggaley, Productivity Press (2004).
Real Numbers, Jean E. Cunningham and Orest J. Fiume, Managing Times Press (2003).
Who's Counting, Jerrold M. Solomon, WCM Associates (2003).

What role does software such as MRP and ERP systems play in the Lean Enterprise?

JPW: Lean thinkers want to create value-creating processes that need as little information as possible to get the job done. By contrast, most IT vendors want to create systems that need enormous amounts of information to get the job done. It's a fundamental philosophic difference between those who believe in reflexive process control, with each downstream process telling the next upstream process what it needs next versus cognitive process control in which a central brain with lots of sensors and feedback loops is able to give directions to every step of the process as to what to do next. Managers have loved the latter in the past 50 years because it gives the illusion of control. We favor the former because it provides actual control at a much lower cost.

MBS: MRP and ERP systems can play a valuable role if used in the right context to solve the right problems. The planning capabilities in most systems can help a lean organization plan

capacities to make their process available, adequate, and flexible. The key is to use these plans for planning purposes, not to actually produce product.

How do you see Lean meshing with traditional ERP systems. Can they co-exist?

MBS: ERP systems can play a valuable role in planning, but should not be used to manage lean production.

It's tempting for large manufacturers to focus on their suppliers to "become lean" and therefore figure out ways to lower total cost of goods and services. Should the focus be on internal processes or on suppliers, or on both?

JPW: It's important to remember that every customer and its suppliers share their key value-creating processes (concept to launch and order to delivery). To the extent that they map these processes together and seek to jointly optimize them to create win-wins, they will be moving toward a lean supply chain. To the extent that the customer simply squeezes by forcing price-downs without removing waste from the shared process, the relationship is moving steadily backwards toward mass production.

Will Lean eliminate distributors from the supply chain?

JPW: Who knows? Distributors spend most of their time running warehouses for slower moving discrete parts. It would be great to think that these will not be needed in a lean world but even Toyota in Japan is still running service parts warehouses. They are just run internally rather than as independent distributors. So my main advice to distributors is to learn how to run lean warehouses supported by lean logistics.

What are the best books out today to get a basic knowledge of Lean?

IW: The Lean Enterprise Institute has several workbooks on lean, two of which recently received Shingo research prizes. And Womack authored the well-known "The Machine That Changed The World."

Also consider "The Toyota Way: 14 Management Principles From The World's Greatest Manufacturer" by Jeffrey Liker.

Productivity Press, http://www.productivitypress.com, has a wealth of books on lean.

For more information
IndustryWeek: http://www.industryweek.com
James P. Womack, Lean Enterprise Institute: http://www.lean.org
Microsoft Business Solutions: http://www.microsoft.com/BusinessSolutions