

Lean Enterprise Academy



Jim Womack e-letter –January 2006

Just in Time, Just in Case, and Just Plain Wrong

Dear Lean Community Member

I started my e-letters immediately after the terror attacks of September 11, 2001, as a response to the many commentators asserting that JIT could no longer work due to the risk of disruption in supply chains. They argued that large inventories were needed everywhere along value streams to permit rapid response to chaotic conditions.

I knew that this was a complete misunderstanding of the situation. Counting on finished units and parts lying around at many locations to somehow respond to disruptions in transport links or at key production facilities would be ineffectual as well as harmful to production organizations and society. Hence my first e-letter, "Nonsense About JIT." (I hope you are aware that this and all 50 of my subsequent e-letters are available at www.lean.org in the Archives section under the Community tab.)

Since that time I've been keeping a media file on reasons why JIT supposedly can't work in today's world. The latest reason comes from the January 12 *Wall Street Journal* where a front-page article carries the headline "Just-In-Time Inventories Make U.S. Vulnerable to a Pandemic." The key sentence in the article describes the problem as follows: "Most fundamentally, the widely embraced 'just-in-time' business practice – which attempts to cut costs and improve quality by reducing inventory stockpiles and delivering products as needed – is at odds with the logic of 'just in case' that promotes stockpiling drugs, government intervention, and overall preparedness."

So, if anyone was foolish enough to think JIT was a good idea after 9/11, surely they will come to their senses at the prospect of avian flu! Let me take a minute to see if I can set the record straight.

First, what is JIT? It's a simple idea first formulated by Kiichiro Toyota at Toyota in the late 1930s. Each step in a value stream should pull precisely what it currently needs from the previous step in the value stream. This "pull" should be the signal for the previous step to immediately make new items to exactly replace those just withdrawn. The idea is to replace complex scheduling systems -- depending on centralized accumulation of information and complicated formulae -- with simple, intuitive systems that work much better while dramatically reducing the amount of inventories along a value stream.

Toyota implemented its pull system by means of simple rules. One was that between every step in a value stream it is critical to accurately



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calculate **standard inventory**. This is the amount of material that must be in place so that the downstream customer is never disappointed. This inventory consists of three elements: Buffer stock, safety stock, and shipping stock:

Buffer stock is goods already finished by a step that are kept on hand to deal with sudden spikes in demand from the downstream customer.

Safety stock is finished items or raw materials that are maintained to protect the output of the process if upstream suppliers fail to respond to the pull signal in a timely manner or if the process itself encounters problems (e.g., bad quality, broken equipment).

Shipping stock is goods being built up for the next shipment.

A second critical rule is to select one point along a value stream as the pacemaker step and to add additional buffer stock there to deal with normal fluctuations in consumer demand. *This buffer is sized to deal with all reasonable variations in commercial demand, so the customer is never disappointed.* By doing this, every step back upstream from this "pacemaker" can operate smoothly with leveled demand for extended periods. This, of course, is heijunka. When done properly, leveling demand largely eliminates the need for the buffer stocks between each step and reduces total inventories along the value stream dramatically.

So what's the problem and why do commentators keep suggesting that JIT can't work in a chaotic world? The problem is that *severe disruptions driven by geo-political events and natural-biological catastrophes must be dealt with outside the framework of JIT.* Only muddled thinking results when normal commerce and extreme emergencies are combined.

How should these issues be uncoupled? Let's look at a specific issue with avian flu, where a major worry is the shortage of ventilators to help victims breathe until their strength returns. Governments need to make a decision now on just how many spare units -- completed and ready to run -- need to be kept on hand to deal with a sudden, enormous surge in demand. (The *Journal* article states that the U.S. government does have a stockpile of 4,500 but that tens of thousands of additional units may be needed very quickly from an industry that currently produces only a few thousand units per year.)

These goods should be held separate from normal commercial inventories, under government control, and called by their proper name: **Emergency stocks**. These are simply a physical version of an insurance policy, except that the policy is for society rather than an individual.

Proposing instead that old-fashioned just-in-case inventories located along the ventilator value stream could solve the problem is naïve: The real

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problem is the lack of capacity to assemble the parts quickly into finished units. And thinking that companies on their own will maintain a buffer stock of finished units adequate for a true emergency is equally naïve. They would go bankrupt if they tried.

(Governments also need to decide how to distribute the emergency stocks when needed, because normal market price allocation can't work in a panic. Looking at the bright side, as the Katrina hurricane emergency showed, modern logistics firms like FedEx and DHL are capable of delivering needed items quickly in chaotic conditions, even when government efforts falter.)

The key point to note is that with emergency stocks in place, as we should all hope they will be, JIT works just fine. It helps production systems deal with "normal" variations in commercial demand at the lowest cost with the highest quality with maximum responsiveness to the customer's desire. Indeed, the cost savings from JIT – which we've only started to achieve across the entire economy – are a good way for society to afford the cost of emergency stocks.

So, please, whenever you hear well-intentioned but muddle-headed people attacking JIT when they really should be confronting our lack of emergency stocks, do what you can to set the record straight.

Best regards

Jim Womack

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